Soil-Use Interpretations for Douglas County, Oregon

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FOREWORD

Preparation of this report and related work was carried out with financial support of the Douglas County Planning Commission and Health Office, and Project 476 of the Oregon Agricultural Experiment Station. Soil Survey information was extracted mainly from "Umpqua Drainage Basin General Soil Map Report with Irrigable Areas" published as Appendix I-16 of "Oregon's Long-Range Requirements for Water" by the Oregon State Water Resources Board. Criteria for rating soils according to their limitations or suitabilities for selected uses were those currently being used in the National Cooperative Soil Survey Program.

Primary attention was given to the development of soil-use interpretations of concern to land-use planning and to health and sanitation problems. Percolation tests, used in evaluating septic tank drainfield suitability, were made at ten representative sites. Drainfield areas with histories of failure were examined in the field with sanitarians of the Douglas County Health Office. A set of detailed soil maps was prepared at the scale of 1 inch = 1500 feet (3.52 inches = 1 mile) on photomaps covering much of the area being developed for residential purposes. Full-scale monliths (undisturbed soil profiles) for display and educational purposes were obtained for ten representative soils.

Cooperation received from the North Douglas Soil and Water Conservation District Office and the Douglas County Cooperative Extension Service Office is gratefully acknowledged.

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SOIL-USE INTERPRETATIONS FOR

DOUGLAS COUNTY, OREGON

James A. Pomerening and Gerald H. Simonson

I. Introduction

This report presents soil-use interpretations related to farm and nonfarm uses of soils in Douglas County, Oregon. The interpretations are those primarily needed for land-use planning and those related to health and sanitation problems. Selected information has been included to assist builders and engineers.

The soil-use interpretations can be related to mapping units of either the general soil map appearing in the Umpqua Drainage Basin general soil map report (4)[1/] or to the detailed soil survey field sheets which are available for limited parts of the county in Soil and Water Conservation district offices at Sutherlin and Reedsport. Soil characteristics of special significance to many of the interpretations are included in Table 1.

How To Use This Report

The soil map shows delineated soil bodies with a symbol identifying each soil. The symbol identifies the soil series and the slope gradient class. For example, in the symbol Dx4, the Dx stands for Dixonville and the 4 indicates a slope gradient ranging from 12 to 20 percent. In the case of slopes from 0 to 3 percent, the series symbol appears without a slope symbol and the slope class is understood to be 1. A legend relating soil symbols to mapping unit names appears in the next section. Roman numerals are used to identify soil series in hilly or mountainous areas where the soil survey information is based on a reconnaissance type of survey.

Determining Soil Characteristics and Soil-Use Interpretations

Soil characteristics and soil-use interpretations of an area can be determined by the following steps:

1. Locate the area on the map.
2. Determine the symbol of the soil body.
3. Refer to Tables 1 to 10 for determining the interpretations.

1/ Numbers in parentheses refer to Bibliography, page 38.

Guidelines for preparing single-purpose interpretative maps and other ways of presenting soil survey interpretations may be found in "Soil Surveys and Land Use Planning" (2).

II. Map Legend and Interpretive Maps

This legend is for the general soil map of the Umpqua Drainage Basin (4) and the detailed maps prepared on the photomaps for this project. Legends for the unpublished detailed soil survey field sheets prepared by the Soil Conservation Service are available in the Soil and Water Conservation district offices in Sutherlin and Reedsport.

Map symbol	Soil series or land type	Percent slope
A	Active dune land	0-70+
An	Anlauf	0-3
An2	Anlauf	3-7
Bs	Bashaw	0-3
Bs2	Bashaw	3-7
Bs3	Bashaw	7-12
Bo3	Boomer	7-12
Bo4	Boomer	12-20
Bo5	Boomer	20-40
Bo6	Boomer	40-70+
Br	Brand	0-3
Bn	Brenner	0-3
Cp	Calapooya	0-3
Ca	Camas	0-3
Ca2	Camas	3-7
Ch	Chehalis	0-3
Ch2	Chehalis	3-7
Cl2	Climax	3-7
Cl3	Climax	7-12
Cl4	Climax	12-20
Ct	Cloquato	0-3
Cq	Coquille	0-3
Co5	Cornutt	20-40
Di2	Dillard	3-7
Di3	Dillard	7-12
Di4	Dillard	12-20
Di5	Dillard	20-40
Di6	Dillard	40-70+
Dx3	Dixonville	7-12
Dx4	Dixonville	12-20
Dx5	Dixonville	20-40
Dx6	Dixonville	40-70+
Do	Dole	0-3
Do2	Dole	3-7
Do3	Dole	7-12
Do4	Dole	12-20
Dr	Drain	0-3
Ga	Gardiner	0-3

Map symbol	Soil series or land type	Percent slope
He	Hedden	0-3
He2	Hedden	3-7
He3	Hedden	7-12
He4	Hedden	12-20
Jy3	Jory	7-12
Jy4	Jory	12-20
Jy5	Jory	20-40
Jy6	Jory	40-70+
Jo5	Josephine	20-40
Jo6	Josephine	40-70+
Ke	Kerby	0-3
Kn2	Knappa	3-7
Kn3	Knappa	7-12
Me	Mehl	0-3
Me2	Mehl	3-7
Me3	Mehl	7-12
Nh	Nehalem	0-3
Nk3	Nekia	7-12
Nk4	Nekia	12-20
Nk5	Nekia	20-40
Nk6	Nekia	40-70+
Ns	Nestucca	0-3
Ne	Newberg	0-3
No2	(No)*	3-7
No3	(No)*	7-12
No4	(No)*	12-20
No5	(No)*	20-40
No6	(No)*	40-70+
Ok	Oakland	0-3
Ok2	Oakland	3-7
Ok3	Oakland	7-12
Ol2	Olalla	3-7
Ol3	Olalla	7-12
Ol4	Olalla	12-20
Os	O'Shea	0-3
Os2	O'Shea	3-7
Os3	O'Shea	7-12
Pa	Packard	0-3
Pa2	Packard	3-7
Pd2	Pollard	3-7
Pd3	Pollard	7-12
RB	Riverbank	12-70+
RW	Riverwash	0-12
R	Rockland	20-70+
Ru2	Ruch	3-7
Ru3	Ruch	7-12
Sa	Salem	0-3
Sp3	(Sp)*	7-12
Sp4	(Sp)*	12-20
Sp5	(Sp)*	20-40

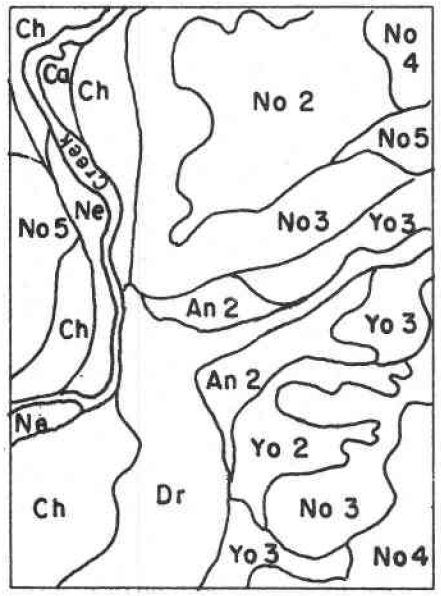
* Proposed unnamed series.

Map symbol	Soil series or land type	Percent slope
Sp6	(Sp)*	40-70+
St	(St)*	0-3
Tl	(Tl)*	0-3
Wi2	Willakenzie	3-7
Wi3	Willakenzie	7-12
Wi4	Willakenzie	12-20
Wi5	Willakenzie	20-40
Wi6	Willakenzie	40-70+
Yo	Yoncalla	0-3
Yo2	Yoncalla	3-7
Yo3	Yoncalla	7-12
Yo4	Yoncalla	12-20
Reconnaissance Units, Possible Series		
I4	Josephine, Boomer	12-20
I5	Josephine, Boomer	20-40
I6	Josephine, Boomer	40-70+
II6	Siskiyou	40-70+
III3	Peel	7-12
III4	Peel	12-20
III5	Peel	20-40
III6	Peel	40-70+
IV4	Willakenzie, (Sp)*	12-20
IV5	Willakenzie, (Sp)*	20-40
V5	Dixonville	20-40
V6	Dixonville	40-70+
VI4	Honeygrove, Apt	12-20
VI5	Honeygrove, Apt	20-40
VI6	Honeygrove, Apt	40-70+
VIII5	Blachly, Slickrock	20-40
VIII6	Blachly, Slickrock	40-70+
IX5	Astoria, Trask	20-40
IX6	Astoria, Trask	40-70+
X5	Lint, Netarts	20-40

* Proposed unnamed series.

Single-purpose interpretative maps can be developed from the soil maps and the soil interpretations in this report. Figure 1 shows a portion of a detailed soil map with examples of interpretive maps indicating the relative suitability or limitations of each soil area for farming, building sites, foundations, and septic tank filter fields.

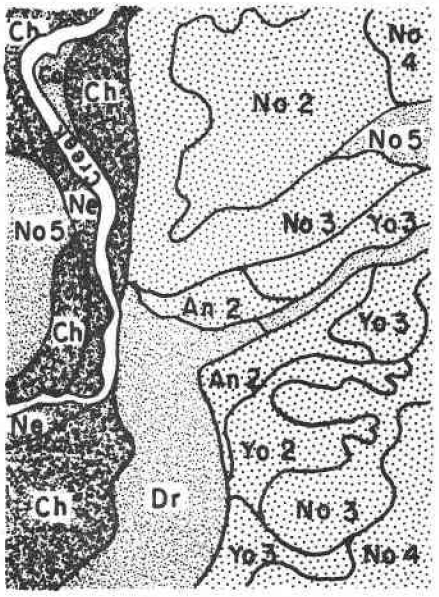
A small-scale single-purpose map of Douglas County showing the relative degree of soil limitations for septic tank filter fields was developed from the Umpqua Basin general soil map (4). This interpretive map has been printed as part of the Douglas County comprehensive sewer and water study.



Soil map

0 1/4 1/2 3/4

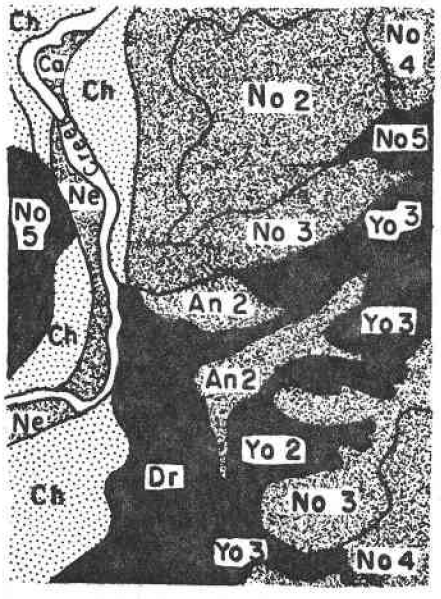
Scale in miles



Suitability for farming

Good Poor

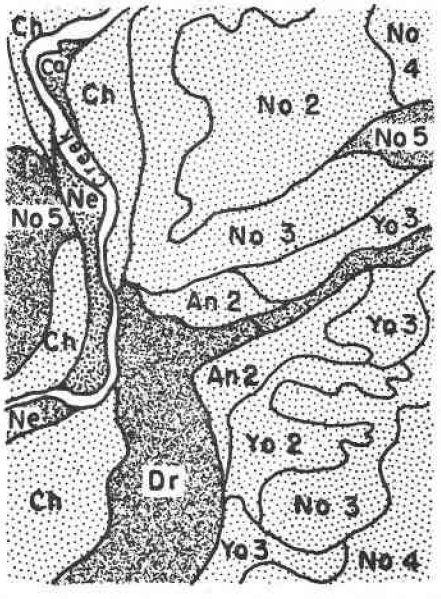
Fair



Limitation for septic tank drainfields

Slight Severe

Moderate Very severe



Limitation for building locations

Slight Severe

Moderate

Figure 1. Detailed soil map with examples of single-purpose interpretative maps.

Table 1. Soil Characteristics and Qualities

Soil series or land type	Map symbol	Drainage class	Permeability	AWHC[1]	Effective root depth (inches)	Shrink-swell potential subsoil	Soil texture, USDA[2] Surface soil	Soil texture, USDA[2] Subsoil	Engineering classifications AASHO Surface soil	Engineering classifications AASHO Subsoil	Engineering classifications Unified Surface soil	Engineering classifications Unified Subsoil	Coarse fragments subsoil (percent)
Active dune land	A	Excess.	Rapid	V.low	60	Low	sand	sand	A-3	A-3	SP	SP	0
Anlauf	An	S.poor	M.slow	High	40-60	Medium	si.c.loam	si.clay	A-5	A-5	ML	ML	0-20
Apt	VI	Good	M.slow	Mod.	40-60	Medium	clay	clay	A-7-5(8)	A-5(3)	MH	SM	0-20
Astoria	IX	Good	Mod.	High	40-60	Low	si.c.loam	si.clay	A-4(8)	A-7-5(11)	ML	MH	0-20
Bashaw	Bs	Poor	V.slow	Mod.	40-60	High	clay	clay	A-7-5	A-7-5	CH	CH	0-20
Blachly	VIII	Good	M.slow	High	40-60	Medium	clay loam	clay	A-4(1)	A-5(8)	SM	MH	0-20
Boomer	Bo,I	Good	M.slow	Mod.	20-40	Low	clay loam	gr.c.loam	A-4	A-4	ML	ML	20-50
Brand	Br	Poor	Slow	High	40-60	Medium	silt loam	si.clay	A-5	A-5	ML	MH	0-20
Brenner	Bn	Poor	Slow	High	40-60	Medium	silt loam	si.clay	A-5	A-7-5	ML	MH	0-20
Calapooya	Cp	S.poor	M.slow	Low	20-40	Low	gr.loam	gr.clay	A-2-4	A-2-7	GM	GC	20-50
Camas	Ca	Excess.	Rapid	V.low	10-20	Low	gr.l.sand	v.gr.sand	A-2-4	A-1-a	SM	GP	50-90
Chehalis	Ch	Good	Mod.	High	40-60	Medium	si.c.loam	si.c.loam	A-6	A-7-5	ML	CL	0-20
Climax	Cl	Good	V.slow	Mod.	20-40	High	clay	clay	A-7-6	A-7-6	CH	CH	0-20
Cloquato	Ct	Good	Mod.	High	40-60	Low	silt loam	silt loam	A-4(8)	A-4(8)	ML	ML	0-20
Coquille	Cq	V.poor	V.slow	Mod.	20-40	Medium	silt loam	si. clay	A-5	A-7-5	ML	MH	0-20
Cornutt	Co	Good	Slow	Mod.	40-60	Medium	clay	clay	A-6	A-5	ML	ML	20-50
Dillard	Di	Good	Slow	Mod.	20-40	Medium	clay loam	clay	A-4	A-5	ML	ML	0-50
Dixonville	Dx,V	Good	M.slow	Low	20-40	High	si.c.loam	si.clay	A-7	A-7	CL	CH	0-50
Dole	Do	Good	M.slow	Mod.	20-40	Low	loam	gr.clay	A-4	A-2-7	ML	GC	20-50
Drain	Dr	Poor	V.slow	Mod.	40-60	High	si.c.loam	clay	A-5	A-7-6	ML	CH	0-20
Gardiner	Ga	S.excess.	Rapid	Low	40-60	Low	silt loam	l.sand	A-2-4	A-1-b	SM	SP	0-20
Hedden	He	Good	M.slow	High	40-60	Medium	silt loam	clay loam	A-5	A-5	ML	ML	0-20
Honeygrove	VI	Good	M.slow	High	40-60	Medium	clay	clay	A-4(4)	A-5(10)	ML	MH	0-20
Jory	Jy	Good	M.slow	High	40-60	Medium	clay	clay	A-7-5(6)	A-7-6(10)	ML	ML	0-20
Josephine	Jo,I	Good	Mod.	Mod.	20-40	Low	loam	clay loam	A-4	A-5	ML	ML	20-50
Kerby	Ke	Good	Mod.	High	40-60	Low	loam	clay loam	A-4	A-4	ML	ML	0-20
Knappa	Kn	Good	Mod.	High	40-60	Low	silt loam	si.c.loam	A-5	A-5	ML	ML	0-20
Lint	X	Good	Mod.	High	40-60	Medium	si.c.loam	si. clay	A-5	A-7-5	ML	MH	0-20
Mehl	Me	S.poor	Slow	Mod.	40-60	Medium	silt loam	clay loam	A-5	A-5	ML	ML	0-20
Nehalem	Nh	Good	Mod.	High	40-60	Low	silt loam	si.c.loam	A-5	A-4	ML	ML	0-20
Nekia	Nk	Good	M.slow	Mod.	20-40	Medium	clay	clay	A-6(9)	A-5(8)	ML	ML	20-50
Nestucca	Ns	S.poor	Mod.	High	40-60	Low	silt loam	si.c.loam	A-5	A-4	ML	ML	0-20

Table 1. (Cont.) Soil Characteristics and Qualities

Soil series or land type	Map symbol	Drainage class	Permeability	AWHC[1]	Effective root depth (inches)	Shrink-swell potential subsoil	Soil texture, USDA[2]		Engineering classifications AASHO		Engineering classifications Unified		Coarse fragments subsoil (percent)
							Surface soil	Subsoil	Surface soil	Subsoil	Surface soil	Subsoil	
Netarts	X	S.excess.	Rapid	Low	40-60	Low	l.f.sand	fine sand	A-1-b	A-1-b	SP	SP	0-20
Newberg	Ne	S.excess.	M.rapid	Mod.	40-60	Low	silt loam	silt loam	A-4	A-2-4	SM	SM	0-20
(No)*	No	Good	Mod.	Low	20-40	Low	silt loam	si.c.loam	A-4	A-4	ML	ML-CL	0-20
Oakland	Ok	Good	M.slow	High	40-60	Medium	silt loam	si.c.loam	A-5	A-4	ML	ML	0-20
Olalla	Ol	M.good	Slow	Low	20-40	Low	gr.c.loam	gr.clay	A-2-7	A-2-7	GM	GC	20-50
O'Shea	Os	Good	M.slow	Mod.	40-60	Low	clay loam	gr.clay	A-5	A-2-7	ML	GC	20-50
Packard	Pa	Good	Mod.	Mod.	40-60	Low	loam	s.c.loam	A-4	A-4	ML	CL	0-20
Peel	III	M.good	V.slow	Low	10-40	High	clay	clay	A-7-6	A-7-6	CH	CH	20-50
Pollard	Pd	Good	M.slow	High	40-60	Medium	clay loam	clay	A-5	A-7-5	ML	CL	0-20
Riverbank	RB	Good	Variable	Vari.	40-60	Variable	Variable	Variable	--	--	--	--	0-20
Riverwash	RW	Excess.	Rapid	V.low	0-60	Low	gravel	gravel	A-1-a	A-1-a	GW	GW	50-90
Rockland	R	Variable	Variable	V.low	0-20	Low	Variable	Variable	--	--	--	--	50-90
Ruch	Ru	Good	M.slow	High	40-60+	Medium	loam	c.loam	A-4	A-6	ML	ML	0-20
Salem	Sa	Good	Mod.	Mod.	20-40	Low	gr.si.loam	gr.c.loam	A-6(8)	A-2	ML	GC	50-90
Siskiyou	II	Good	Rapid	V.low	20-40	Low	gr.s.loam	gr.s.loam	A-2-4	A-2-4	SM	SM	20-50
Slickrock	VIII	Good	M.slow	High	40-60	Low	gr.loam	gr.c.loam	A-5(1)	A-5(1)	SM	SM	20-50
(Sp)*	Sp,IV	Good	M.slow	Mod.	20-40	Low	loam	clay loam	A-5	A-5	ML	ML	20-50
(St)*	St	S.poor	Mod.	High	40-60	Medium	silt loam	si.c.loam	A-5	A-4	ML	ML	0-20
(Tl)*	Tl	S.excess.	Rapid	Low	20-40	Low	l.sand	l.sand	A-1-b	A-1-b	SP	SP	0-20
Trask	IX	Good	M.rapid	Low	20-40	Low	st.loam	st.loam	A-4	A-4	SM	SM	50-90
Willakenzie	Wi,IV	Good	M.slow	Mod.	20-40	Low	si.c.loam	si.c.loam	A-5	A-6	ML	ML	20-50
Yoncalla	Yo	S.poor	V.slow	Mod.	20-40	Medium	silt loam	clay	A-4	A-7	ML	MH-CH	0-20

* Unnamed proposed series.

[1] Available water-holding capacity.

[2] s = sandy, si = silty, l = loamy, c = clay, gr = gravelly, st = stony, f = fine, v = very.

III. Soil Characteristics and Qualities

Some soil properties and qualities that are of importance in making the soil-use interpretations appearing in this report are given in Table 1 for each soil series or miscellaneous land type. More detailed soil information may be found in the Umpqua Drainage Basin general soil map report (4). The properties and qualities appearing in Table 1 are described in the following paragraphs.

Drainage Class

Drainage classes indicate the degree of wetness under natural conditions or the natural removal of water from the large soil pores with respect to the addition of water. Well drained soils (soils with good drainage) are almost never saturated with water within the root zone. Poorly drained soils have a water table at or near the surface for a considerable part of the year. Moderately well drained and somewhat poorly drained soils are intermediate. Excessively drained soils are very porous and drain even faster than well drained soils.

Soil drainage class can be inferred from the soil color pattern. Gray or dull colors generally indicate reducing conditions caused by saturation with water for extended periods. A mottled color pattern consisting of bright reddish or yellowish specks and dull gray specks indicates shorter durations of saturation of a fluctuating water table. Uniform bright colors suggest good natural drainage.

Most uses of soils are affected by their natural drainage or degree of impeded drainage. For purposes of this report it might be well to emphasize the importance of these factors to the functioning of septic tank drainfields. Drainfields can only function properly in soils that are not saturated naturally. Therefore, they will generally fail in soils with impeded drainage during the wet winter months. The duration of improper discharge of effluent will generally increase as the degree of impeded soil drainage increases.

Percolation tests performed during the dry summer months may not show the limitation imposed by the natural drainage class because it is very difficult to artificially saturate the sphere of soil around the auger hole. Therefore, persons evaluating sites for prospective drainfields should learn to recognize the soil color patterns associated with natural impeded drainage.

Permeability

Soil permeability is that quality of soil that enables it to transmit water or air. It is measured in terms of rate of flow of water through a unit cross-section of saturated soil per unit time. Six classes of permeability are recognized. Permeability for the whole soil is determined by the least permeable layer.

Descriptive term	Rate in inches per hour
Very slow	Less than 0.06
Slow	0.06 to 0.20
Moderately slow	0.20 to 0.63
Moderate	0.63 to 2.00
Moderately rapid	2.00 to 6.30
Rapid	6.20 to 20.00

The design of drainfields is closely related to soil permeability. As the permeability rate decreases, the size of the drainfield must be increased. Generally, conventional drainfields will not be feasible in soils with very slow permeabilities. Soils with a slow or moderately slow permeability have a severe limitation for septic tank drainfields. Soils with a rapid permeability may create a groundwater pollution hazard.

Soil scientists usually infer soil permeability from an evaluation of soil texture, soil structure, and size and continuity of pores. Considerable experience is required to learn to distinguish between every class, but a careful observer can quickly learn to distinguish soils with moderate to rapid permeabilities from soils that have moderately slow to very slow permeabilities.

Available Water-Holding Capacity (AWHC)

Available water-holding capacity refers to the total quantity of water available for plant growth that is stored in the effective root zone or the upper 60 inches of the soil profile at field capacity. It is largely dependent upon the effective depth, texture, porosity, organic matter content, and coarse-fragment content. The following five classes are recognized:

Descriptive term	Available water in inches
Very high	More than 12
High	9 to 12
Moderate	6 to 9
Low	3 to 6
Very low	Less than 3

Effective Root Zone

The effective root zone consists of either the upper 60 inches of soil or the usable soil above the layer that restricts root growth and water movement that is less than 60 inches deep. The effective root zone may be thinner than the soil profile if root penetration is restricted by a claypan or clean gravel and sand layers. Recognized class names for segments of the depth range are as follows:

Descriptive term	Depth in inches
Very shallow	0-10
Shallow	10-20
Moderately deep	20-40
Deep	40-60

Upland soils with an effective depth of less than 40 inches to bedrock generally have a severe limitation for septic tank drainfields.

Shrink-Swell Potential

Ratings for shrink-swell potential indicate in relative terms the soil volume change to be expected with changes in moisture content of a soil. Ratings are low, medium,and high. In general, soils that

contain large amounts of sand and silt and small amounts of plastic clay have a low shrink-swell potential and soils that contain large amounts of plastic clay have a high shrink-swell potential. Shrink-swell potential is an important consideration when using the soil for construction sites and as fill material.

Soil Texture

Soil texture refers to the relative proportions of particle size groupings (sand, silt, clay) in a soil. It only refers to the particle size distribution of individual mineral grains and does not imply anything about how the individual grains are grouped into peds or aggregates (soil structural units). Twelve textural classes are recognized and in order of increasing contents of silt and clay these are: sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. These classes may be modified by the terms "gravelly" or "stony," depending on coarse fragment content and size.

AASHO Classification

The American Association of State Highway Officials system of classifying soils is an engineering-property classification based on field performance of highways and it is the most widely used in highway practice (1). It consists of seven basic groupings of soils having about the same general load-carrying capacity that are designated A-1 through A-7. The best soils for road subgrades have the lowest numbers. The classification system is based on a sieve analysis of particle size distribution, liquid limit, and plasticity index. A more detailed explanation of the AASHO classification may be found in the "PCA Soil Primer" (1).

Where available, the AASHO classification of soils occurring in Douglas County was taken from reports for other areas that have some of the same soils as Douglas County (5,6,9). The remaining soils were classified by subjectively judging the relationship between soil texture and consistence and the AASHO classification. All the AASHO ratings should be used with caution because of the variability that exists within soil series and because of the paucity of actual data.

Unified Soil Classification

The Unified Soil Classification System is used by the Corps of Engineers, the Bureau of Reclamation, and the Soil Conservation Service. It applies to embankments and foundations as well as to roads and airfields.

The Unified Soil Classification System is based on identification of soils according to their textural and plasticity qualities and their grouping with respect to their performances as engineering construction materials. The system is described in the "PCA Soil Primer" (1).

The soil is given a letter symbol indicating its principal characteristics. The soils are divided into three divisions: (1) coarse-grained soils, (2) fine-grained soils, and (3) highly organic soils. The coarse-grained soils are subdivided into gravels (G) and sands (S). Both the

gravel and sand groups are divided into four secondary groups--GW, GP, GM, and GC and SW, SP, SM, and SC respectively, depending on the amount and types of fines (M for silt and C for clay), and the shape of the grain-size distribution curve (P for poorly graded and W for well graded).

The fine-grained soils are subdivided into silts (M) and clays (C) and these are divided into secondary groups based on whether they have a relatively low (L), or high (H) liquid limit. Organic (O) soils are likewise divided into OL or OH secondary groups. Highly organic, very compressible soils are classified as Pt from the word "peat."

The same procedure used for assigning the AASHO classification was applied to the Unified Classification and therefore the same degree of caution should be exercised in using these ratings.

Coarse Fragment Content of Subsoil

Mineral particles larger than 2.0 mm are referred to as coarse fragments. Depending upon their size and shape, they are referred to as gravel, cobbles, stones, channers, etc. Coarse fragment contents affect use of the soil for tillage, construction material, and for recreational purposes. They are chemically and physically inert and therefore have a diluting effect on the water-holding capacity and nutrient-supplying capacity of soils. Generally, soils with less than 20 percent coarse fragments are considered nongravelly; from 20 to 50 percent, gravelly; and over 50 percent, very gravelly.

IV. Urban and Engineering Interpretations

Septic Tank Drainfields and Sewage Lagoons

The ratings for the degree of soil limitation for septic tank drainfields and sewage lagoons are in Table 2. Criteria used to evaluate these ratings appear in Appendices 1 and 2. The soil conditions influencing the limitation ratings are shown in Table 2 by means of footnotes. A very severe degree of limitation rating for drainfields was used in addition to the slight, moderate, and severe degrees appearing in Appendix 1. Soils were placed in the very severe limitation rating if they had one or more of the following characteristics: (1) a very slow permeability rating, (2) a seasonal water table of less than one foot, (3) slopes of over 20 percent, and (4) depths to bedrock of less than 20 inches.

Percolation tests were run on soils at ten different locations during the course of this study. Results of these tests are summarized in Table 3. Two procedures were used to measure the rate of entry of free water into "saturated" soils. One procedure was that recommended by the Public Health Service outlined in "Manual of Septic Tank Practice" (1). The other procedure was a modification of a field method for measuring hydraulic conductivity of soil first reported by Bouwer (3), and later applied to septic tank drainfield investigations by Wert (8) at Oregon State University.

Table 2. Interpretations for Septic Tank Drainfields and Sewage Lagoons

Soil series or land type	Map symbol	Degree of soil limitation[1] for: Septic tank drainfield	Sewage lagoon	Depth to seasonal water table (inches)	Estimated percolation rate, subsoil min./in.
Active dune land	A	Severe(x)	Severe(s-x)	N/A[3]	0-3
Anlauf	An,An2	Severe(p-w)	Slight	10-30	15-30
Bashaw	Bs,Bs2,3	Very severe(p-w)	Slight	0-10	60+
Boomer	Bo3	Severe(p)	Severe(d-s)	N/A	15-30
Boomer	Bo4	Severe(p-s)	Severe(d-s)	N/A	15-30
Boomer	Bo5,6	Very severe(s)[2]	Severe(d-s)	N/A	15-30
Brand	Br	Very severe(p-w)	Slight	0-10	30-60
Brenner	Bn	Very severe(p-s)	Slight	0-10	30-60
Calapooya	Cp	Severe(p-w)	Moderate(t)	10-20	15-30
Camas	Ca,Ca2	Severe(f-x)	Severe(f-x)	N/A	0-3
Chehalis	Ch,Ch2	Moderate(f)	Moderate(f-p)	N/A	7.5-15
Climax	Cl2,3,4,5	V. severe(d-p)	Severe(d-s)	N/A	60+
Cloquato	Ct	Severe(f)	Severe(f-p)	N/A	7.5-15
Coquille	Cq	V. severe(f-p)	Severe(f)	0-10	60+
Cornutt	Co5	V. severe(p-s)[2]	Severe(d-s)	N/A	30-60
Dillard	Di2,3,4	Severe(d-s)	Severe(d-s)	N/A	30-60
Dillard	Di5,6	V. severe(s)[2]	Severe(d-s)	N/A	30-60
Dixonville	Dx2,3,4	Severe(d-s)	Severe(d-s)	N/A	15-30
Dixonville	Dx5,6	V. severe(s)[2]	Severe(d-s)	N/A	15-30
Dole	Do2	Severe(p)	Moderate(s-t)	40-60	15-30
Dole	Do3,4	Severe(p-s)	Severe(s-t)	40-60	15-30
Drain	Dr	V. severe(p-w)	Slight	0-10	60+
Gardiner	Ga	Severe(f-x)	Severe(f-x)	N/A	0-3
Hedden	He2,3	Severe(p)	Moderate(s)	N/A	15-30
Hedden	He4	Severe(p-s)	Severe(s)	N/A	15-30
Hedden	He5	V. severe(s)[2]	Severe(s)	N/A	15-30
Jory	Jy3	Severe(p)	Severe(s)	N/A	15-30
Jory	Jy4	Severe(p-s)	Severe(s)	N/A	15-30
Jory	Jy5,6	V. severe(s)[2]	Severe(s)	N/A	15-30
Josephine	Jo5,6	V. severe(s)[2]	Severe(s)	N/A	7.5-15
Kerby	Ke	Slight	Moderate(p)	N/A	7.5-15
Knappa	Kn2	Moderate(p)	Moderate(p-s)	N/A	7.5-15
Knappa	Kn3	Moderate(p-s)	Severe(p-s)	N/A	7.5-15

Table 2. (Cont.) Interpretations for Septic Tank Drainfields and Sewage Lagoons

Soil series or land type	Map symbol	Degree of soil limitation[1] for: Septic tank drainfield	Sewage lagoon	Depth to seasonal water table (inches)	Estimated percolation rate, subsoil min./in.
Mehl	Me,Me2,3	Severe(p-w)	Moderate(s)	10-30	30-60
Nehalem	Nh	Moderate(f)	Moderate(f-p)	N/A	7.5-15
Nekia	Nk3,4	Severe(p-s)	Severe(d-s)	N/A	15-30
Nekia	Nk5,6	V. severe(s)[2]	Severe(d-s)	N/A	15-30
Nestucca	Ns	Moderate(f-w)	Moderate(f-p)	10-30	7.5-15
Newberg	Ne	Severe(f)	Severe(f-x)	N/A	2-7.5
(No)*	No2,3,4	Severe(d)	Severe(d-s)	N/A	7.5-15
(No)*	No5,6	V. severe(d-s)[2]	Severe(d-s)	N/A	7.5-15
Oakland	Ok,Ok,2,3	Severe(p)	Moderate(s)	N/A	15-30
Olalla	Ol,Ol2,3	Severe(p-w)	Moderate(s-t)	10-30	30-60
Olalla	Ol4	Severe(p-s-w)	Severe(s-t)	10-30	30-60
O'Shea	Os,Os2,3	Severe(p)	Moderate(s-t)	40-60	15-30
Packard	Pa,Pa2	Slight	Moderate(p)	N/A	7.5-15
Pollard	Pd2,3	Severe(p)	Moderate(s)	N/A	15-30
Riverbank	RB	V. severe(s)	Severe(s)	N/A	0-30
Riverwash	RW	V. severe(f-x)	Severe(f-x)	N/A	0-2
Rockland	R	V. severe(d-s)	Severe(d-s)	N/A	7.5-30
Ruch	Ru2,3	Severe(p)	Moderate(s)	N/A	15-30
Salem	Sa	Slight(x)	Severe(p-t)	N/A	7.5-15
(Sp)*	Sp3,4	Severe(d-p)	Severe(d-s)	N/A	15-30
(Sp)*	Sp5,6	V. severe(d-s)[2]	Severe(d-s)	N/A	15-30
(St)*	St	Moderate(f-w)	Moderate(f-p)	10-30	7.5-15
(Tl)*	Tl	Slight(x)	Severe(x)	N/A	0-2
Willakenzie	Wi2,3,4	Severe(d-p)	Severe(d-s)	N/A	15-30
Willakenzie	Wi5,6	V. severe(d-s)[2]	Severe(d-s)	N/A	15-30
Yoncalla	Yo,Yo2	V. severe(p)	Moderate(s)	10-30	60+
Yoncalla	Yo3,4	V. severe(p)	Severe(s)	10-30	60+
Reconnaissance Units, Possible Series					
Josephine, Boomer	I4	Severe(p-s)	Severe(d-s)	N/A	7.5-30
Josephine, Boomer	I5,6	V. severe(s)[1]	Severe(d-s)	N/A	7.5-30

Table 2. (Cont.) Interpretations for Septic Tank Drainfields and Sewage Lagoons

Soil series or land type	Map symbol	Degree of soil limitation[1/] for: Septic tank drainfield	Sewage lagoon	Depth to seasonal water table (inches)	Estimated percolation rate, subsoil min./in.
Siskiyou	II6	V. severe(s)[2/]	Severe(d-s)	N/A	0-2
Peel	III3,4	V. severe(p-s)	Severe(d-s)	10-30	60+
Peel	III5,6	V. severe(p-s)	Severe(d-s)	10-30	60+
Willakenzie, (Sp)*	IV4	Severe(d-p-s)	Severe(d-s)	N/A	15-30
Willakenzie, (Sp)*	IV5,6	V. severe(s)[2/]	Severe(d-s)	N/A	15-30
Dixonville	V5,6	V. severe(s)[2/]	Severe(d-s)	N/A	15-30
Honeygrove, Apt	VI4	Severe(p-s)	Severe(s)	N/A	15-30
Honeygrove, Apt	VI5,6	V. severe(p-s)[2/]	Severe(s)	N/A	15-30
Blachly, Slickrock	VIII5,6	V. severe(s)[2/]	Severe(s)	N/A	15-30
Astoria, Trask	IX5,6	V. severe(s)[2/]	Severe(s)	N/A	2-15
Lint, Netarts	X5	V. severe(s)[2/]	Severe(s)	N/A	0-15

* Unnamed proposed series.

[1/] Soil-limiting factors:

(b)	bearing strength	(p)	permeability limitation
(c)	canopy cover	(s)	slope limitation
(d)	depth limitation	(ss)	shrink-swell potential
(e)	erosion hazard	(t)	textural limitation
(f)	flooding hazard	(w)	wetness limitation
		(x)	excessive drainage

[2/] Drainfield limitation is less severe for included areas of low slope.

[3/] Not applicable; well or excessively drained.

Table 3. Summary of Percolation Tests on Douglas County Soils

Soil series	Map symbol	Location	PHS procedure Site 1 min/in	PHS procedure Site 2 min/in	PHS procedure Mean min/in	OSU procedure min/in
Anlauf	An	NW¼, SW¼, Sec 1, T27S, R7W	5	5	5	22
Bashaw	Bs	SW¼, SE¼, Sec 3, T27S, R6W	160	68	114	Inf.[1]
Chehalis	Ch	NW¼, NW¼, Sec 10, T27S, R6W	48	6	27	11[2]
Dixonville	Dx	NW¼, NE¼, Sec 10, T27S, R6W	3	3	3	4
Drain	Dr	NW¼, SW¼, Sec 1, T27S, R7W	F[3]	4	4	Inf.
Drain	Dr	NW¼, SE¼, Sec 24, T27S, R5W	4	3	3.5	F[2]
(No)*	No	SW¼, NW¼, Sec 12, T27S, R7W	14	13	14	5[2]
Willakenzie	Wi	SW¼, NW¼, Sec 35, T26S, R7W	4	5	4.5	11
Yoncalla	Yo	SE¼, NW¼, Sec 16, T27S, R6W	97	113	105	Inf.

* Unnamed proposed series.

1/ No measurable drop in two or more hours.

2/ Probable failure.

3/ Failure. May be presence of large channel in PHS test holes or "blow-out" in OSU procedure.

In the OSU method, one essentially measures the infiltration rate of saturated soil under a head of about 15 inches as used in this study. An outer tube with an eight-inch diameter is pressed firmly into the soil at the bottom of an augered hole. Depth of the holes generally ranged from 30 to 36 inches. An inner tube with a four-inch diameter is also firmly pressed into the soil. Water is maintained in both tubes for 24 hours prior to measuring the rate of drop in the inner tube.

Since water can only enter the soil vertically in the OSU method, and from a surface area considerably smaller than that of the PHS auger holes, one would expect the OSU readings to always be lower than those of the PHS method. This was not the case for the tests run on the Chehalis and (No) soils, and it is possible that the tubes were not firmly in place, thus permitting water to leak from the inner tube to the outer tube.

Both procedures show that the Bashaw and Yoncalla soils are essentially unsuited for drainfields. The PHS test was run in duplicate at each site where the duplicate holes were about twelve feet apart. It is interesting to note the amount of variation in the results of this test for such soils as Chehalis. Neither method does a good job of showing differences between soils whose permeabilities are rated moderate to moderately slow by soil scientists. Very likely, many of the soils were not "saturated" by the presoaking treatment given. Percolation tests would be much more meaningful if they were run in the winter or early spring.

Table 2 also includes the estimated percolation rate (by the PHS method) for each soil. These estimates are based partially upon the results of the tests run for this study, but primarily they are subjective judgments based on the soil permeability ratings that soil scientists assign to soils on the basis of morphological properties known to influence permeability. The relationship between permeability classes and estimated percolation rates is judged to be as follows:

Permeability class	Percolation rate		Absorption area
	min/in	in/hr	sq. ft./bedroom*
Very slow	60+	<1	>330
Slow	30-60	1-2	250-330
Moderately slow	15-30	2-4	190-250
Moderate	7.5-15	4-8	150-190
Moderately rapid	3-7.5	8-20	100-150
Rapid	0-3	20+	<100

* Number of bedrooms is used as estimate of septic tank system use.

Sanitarians can relate the estimated percolation rates to the adsorption-area requirements outlined in the "Manual of Septic Tank Practice" (1). The relationship is also given in the above table. An on-site investigation should be made by the sanitarian when estimating percolation rates of a soil because the soil delineations shown on a soil map may have sizable inclusions of soils unlike those indicated by the symbol in the delineation.

Building Location, Foundations, Highways, and Corrosion of Steel

The interpretations for degree of soil limitations for foundations and location for low buildings, locating streets and highways, and for corrosion of steel pipes are in Table 4. The criteria used to rate the soils for each of these are in Appendices 3, 4, and 5.

Some of the criterion used to rate the soils are known quite accurately, such as degree of wetness, slope, depth to bedrock, and even shrink-swell potentials. The available information about others, such as the sheer strength, susceptibility to sliding, and the Unified Classification is rather limited and was not weighed as heavily as the better known characteristics in arriving at these ratings.

Table 4. Interpretations for Building Location, Foundations, Highways, and Corrosion of Steel Pipes

Soil series or land type	Map symbol	Degree of soil limitation[1/] for: Buildings and foundations	Highway location	Corrosion of steel pipes
Active dune land	A	Moderate(b)	Severe(s)	Slight
Anlauf	An,An2	Moderate(ss-w)	Moderate(ss-w)	Severe(w)
Bashaw	Bs,Bs2,3	Severe(ss-w)	Severe(ss-w)	Severe(w)
Boomer	Bo3,4	Moderate(d)	Moderate(d)	Moderate(t)
Boomer	Bo5,6	Severe(s-d)	Severe(d-s)	Moderate(t)
Brand	Br	Severe(ss-w)	Severe(w)	Severe(w)
Brenner	Bn	Severe(ss-w)	Severe(w)	Severe(w)
Calapooya	Cp	Severe(w)	Moderate(w)	Severe(w)
Camas	Ca,Ca2	Severe(f)	Moderate(f)	Slight
Chehalis	Ch,Ch2	Moderate(ss)	Slight	Moderate(t)
Climax	C12,3,4,5	Severe(ss)	Severe(ss)	Severe(t)
Cloquato	Ct	Severe(f)	Moderate(f)	Slight
Coquille	Cq	Severe(ss-w)	Severe(ss-w)	Severe(w)
Cornutt	Co5	Severe(s)	Severe(s)	Moderate(t)
Dillard	Di2,3,4	Moderate(d-ss)	Moderate(d-ss)	Moderate(t)
Dillard	Di5,6	Severe(s-d)	Severe(s)	Moderate(t)
Dixonville	Dx2,3,4	Moderate(d-ss)	Moderate(d-ss)	Severe(t)
Dixonville	Dx5,6	Severe(d-s)	Severe(s)	Severe(t)
Dole	Do2,3	Slight	Slight	Severe(t)
Dole	Do4	Slight	Moderate(s)	Severe(t)
Drain	Dr	Severe(ss-w)	Severe(ss-w)	Severe(w)
Gardiner	Ga	Severe(f)	Moderate(f)	Slight
Hedden	He2,3,4	Moderate(ss)	Moderate(ss)	Moderate(t)
Hedden	He5	Moderate(ss)	Severe(s)	Moderate(t)
Jory	Jy3,4	Moderate(ss)	Moderate(ss)	Severe(t)
Jory	Jy5,6	Severe(s-ss)	Severe(s)	Severe(t)
Josephine	Jo5,6	Severe(s-d)	Severe(s)	Moderate(t)
Kerby	Ke	Slight	Slight	Slight
Knappa	Kn2,3	Slight	Slight	Moderate(t)
Mehl	Me,Me2,3	Moderate(ss-w)	Moderate(ss-w)	Severe(w)
Nehalem	Nh	Slight	Moderate(f)	Moderate(t)
Nekia	Nk3,4	Moderate(d-ss)	Moderate(d-ss)	Moderate(t)
Nekia	Nk5,6	Severe(d-s)	Severe(s)	Moderate(t)
Nestucca	Ns	Moderate(w)	Moderate(f-w)	Severe(w)
Newberg	Ne	Severe(f)	Moderate(f)	Slight
(No)*	No2,3,4	Moderate(d)	Moderate(d)	Moderate(t)
(No)*	No5,6	Severe(s-d)	Severe(s)	Moderate(t)
Oakland	Ok,Ok2,3	Moderate(ss)	Moderate(ss)	Moderate(t)
Olalla	Ol,Ol2,3	Moderate(w)	Moderate(w)	Severe(w)
Olalla	Ol4	Moderate(w)	Moderate(s-w)	Severe(w)
O'Shea	Os,Os2,3	Slight	Slight	Severe(t)

Table 4. (Cont.) Interpretations for Building Location, Foundation, Highways, and Corrosion of Steel Pipes

Soil series or land type	Map symbol	Degree of soil limitation[1/] for: Buildings and foundations	Highway location	Corrosion of steel pipes
Packard	Pa,Pa2	Slight	Slight	Moderate(t)
Pollard	Pd2,3	Moderate(ss)	Moderate(ss)	Severe(t)
Riverbank	RB	Variable	Severe(f-s)	Moderate(t)
Riverwash	RW	Variable	Severe(f)	Moderate(t)
Rockland	R	Severe(d)	Severe(d-s)	Moderate(t)
Ruch	Ru2,3	Moderate(ss)	Moderate(ss)	Moderate
Salem	Sa	Slight	Slight	Moderate(t)
(Sp)*	Sp3,4	Moderate(d)	Moderate(d)	Moderate(t)
(Sp)*	Sp5,6	Severe(s-d)	Severe(s)	Moderate(t)
(St)*	St	Moderate(ss-w)	Moderate(ss-w)	Severe(w)
(Tl)*	Tl	Slight	Slight	Slight
Willakenzie	Wi2,3,4	Moderate(d)	Moderate(d)	Moderate(t)
Willakenzie	Wi5,6	Severe(d-s)	Severe(s)	Moderate(t)
Yoncalla	Yo,Yo2,3	Moderate(ss-w)	Moderate(ss)	Slight(w)
Yoncalla	Yo3,4	Moderate(ss-w)	Moderate(ss)	Slight(w)
Reconnaissance Units, Possible Series				
Josephine, Boomer	I4	Moderate(d)	Moderate(d)	Moderate(t)
Josephine, Boomer	I5,6	Severe(s-d)	Severe(s)	Moderate(t)
Siskiyou	II6	Severe(s-d)		Slight
Peel	III3,4	Severe(ss)	Severe(ss)	Severe(t)
Peel	III5,6	Severe(ss-s)	Severe(s)	Severe(t)
Willakenzie,(Sp)*	IV4	Moderate(d-ss)	Moderate(d-ss)	Moderate(t)
Willakenzie,(Sp)*	IV5,6	Severe(d-s)	Severe(s)	Moderate(t)
Dixonville	V5,6	Severe(d-s)	Severe(s)	Moderate(t)
Honeygrove, Apt	VI4	Moderate(ss)	Moderate(ss)	Severe(t)
Honeygrove, Apt	VI5,6	Severe(s-ss)	Severe(s)	Severe(t)
Blachly, Slickrock	VIII5,6	Severe(s-ss)	Severe(s)	Severe(t)
Astoria, Trask	IX5,6	Severe(s)	Severe(s)	Severe(t)
Lint, Netarts	X5	Moderate(ss)	Severe(s)	Moderate(t)

* Unnamed proposed series.

[1/] Soil-limiting factors:

(b)	bearing strength	(p)	permeability limitation
(c)	canopy cover	(s)	slope limitation
(d)	depth limitation	(ss)	shrink-swell potential
(e)	erosion hazard	(t)	textural limitation
(f)	flooding hazard	(w)	wetness limitation
		(x)	excessive drainage

It is not intended that these interpretations will eliminate the need for on-site sampling and testing of sites for design and construction of specific engineering works and uses. They should be used primarily in planning more detailed field investigations to determine the in-place condition of the soil at the proposed construction site.

Reservoir Areas, Pond Embankments, Terraces and Diversions, and Winter Grading

Soil ratings, giving the degree of limitation for reservoir or pond areas, pond earthen embankments, terraces and diversions, and winter grading are given in Table 5. The criteria for rating the soils for these uses are given in Appendices 6, 7, 8, and 9.

Criteria for the reservoir area ratings are similar to the sewage lagoon ratings except the pond reservoirs are not restricted so much by slope gradient. Depth to bedrock severely limits locating farm ponds on many upland soils in Douglas County.

Good material for pond embankments is high in clay and at the same time should have a low shrink-swell potential. None of the clayey soils in Douglas County have a low shrink-swell potential, but some only have a medium potential and therefore they only have a moderate limitation for that use.

Table 5. Interpretations for Reservoir Areas, Pond Embankments, Terraces and Diversions, and Winter Grading

Soil series or land type	Map symbol	Degree of soil limitation[1/] for: Reservoir areas	Pond embankments	Terraces and diversions	Winter grading
Active dune land	A	Severe(x)	Severe(x)	Severe(s-t)	Severe(s)
Anlauf	An,An2	Moderate(t)	Moderate(ss)	Moderate(ss)	Moderate(w)
Bashaw	Bs,Bs2,3	Slight	Severe(ss)	Severe(ss)	Severe(t-w)
Boomer	Bo3,4	Severe(d)	Moderate(t)	Moderate(d-s-t)	Moderate(d-s-t)
Boomer	Bo5,6	Severe(d-s)	Moderate(t)	Severe(s)	Severe(s)
Brand	Br	Slight	Moderate(ss)	Moderate(ss)	Severe(w)
Brenner	Bn	Slight	Moderate(ss)	Moderate(ss)	Severe(w)
Calapooya	Cp	Slight	Moderate(t)	Moderate(t)	Severe(w)
Camas	Ca,Ca2	Severe(x)	Severe(x)	Severe(t)	Slight
Chehalis	Ch,Ch2	Slight(p)	Moderate(ss)	Moderate(ss)	Moderate(t)
Climax	Cl2,3,4,5	Severe(d)	Severe(ss)	Severe(ss)	Severe(t)
Cloquato	Ct	Moderate(p)	Moderate(t)	Moderate(t)	Moderate(t)
Coquille	Cq	Slight	Moderate(ss)	Moderate(ss)	Severe(w)
Cornutt	Co5	Severe(s)	Moderate(ss)	Severe(s)	Severe(s)
Dillard	Di2,3,4	Severe(d)	Moderate(ss)	Moderate(s-t)	Moderate(d-s)
Dillard	Di5,6	Severe(d-s)	Moderate(ss)	Severe(d-s)	Severe(d-s)
Dixonville	Dx2,3,4	Severe(d)	Slight	Moderate(d-ss)	Moderate(d-s)
Dixonville	Dx5,6	Severe(d-s)	Slight	Severe(d-s)	Severe(d-s)
Dole	Do,Do2,3	Slight	Moderate(t)	Moderate(t)	Moderate(t)
Dole	Do4	Moderate(s)	Moderate(t)	Moderate(t-s)	Moderate(t-s)
Drain	Dr	Slight	Severe(ss)	Severe(ss)	Severe(w)
Gardiner	Ga	Severe	Severe(x)	Severe(t)	Slight
Hedden	He2,3	Slight	Moderate(ss)	Moderate(t)	Moderate(t)
Hedden	He4	Moderate(s)	Moderate(ss)	Moderate(s-t)	Moderate(t-s)
Hedden	He5	Severe(s)	Moderate(ss)	Severe(s)	Severe(s)
Jory	Jy3	Slight	Moderate(ss)	Slight	Severe(t)
Jory	Jy4	Moderate(s)	Moderate(ss)	Moderate(s-ss)	Severe(s-t)
Jory	Jy5,6	Severe(s)	Moderate(ss)	Severe(s)	Severe(s-t)
Josephine	Jo5,6	Severe(d-s)	Moderate(t)	Severe(s)	Severe(d-t)

Table 5. (Cont.) Interpretations for Reservoir Areas, Pond Embankments, Terraces and Diversions, and Winter Grading

Soil series or land type	Map symbol	Degree of soil limitation[1/] for: Reservoir areas	Pond embankments	Terraces and diversions	Winter grading
Kerby	Ke	Moderate(p)	Moderate(t)	Slight	Slight
Knappa	Kn2,3	Moderate(p)	Moderate(t)	Moderate(t)	Moderate(t)
Mehl	Me,Me2,3	Slight	Moderate(ss)	Moderate(t)	Moderate(t-w)
Nehalem	Nh	Moderate(p)	Moderate(t)	Moderate(t)	Moderate(t)
Nekia	Nk3,4	Severe(d)	Moderate(ss)	Moderate(d-ss)	Severe(d-t)
Nekia	Nk5,6	Severe(d-s)	Moderate(ss)	Severe(s)	Severe(d-s-t)
Nestucca	Ns	Moderate(p)	Moderate(t)	Moderate(t)	Moderate(w)
Newberg	Ne	Severe(x)	Moderate(t)	Slight	Slight
(No)*	No2,3,4	Severe(d)	Moderate(t)	Moderate(d-t)	Moderate(d)
(No)*	No5,6	Severe(d-s)	Moderate(t)	Severe(s)	Severe(d-s)
Oakland	Ok,Ok2,3	Moderate(p)	Moderate(ss)	Moderate(ss)	Moderate(t)
Olalla	Ol,Ol2,3	Slight	Moderate(t)	Moderate(t)	Moderate(t-w)
Olalla	Ol4	Moderate(s)	Moderate(t)	Moderate(s-t)	Moderate(t-w-s)
O'Shea	Os,Os2,3	Slight	Moderate(t)	Moderate(t)	Moderate(t)
Packard	Pa,Pa2	Moderate(p)	Moderate(t)	Moderate(t)	Slight
Pollard	Pd2,3	Slight	Moderate(ss)	Moderate(ss)	Moderate(t)
Riverbank	RB	Severe(s)	Severe(t)	Severe(s)	Severe(s)
Riverwash	RW	Severe(f-x)	Severe(t)	Severe(t)	Severe(t)
Rockland	R	Severe(d-s)	Severe(t)	Severe(d-s)	Severe(d-s)
Ruch	Ru2,3	Moderate(t)	Moderate(ss)	Moderate(ss)	Slight
Salem	Sa	Severe(p)	Moderate(t)	Moderate(t)	Slight
(Sp)*	Sp3,4	Severe(d)	Moderate(t)	Moderate(d-s)	Moderate(d)
(Sp)*	Sp5,6	Severe(d-s)	Moderate(t)	Severe(d-s)	Severe(d-s)
(St)*	St	Moderate(p)	Moderate(ss)	Moderate(ss)	Moderate(w)
(Tl)*	Tl	Severe(x)	Severe(x)	Severe(t)	Slight
Willakenzie	Wi2,3,4	Severe(d)	Moderate(t)	Moderate(d-s)	Moderate(d)
Willakenzie	Wi5,6	Severe(d-s)	Moderate(t)	Severe(d-s)	Severe(d-s)
Yoncalla	Yo,Yo2,3	Slight	Moderate(ss)	Moderate(ss)	Moderate(t)
Yoncalla	Yo4	Moderate(s)	Moderate(ss)	Severe(s)	Moderate(t-s)
Reconnaissance Units, Possible Series					
Josephine, Boomer	I4	Severe(d)	Moderate(t)	Moderate(d-t)	Moderate(d-t)

Table 5. (Cont.) Interpretations for Reservoir Areas, Pond Embankments, Terraces and Diversions, and Winter Grading

Soil series or land type	Map symbol	Degree of soil limitation[1/] for: Reservoir areas	Pond embankments	Terraces and diversions	Winter grading
Josephine, Boomer	I5,6	Severe(d-s)	Moderate(t)	Severe(d-s)	Severe(d-s)
Siskiyou	II6	Severe(d-s)	Moderate(t)	Severe(d-s)	Severe(d-s)
Peel	III3,4	Severe(d)	Severe(ss)	Severe(t)	Severe(d-t)
Peel	III5,6	Severe(d-s)	Severe(ss)	Severe(s-t)	Severe(d-t-s)
Willakenzie, (Sp)*	IV4	Severe(d)	Moderate(t)	Moderate(d-s)	Moderate(d-t)
Willakenzie, (Sp)*	IV5,6	Severe(d-s)	Moderate(t)	Severe(d-s)	Severe(d-t-s)
Dixonville	V5,6	Severe(d-s)	Slight	Severe(d-s)	Severe(d-s)
Honeygrove, Apt	VI4	Moderate(s)	Moderate(ss)	Severe(t)	Severe(t)
Honeygrove, Apt	VI5,6	Severe(s)	Moderate(ss)	Severe(t-s)	Severe(t-s)
Blachly, Slickrock	VIII5,6	Severe(s)	Moderate(ss)	Severe(s)	Severe(s)
Astoria, Trask	IX5,6	Severe(s)	Moderate(ss)	Severe(s)	Severe(s)
Lint, Netarts	X5	Severe(s-x)	Mod-Severe(ss-x)	Severe(s)	Severe(s)

* Unnamed proposed series.

[1/] Soil-limiting factors:

(b) - bearing strength
(c) - canopy cover
(d) - depth limitation
(e) - erosion hazard
(f) - flooding hazard
(p) - permeability limitation
(s) - slope limitation
(ss) - shrink-swell potential
(t) - textural limitation
(w) - wetness limitation
(x) - excessive drainage

Suitability for Topsoil, Sand and Gravel, and Road Fill Material

The ratings for degree of suitability of the soils as sources of topsoil, sand and gravel, and road fill material are given in Table 6. Criteria used to evaluate these suitabilities are in Appendices 10, 11, and 12. It is interesting to note that nearly all but the clay textured soils have a fair to good suitability for road fill material. It should be emphasized that for many soils, the AASHO and Unified Classifications that are used to rate these soils for road fill are subjective judgments based on comparing soil texture and consistence characteristics of the unknown soils with the data available for a few "benchmark" soils. Actual tests should be made on these soils before using them for designing or constructing a road.

Table 6. Interpretations for Topsoil, Sand and Gravel, and Road Fill Material

Soil series or and type	Map symbol	Degree of suitability[1] for: Topsoil	Sand and gravel	Road fill
Active dune land	A	Poor(t)	Good	Fair(b)
Anlauf	An	Fair(t)	Poor	Fair(b)
Bashaw	Bs	Poor(t)	Poor	Poor(b)
Boomer	Bo,I	Fair(t)	Poor	Fair(b-d)
Brand	Br	Fair(t)	Poor	Poor(b)
Brenner	Bn	Fair(t)	Poor	Poor(b)
Calapooya	Cp	Fair(t)	Poor	Fair(b)
Camas	Ca	Poor(t)	Good	Good
Chehalis	Ch	Good	Poor	Fair(b)
Climax	Cl	Poor(t)	Poor	Poor(b)
Cloquato	Ct	Good	Poor	Fair(b)
Coquille	Cq	Fair(t)	Poor	Poor(b)
Cornutt	Co	Poor(t)	Poor	Fair(b-d)
Dillard	Di,I	Fair(t)	Poor	Fair(b-d)
Dixonville	Dx,V	Fair(t)	Poor	Fair(b-d)
Dole	Do	Fair(t)	Poor	Fair(b)
Drain	Dr	Fair(t)	Poor	Poor(b)
Gardiner	Ga	Good	Fair	Good
Hedden	He	Fair(t)	Poor	Fair(b)
Jory	Jy	Fair	Poor	Fair(b)
Josephine	Jo,I	Fair(t)	Poor	Fair(b-d)
Kerby	Ke	Good	Poor	Fair(b)
Knappa	Kn	Fair(t)	Poor	Fair(b)
Mehl	Me	Fair(t)	Poor	Fair(b)
Nehalem	Nh	Good	Poor	Fair(b)
Nekia	Nk,V	Poor(t)	Poor	Fair(b-d)
Nestucca	Ns	Good	Poor	Fair(b)
Newberg	Ne	Good	Poor	Good

Table 6. (Cont.) Interpretations for Topsoil, Sand and Gravel, and Road Fill Material

Soil series or land type	Map symbol	Degree of suitability[1/] for: Topsoil	Sand and gravel	Road fill
(No)*	No	Fair(t)	Poor	Fair(d)
Oakland	Ok	Good	Poor	Fair(b)
Olalla	Ol	Poor(t)	Poor	Fair(b)
O'Shea	Os	Fair(t)	Poor	Fair(b)
Packard	Pa	Good	Poor	Fair(b)
Pollard	Pd	Fair(t)	Poor	Fair(b)
Riverbank	RB	Poor(t)	Poor	Fair(b)
Riverwash	RW	Poor(t)	Good	Good
Rockland	R	Poor(t)	Poor	Poor(d)
Ruch	Ru	Good	Poor	Fair(b)
Salem	Sa	Fair(t)	Fair	Good
(Sp)*	Sp	Fair(t)	Poor	Fair(b-d)
(St)*	St	Fair(t)	Poor	Fair(b)
(Tl)*	Tl	Fair(t)	Poor	Good
Willakenzie	Wi,IV	Fair(t)	Poor	Fair(b-d)
Yoncalla	Yo	Fair(t)	Poor	Poor(b)
Reconnaissance Units, Possible Series				
Josephine, Boomer	I	Fair(t)	Poor	Fair(b-d)
Siskiyou	II	Fair(t)	Poor	Fair(d)
Peel	III	Poor(t)	Poor	Poor(b)
Willakenzie, (Sp)*	IV	Fair(t)	Poor	Fair(b-d)
Dixonville	V	Poor(t)	Poor	Fair(b-d)
Honeygrove, Apt	VI	Poor(t)	Poor	Poor(b)
Blachly, Slickrock	VIII	Fair(t)	Poor	Fair(b)
Astoria, Trask	IX	Fair(t)	Poor	Fair(b)
Lint, Netarts	X	Fair(t)	Poor-Good	Poor-Good

* Unnamed proposed series.

[1/] Soil-limiting factors:

(b)	bearing strength	(p)	permeability limitation
(c)	canopy cover	(s)	slope limitation
(d)	depth limitation	(ss)	shrink-swell potential
(e)	erosion hazard	(t)	textural limitation
(f)	flooding hazard	(w)	wetness limitation
		(x)	excessive drainage

V. Farm and Woodland Interpretations

Farming, Woodland, Improved Pasture, and Irrigation

The soils are rated according to their degree of suitability for (1) farming, (2) woodland, (3) improved permanent pasture, and (4) irrigation in Table 7. Criteria used to evaluate soil suitabilities for these uses appear in Appendices 13, 14, 15, and 16.

As is to be expected, many soils suited for farming are also suited for woodland and improved pasture, using the criteria given in the appendices. Stand density is a criterion used to evaluate the soils for improved permanent pasture; the more dense the stand, the less the suitability. Generally, the wooded hills between Drain and Dillard were considered to have a medium density, whereas the more rugged mountainous regions that are generally forested were considered to have a dense canopy. Low moisture capacity limits the pasture potential of many of the oak-grass covered hills in the county.

The irrigation suitability ratings appearing in Table 7 are the same as those appearing in "Umpqua Drainage Basin General Soil Map Report with Irrigable Areas" (4). They are repeated here simply for convenience. There are five classes of irrigation suitability, whereas only three classes are used for the other ratings in Table 7.

Table 8 gives drainage groups for the soils having impeded drainage. This information was also taken from the general soil map report (4).

Table 7. Interpretations for Farming, Woodland, Improved Pasture, and Irrigation

Soil series or land type	Map symbol	Degree of suitability[1/] for: Farming	Woodland	Improved pasture	Irrigation
Active dune land	A	Poor(e-s-x)	Poor(a-t)	Poor(a)	Very poor(s-x)
Anlauf	An,An2	Fair(w)	Fair(w)	Good(w)	Good(w)
Bashaw	Bs,Bs2,3	Poor(p-t-w)	Poor(t-w)	Fair(t)	Poor(p-w)
Boomer	Bo3	Fair(d-e)	Fair(d)	Fair(c)	Fair(s)
Boomer	Bo4	Fair(d-e)	Fair(d)	Fair(c)	Poor(s)
Boomer	Bo5	Poor(e-s)	Fair(d)	Poor(c)	Very poor(s)
Boomer	Bo6	Poor(e-s)	Fair(d-s)	Poor(c)	Very poor(s)
Brand	Br	Fair(w)	Poor(w)	Good(w)	Poor(p-w)
Brenner	Bn	Fair(w)	Poor(w)	Good(w)	Fair(w)
Calapooya	Cp	Fair(w)	Poor(a-w)	Fair(a-w)	Good(w)
Camas	Ca,Ca2	Fair(f-x)	Poor(a)	Poor(a)	Poor(a-f)
Chehalis	Ch,Ch2	Good	Good	Good	Excellent
Climax	Cl2,3,4	Poor(e-p-t)	Poor(d-t)	Fair(t)	Poor(s-t)
Cloquato	Ct	Good	Good	Good	Good(f)
Coquille	Cq	Poor(f-w)	Poor(w)	Fair(w)	Poor(p-w)
Cornutt	Co5	Poor(e-s)	Fair(d-t)	Poor(c)	Very poor(s)
Dillard	Di2,3	Fair(d-e-p)	Fair(d-t)	Good	Fair(s)
Dillard	Di4	Fair(d-e-p)	Fair(d-t)	Good	Poor(s)
Dillard	Di5	Poor(e-s)	Fair(d-t)	Good	Very poor(s)
Dillard	Di6	Poor(e-s)	Fair(d-s)	Fair(s)	Very poor(s)
Dixonville	Dx2,3	Fair(d-e)	Poor(d-d)	Fair(a)	Fair(s)
Dixonville	Dx4	Fair(d-e)	Poor(a-d)	Fair(a)	Poor(s)
Dixonville	Dx5	Poor(e-s)	Poor(a-d)	Fair(a)	Very poor(s)
Dixonville	Dx6	Poor(e-s)	Poor(a-d)	Fair(a)	Very poor(s)
Dole	Do,Do2	Fair(d-t)	Fair(d-t)	Good	Good(s-t)
Dole	Do3	Fair(e-t)	Fair(d-t)	Good	Fair(s)
Dole	Do4	Fair(e-t)	Fair(d-t)	Good	Poor(s)
Drain	Dr	Poor(p-w)	Poor(w)	Good(w)	Poor(p-w)
Gardiner	Ga	Fair(f-x)	Poor(a)	Fair(a)	Fair(x)
Hedden	He2	Good(e)	Good	Good	Good(s)
Hedden	He3	Good(e)	Good	Good	Fair(s)
Hedden	He4	Fair(e)	Good	Good	Poor(s)
Hedden	He5	Poor(e-s)	Good	Good	Very poor(s)

Table 7. (Cont.) Interpretations for Farming, Woodland, Improved Pasture, and Irrigation

Soil series or land type	Map symbol	Degree of suitability[1] for: Farming	Woodland	Improved pasture	Irrigation
Jory	Jy3	Good(e)	Good	Fair(c)	Fair(s)
Jory	Jy4	Fair(e)	Good	Fair(c)	Poor(s)
Jory	Jy5	Poor(e-s)	Good	Fair(c)	Very poor(s)
Jory	Jy6	Poor(e-s)	Fair(s)	Fair(c)	Very poor(s)
Josephine	Jo5	Poor(e-s)	Fair(d)	Poor(c)	Very poor(s)
Josephine	Jo6	Poor(e-s)	Fair(d-s)	Poor(c)	Very poor(s)
Kerby	Ke,Ke2	Good	Good	Good	Excellent
Knappa	Kn2	Good(e)	Good	Fair(c)	Excellent
Knappa	Kn3	Good(e)	Good	Fair(c)	Fair(s)
Mehl	Me,Me2	Fair(w)	Fair(w)	Good	Good(w)
Mehl	Me3	Fair(e-w)	Fair(w)	Good	Fair(s)
Nehalem	Nh	Good	Good	Good	Good(f)
Nekia	Nk3	Fair(d-e)	Fair(d)	Fair(c)	Fair(s)
Nekia	Nk4	Fair(d-e)	Fair(d)	Fair(c)	Poor(s)
Nekia	Nk5	Poor(e-s)	Fair(d)	Fair(c)	Very poor(s)
Nekia	Nk6	Poor(e-s)	Fair(d-s)	Fair(c)	Very poor(s)
Nestucca	Ns	Fair(w)	Fair(w)	Good	Good(f)
Newberg	Ne	Good(x)	Good	Good	Good(f)
(No) *	No2,3	Fair(d-e)	Poor(a)	Fair(a)	Fair(s)
(No) *	No4	Fair(d-e)	Poor(a)	Fair(a)	Poor(s)
(No) *	No5	Poor(e-s)	Poor(a)	Fair(a)	Very poor(s)
(No) *	No6	Poor(e-s)	Poor(a)	Fair(a)	Very poor(s)
Oakland	Ok,Ok2	Good	Good	Good	Good(s)
Oakland	Ok3	Good(e)	Good	Good	Fair(s)
Olalla	Ol,Ol2	Fair(w-t)	Poor(a)	Fair(a)	Fair(w)
Olalla	Ol3	Fair(e-w-t)	Poor(a)	Fair(a)	Fair(s)
Olalla	Ol4	Fair(e-w-t)	Poor(a)	Fair(a)	Poor(s)
O'Shea	Os,Os2	Good	Fair(t)	Good	Good(s-t)
O'Shea	Os3	Good(e)	Fair(t)	Good	Fair(s)
Packard	Pa,Pa2	Good	Good	Good	Excellent
Pollard	Pd2	Good	Good	Good	Good(s)
Pollard	Pd3	Good(e)	Good	Good	Fair(s)

Table 7. (Cont.) Interpretations for Farming, Woodland, Improved Pasture, and Irrigation

Soil series or land type	Map symbol	Degree of suitability[1/] for: Farming	Woodland	Improved pasture	Irrigation
Riverbank	RB	Poor(e-f-s)	Fair-Poor	Poor(c)	Very poor(s)
Riverwash	RW	Poor(f-t-x)	Poor(d)	Poor(a)	Very poor(t-x)
Rockland	R	Poor(d-e-s)	Poor(a-s)	Poor(a)	Very poor(s)
Ruch	Ru2	Good	Good	Good	Good(s)
Ruch	Ru3	Good(e)	Good	Good	Fair(s)
Salem	Sa	Good	Fair(d)	Good	Excellent
(Sp)*	Sp3	Fair(d-e)	Fair(d)	Fair(c)	Fair(s)
(Sp)*	Sp4	Fair(d-e)	Fair(d)	Fair(c)	Poor(s)
(Sp)*	Sp5	Poor(e-s)	Fair(d)	Fair(c)	Very poor(s)
(Sp)*	Sp6	Poor(e-s)	Fair(d-s)	Fair(c)	Very poor(s)
(St)*	St	Fair(w)	Fair(w)	Good	Excellent(w)
(Tl)*	Tl	Fair(t-x)	Poor(a)	Fair(x)	Fair(x)
Willakenzie	Wi3	Fair(d-e)	Fair(d)	Fair(c)	Fair(s)
Willakenzie	Wi4	Fair(d-e)	Fair(d)	Fair(c)	Poor(s)
Willakenzie	Wi5	Poor(e-s)	Fair(d)	Fair(c)	Very poor(s)
Willakenzie	Wi6	Poor(e-s)	Fair(d-s)	Fair(c)	Very poor(s)
Yoncalla	Yo,Yo2	Fair(p-w)	Fair(t-w)	Good(w)	Fair(w)
Yoncalla	Yo3,4	Fair(e-p-w)	Fair(t-w)	Good(w)	Poor(s-t)
Reconnaissance Units, Possible Series					
Josephine, Boomer	I4	Fair(d-e)	Fair(d)	Poor(c)	Poor(s)
Josephine, Boomer	I5	Poor(e-s)	Fair(d)	Poor(c)	Very poor(s)
Josephine, Boomer	I6	Poor(e-s)	Fair(d-s)	Poor(c)	Very poor(s)
Siskiyou	II6	Poor(e-s)	Poor(a)	Poor(c)	Very poor(s)
Peel	III3,4	Poor(d-p-t)	Poor(a-t-w)	Fair(a)	Poor(s-t)
Peel	III5	Poor(e-s)	Poor(a-t-w)	Fair(a)	Very poor(s)
Peel	III6	Poor(e-s)	Poor(a-t-w)	Fair(a)	Very poor(s)
Willakenzie, (Sp)*	IV4	Fair(d-e)	Fair(d)	Fair(c)	Poor(s)
Willakenzie, (Sp)*	IV5	Poor(e-s)	Fair(d)	Fair(c)	Very poor(s)
Willakenzie, (Sp)*	IV6	Poor(e-s)	Fair(d-s)	Fair(c)	Very poor(s)

Table 7. (Cont.) Interpretations for Farming, Woodland, Improved Pasture, and Irrigation

Soil series or land type	Map symbol	Degree of suitability[1/] for: Farming	Woodland	Improved pasture	Irrigation
Dixonville	V5	Poor(e-s)	Fair(e-t)	Fair(a)	Very poor(s)
Dixonville	V6	Poor(e-s)	Fair(d-t-s)	Fair(a)	Very poor(s)
Honeygrove, Apt	VI4	Fair(e)	Good	Poor(c)	Poor(s)
Honeygrove, Apt	VI5	Poor(e-s)	Good	Poor(c)	Very poor(s)
Honeygrove, Apt	VI6	Poor(e-s)	Fair(s)	Poor(c)	Very poor(s)
Blachly, Slickrock	VIII5	Poor(e-s)	Good	Poor(c)	Very poor(s)
Blachly, Slickrock	VIII6	Poor(e-s)	Fair(s)	Poor(c)	Very poor(s)
Astoria, Trask	IX5	Poor(e-s)	Good-Poor(a)	Poor(c)	Very poor(s)
Astoria, Trask	IX6	Poor(e-s)	Fair-Poor(a-s)	Poor(c)	Very poor(s)
Lint, Netarts	X5	Poor(e-s)	Good-Poor(t-a)	Poor(c)	Very poor(s)

* Unnamed proposed series.

[1/] Soil-limiting factors:

(a) available water-holding capacity
(b) bearing strength limitation
(c) canopy cover limitation
(d) depth limitation
(e) erosion hazard
(f) flooding hazard
(p) permeability limitation
(s) slope limitation
(t) textural limitation
(w) wetness limitation
(x) excessive drainage

Table 8. Drainage Groups

Group 1.	Moderately well drained soils that need drainage for intensive use; difficult to drain.	Olalla - Ol Peel - III
Group 2.	Somewhat poorly drained soils that need drainage for most uses; easily drained.	Anlauf - An Calapooya - Cp Nestucca - Ns Unnamed - St
Group 3.	Somewhat poorly drained soils that need drainage for most uses; difficult to drain.	Mehl - Me Yoncalla - Yo
Group 4.	Poorly drained soils with excess surface water; difficult to subsurface drain.	Brand - Br Brenner - Bn
Group 5.	Poorly drained soils with excess surface water; not feasible to subsurface drain.	Bashaw - Bs Drain - Dr
Group 6.	Very poorly drained soils with excess surface water; difficult to subsurface drain.	Coquille - Cq

Land Capability Classification

The soils are grouped by Land Capability Subclass in Table 9. Land capability classification is a system which groups soils of similar characteristics and behavior. It is a practical grouping based on soil limitations, risk of damage, and response to treatment. It is used extensively by Soil Conservation Service Farm Planners working with farmers in developing soil and water conservation farm plans. It does not group soils according to their inherent productive capacity, but more in terms of the kind and degree of hazard or limitation to continued use of the soils for growing plants.

In this system, soils are grouped at three levels: the capability class, subclass, and unit. Only the first two levels are included in this report. The classes indicate the degree of limitation or hazard to sustained use and are designated by Roman numerals I through VIII. Class I soils have few limitations and are not subdivided into subclasses. Soils in Class VIII are so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, forages, or woodland.

The subclasses indicate major kinds of limitations within the classes. The subclass is indicated by adding a small letter e, w, or s to the class numeral, for example, IIe. The letter e stands for an erosion hazard, w for a wetness or overflow problem, and s shows a soil profile limitation such as shallowness, droughtiness, or stoniness.

Table 9. Land Capability Subclasses

Class I. Soils with no significant limitations.

Chehalis, 0-3% slopes(Ch)
Cloquato, 0-3% slopes(Ct)
Kerby, 0-3% slopes (Ke)
Nehalem, 0-3% slopes (Nh)
Oakland, 0-3% slopes (Ok)

Subclass IIe. Soils with a slight erosion hazard.

Chehalis, 3-7% slopes (Ch2)
Oakland, 3-7% slopes (Ok2)
Pollard, 3-7% slopes (Pd2)
Ruch, 3-7% slopes (Ru2)

Subclass IIs. Soils with a moderate water-holding capacity.

Dole, 0-7% slopes (Do,Do2)
Newberg, 0-3% slopes (Ne)
O'Shea, 0-7% slopes (Os,Os2)
Packard, 0-7% slopes (Pa,Pa2)
Salem, 0-3% slopes (Sa)

Subclass IIIe. Soils with a moderate erosion hazard.

Boomer, 7-12% slopes (Bo3)
Hedden, 3-12% slopes (He2,3)
Jory, 0-3% slopes (Jy3)
Knappa, 3-12% slopes (Kn2,3)
Mehl, 7-12% slopes (Me3)
Oakland, 7-12% slopes (Ok3)
O'Shea, 7-12% slopes (Os3)
Pollard, 7-12% slopes (Pd3)
Ruch, 7-12% slopes (Ru3)

Subclass IIIw. Soils with a moderate wetness limitation.

Anlauf, 0-7% slopes (An,An2)
Calapooya, 0-3% slopes (Cp)
Mehl, 0-7% slopes (Me,Me2)
Nestucca, 0-3% slopes (Ns)
Olalla, 0-7% slopes (Ol,Ol2)
(St)*, 0-3% slopes (St)
Yoncalla, 0-7% slopes (Yo,Yo2)

Subclass IIIs. Soils with a low water-holding capacity.

Camas, 0-7% slopes (Ca,Ca2)
Gardiner, 0-3% slopes (Ga)
(Tl)*, 0-3% slopes (Tl)

Table 9. (Cont.) Land Capability Subclasses

Subclass IVe. Soils with a severe erosion hazard.

Boomer, 12-20% slopes (Bo4)
Dole, 7-20% slopes (Do3,4)
Hedden, 12-20% slopes (He4)
Jory, 12-20% slopes (Jy4)
Nekia, 7-20% slopes (Nk3,4)
Olalla, 7-20% slopes (Ol3,4)
(Sp)*, 7-20% slopes (Sp3,4)
Willakenzie, 7-20% slopes (Wi3,4)
I4,[1] 7-20% slopes (I4)
IV4, 12-20% slopes (IV4)
VI4, 12-20% slopes (VI4)

Subclass IVw. Soils with a severe wetness problem.

Bashaw, 0-12% slopes (Bs,Bs2,3)
Brand, 0-3% slopes (Br)
Brenner, 0-3% slopes (Bn)
Coquille, 0-3% slopes (Cq)
Drain, 0-3% slopes (Dr)

Subclass IVs. Soils with a textural or water-holding capacity problem.

Climax, 3-20% slopes (Cl2,3,4)
Dillard, 3-20% slopes (Di2,3,4)
Dixonville, 3-20% slopes (Dx2,3,4)
(No)*, 3-20% slopes (No2,3,4)
Yoncalla, 7-20% slopes (Yo3,4)
Peel, 7-20% slopes (Pe3,4)

Subclass VIe. Soils with a severe erosion hazard.

Boomer, 20-40% slopes (Bo5)
Climax, 20-40% slopes (Cl5)
Cornutt, 20-40% slopes (Co5)
Dillard, 20-40% slopes (Di5)
Dixonville, 20-40% slopes (Dx5)
Hedden, 20-40% slopes (He5)
Jory, 20-40% slopes (Jy5)
Josephine, 20-40% slopes (Jo5)
Nekia, 20-40% slopes (Nk5)
(No)*, 20-40% slopes (No5)
(Sp)*, 20-40% slopes (Sp5)
Willakenzie, 20-40% slopes (Wi5)
I5, 20-40% slopes (I5)
III5, 20-40% slopes, (III5)
IV5, 20-40% slopes (IV5)
V5, 20-40% slopes (V5)
VI5, 20-40% slopes (VI5)
VIII5, 20-40% slopes (VIII5)
IX5, 20-40% slopes (IX5)
X5, 20-40% slopes (X5)

Table 9. (Cont.) Land Capability Subclasses

Subclass VIIe. Steep soils with a very severe erosion hazard.

Boomer, 40-70% slopes (Bo6)
Dillard, 40-70% slopes (Di6)
Dixonville, 40-70% slopes (Dx6)
Jory, 40-70% slopes (Jy6)
Josephine, 40-70% slopes (Jo6)
Nekia, 40-70% slopes (Nk6)
(No)*, 40-70% slopes (No6)
(Sp)*, 40-70% slopes (Sp6)
Willakenzie, 40-70% slopes (Wi6)
I6,[1/] 40-70% slopes (I6)
II6, 40-70% slopes (II6)
III6, 40-70% slopes (III6)
IV6, 40-70% slopes (IV6)
V6, 40-70% slopes (V6)
VI6, 40-70% slopes (VI6)
VIII6, 40-70% slopes (VIII6)
IX6, 40-70% slopes (IX6)

Subclass VIIIs. Miscellaneous land types with extremely severe limitation.

Active dune land (A)
Riverwash (RW)
Rockland(R)

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* Unnamed proposed series.

[1/] Roman numerals are reconnaissance units, see Map Legend, page 4.

VI. Recreational Interpretations

The degree of soil limitations for use of the soils for (1) playgrounds, (2) camp areas, (3) picnic areas, and (4) paths and trails is shown in Table 10. The criteria used to rate the soils are in Appendices 17, 18, 19, and 20. The soil properties or qualities most strongly affecting the ratings are indicated in Table 10 by means of footnotes. Flood hazard, wetness, slope, and adverse soil texture are the soil properties most commonly limiting use of these soils for recreational purposes. The poorly drained and the steep and very steep soils have a severe limitation even for using the soils for hiking trails.

Table 10. Interpretations for Playgrounds, Camp Areas, Picnic Areas, and Paths and Trails

Soil series or land type	Map symbol	Degree of soil limitation[1/] for: Playgrounds	Camp areas	Picnic areas	Paths and trails
Active dune land	A	Severe(s-t)	Severe(s-t)	Severe(s-t)	Severe(s-t)
Anlauf	An,An2	Moderate(w)	Moderate(w)	Slight	Slight
Bashaw	Bs,Bs2,3	Severe(t-w)	Severe(t-w)	Severe(t-w)	Severe(t-w)
Boomer	Bo3	Severe(s)	Moderate(s)	Moderate(s)	Moderate(t)
Boomer	Bo4	Severe(s)	Severe(s)	Severe(s)	Moderate(t)
Boomer	Bo5,6;I5,6	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Brand	Br	Severe(w)	Severe(w)	Severe(w)	Severe(w)
Brenner	Bn	Severe(w)	Severe(w)	Severe(w)	Severe(w)
Calapooya	Cp	Moderate(w)	Moderate(w)	Moderate(w)	Moderate(w)
Camas	Ca,Ca2	Severe(f-t)	Severe(f)	Severe(f)	Moderate(f)
Chehalis	Ch	Moderate(f)	Moderate(f)	Moderate(f)	Moderate(f)
Chehalis	Ch2	Moderate(s)	Slight	Slight	Slight
Climax	C12,3,4	Severe(t)	Severe(t)	Severe(t)	Severe(t)
Cloquato	Ct	Severe(f)	Severe(f)	Moderate(f)	Slight
Coquille	Cq	Severe(w)	Severe(w)	Severe(w)	Severe(w)
Cornutt	Co5	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Dillard	Di2	Moderate(s)	Slight	Slight	Slight
Dillard	Di3	Severe(s)	Moderate(s)	Moderate(s)	Slight
Dillard	Di4	Severe(s)	Severe(s)	Severe(s)	Moderate(s)
Dillard	Di5,6;I5,6	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Dixonville	Dx3	Severe(s)	Moderate(s)	Moderate(s)	Slight
Dixonville	Dx4	Severe(s)	Severe(s)	Severe(s)	Moderate(s)
Dixonville	Dx5,6;V5,6	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Dole	Do	Moderate(t)	Moderate(p)	Slight	Slight
Dole	Do2	Moderate(s)	Moderate(p)	Slight	Slight
Dole	Do3	Severe(s)	Moderate(s)	Moderate(s)	Slight
Dole	Do4	Severe(s)	Severe(s)	Severe(s)	Moderate(s)
Drain	Dr	Severe(w)	Severe(w)	Severe(w)	Severe(w)
Gardiner	Ga	Moderate(t)	Slight	Slight	Slight
Hedden	He2	Moderate(s)	Moderate(p)	Slight	Slight
Hedden	He3	Severe(s)	Moderate(s)	Moderate(s)	Slight
Hedden	He4	Severe(s)	Severe(s)	Severe(s)	Moderate(s)
Jory	Jy3	Severe(s)	Moderate(p)	Moderate(s)	Moderate(t)
Jory	Jy4	Severe(s)	Severe(s)	Severe(s)	Moderate(s)
Jory	Jy5,6	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Josephine	Jo5,6;I5,6	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Kerby	Ke	Slight	Slight	Slight	Slight
Knappa	Kn2	Moderate(s)	Slight	Slight	Slight
Knappa	Kn3	Severe(s)	Moderate(s)	Moderate(s)	Slight
Mehl	Me,Me2	Moderate(s)	Moderate(p)	Slight	Slight
Mehl	Me3	Severe(s)	Moderate(s)	Moderate(s)	Slight
Nehalem	Nh	Slight	Slight	Slight	Slight
Nekia	Nk3	Severe(s)	Moderate(s)	Moderate(s)	Moderate(t)
Nekia	Nk4	Severe(s)	Severe(s)	Severe(s)	Moderate(s)
Nekia	Nk5,6;V5,6	Severe(s)	Severe(s)	Severe(s)	Severe(s)

Table 10. (Cont.) Interpretations for Playgrounds, Camp Areas, Picnic Areas, and Paths and Trails

Soil series or land type	Map symbol	Degree of soil limitation[1/] for: Playgrounds	Camp areas	Picnic areas	Paths and trails
Nestucca	Ns	Moderate(w)	Moderate(w)	Slight	Slight
Newberg	Ne	Severe(f)	Moderate(f)	Moderate(f)	Moderate(f)
(No)*	No2	Moderate(s)	Slight	Slight	Slight
(No)*	No3	Severe(s)	Moderate(s)	Moderate(s)	Slight
(No)*	No4	Severe(s)	Severe(s)	Severe(s)	Moderate(s)
(No)*	No5,6	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Oakland	Ok2	Moderate(s)	Slight	Slight	Slight
Oakland	Ok3	Severe(s)	Moderate(s)	Moderate(s)	Slight
Olalla	Ol2	Moderate(s)	Moderate(w)	Slight	Slight
Olalla	Ol3	Severe(s)	Moderate(s)	Moderate(s)	Slight
Olalla	Ol4	Severe(s)	Severe(s)	Severe(s)	Moderate(s)
O'Shea	Os	Moderate(t)	Moderate(p)	Slight	Slight
O'Shea	Os2	Moderate(s)	Moderate(p)	Slight	Slight
O'Shea	Os3	Severe(s)	Moderate(s)	Moderate(s)	Slight
Packard	Pa	Slight	Slight	Slight	Slight
Packard	Pa2	Moderate(s)	Slight	Slight	Slight
Pollard	Pd2	Moderate(s)	Moderate(p)	Slight	Slight
Pollard	Pd3	Severe(s)	Moderate(s)	Moderate(s)	Slight
Riverbank	RB	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Riverwash	RW	Severe(f)	Severe(f)	Severe(f)	Severe(f)
Rockland	R	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Ruch	Ru2	Moderate(s)	Moderate(p)	Slight	Slight
Ruch	Ru3	Severe(s)	Moderate(s)	Moderate(s)	Slight
Salem	Sa	Slight	Slight	Slight	Slight
(Sp)*	Sp3	Severe(s)	Moderate(s)	Moderate(s)	Slight
(Sp)*	Sp4	Severe(s)	Severe(s)	Severe(s)	Moderate(s)
(Sp)*	Sp5,6	Severe(s)	Severe(s)	Severe(s)	Severe(s)
(St)*	St	Moderate(w)	Moderate(w)	Slight	Slight
(Tl)*	Tl	Moderate(t)	Moderate(t)	Slight	Slight
Willakenzie	Wi2	Moderate(s)	Slight	Slight	Slight
Willakenzie	Wi3	Severe(s)	Moderate(s)	Moderate(s)	Slight
Willakenzie	Wi4;IV4	Severe(s)	Severe(s)	Severe(s)	Moderate(s)
Willakenzie	Wi5,6;IV5,6	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Yoncalla	Yo	Severe(p)	Severe(p)	Slight	Slight
Yoncalla	Yo2	Severe(p)	Severe(p)	Slight	Slight
Yoncalla	Yo3	Severe(p)	Severe(p)	Moderate(s)	Moderate(s)
Yoncalla	Yo4	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Reconnaissance Units, Possible Series					
Josephine, Boomer	I4	Severe(s)	Severe(s)	Severe(s)	Moderate(s)
Josephine, Boomer	I5,6	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Siskiyou	II6	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Peel	III3,4	Severe(s)	Severe(s)	Severe(t)	Severe(t)
Peel	III5,6	Severe(s)	Severe(s)	Severe(s)	Severe(s)

Table 10. (Cont.) Interpretations for Playgrounds, Camp Areas, Picnic Areas, and Paths and Trails

Soil series or land type	Map symbol	Degree of soil limitation[1/] for: Playgrounds	Camp areas	Picnic areas	Paths and trails
Willakenzie	IV4	Severe(s)	Severe(s)	Severe(s)	Moderate(s)
Willakenzie	IV5,6	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Dixonville	V5,6	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Honeygrove, Apt	VI4	Severe(s)	Severe(s)	Severe(s)	Moderate(s)
Honeygrove, Apt	VI5,6	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Blachly, Slickrock	VIII5,6	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Astoria, Trask	IX5,6	Severe(s)	Severe(s)	Severe(s)	Severe(s)
Lint, Netarts	X5	Severe(s)	Severe(s)	Severe(s)	Severe(s)

* Unnamed proposed series.

1/ Soil-limiting factors:

(b) bearing strength
(c) canopy cover
(d) depth limitation
(e) erosion hazard
(f) flooding hazard
(p) permeability limitation
(s) slope limitation
(ss) shrink-swell potential
(t) textural limitation
(w) wetness limitation
(x) excessive drainage

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Appendix 1. Soil Limitations for Septic Tank Filter Fields (Drainfields)

Items affecting use	Degree of soil limitation		
	Slight	Moderate	Severe
Permeability class	Rapid, moderately rapid, and upper end of moderate (more than 1"/hr.)[1/]	Lower end of moderate (1.00 to 0.63"/hr.)	Moderately slow and slow (less than 0.63"/hr.)[2/]
Hydraulic conductivity rate(Uhland core procedure)	More than 1.0 inch/hr. [1/]	1.0 to 0.63 inch/hr.	Less than 0.63 inch/hr.
Percolation rate (post-hole procedure)	Faster than 45.0 min./inch [1/]	45 to 75 min./inch	Slower than 75 min./inch
Depth to water table (seasonal or normal)	Over 4.0 feet below surface	2.0 to 4.0 feet temporary seasonal water table	Less than 2.0 ft. normally high water table
Flooding hazard (frequency)	Not subject to flooding	Very seldom flood. Not more often than once in 5 years.	Subject to flood. More often than once in 5 years.
Slopes	0 to 7%	7 to 12%	Over 12%
Depth to hardrock, bedrock, or other impervious materials	Over 6.0 feet	4.0 to 6.0 feet	Less than 4.0 feet

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[1/] Pollution to water supplies is a hazard.

[2/] In arid or semi-arid areas soils with moderately slow permeability may have a moderate limitation.

Appendix 2. Soil Limitations for Lagoons [1/]

Items affecting use	Degree of soil limitation		
	Slight	Moderate	Severe
Permeability	Less than 0.63 inch/hr.	0.63 to 2.0 inch/hr.	Over 2.0 inch/hr.
Depth to bedrock	Over 60"	40 to 60"	Less than 40"
Slope	Less than 2%	2 to 7%	Over 7%
Reservoir site material (Unified grouping)	GC, SC, CL, and CH	GM, ML, SM, and MH	GP, SW, SP, GW, OL, and OH
Coarse fragments, under 6" in diameter, by volume	Less than 20%	20 to 50%	Over 50%
Percent of surface area covered by coarse fragments over 6"	Less than 3%	3 to 15%	Over 15%
Organic matter	Less than 2%	2 to 15%	Over 15%
Flooding	None	Not more than once in 5 yrs	More often than once in 5 years

[1/] Items listed here are for the impounded area. Requirements for the dam are the same as for other embankments designed to impound water. See Soil Limitations for Pond Embankments, Appendix 7, page 43.

Appendix 3. Soil Limitations for Foundations and Location for Low Buildings

Items affecting use	Degree of soil limitation		
	Slight	Moderate	Severe
Wetness	Water table below 30"	Water table below 20"	Water table above 20"
Depth to bedrock	More than 40"	20-40"	Less than 20"
Susceptibility to sliding	Slight	Moderate	High
Slopes	Level to sloping	Moderately steep	Steep and very steep
Shrink-swell potential	Low	Moderate	High
Sheer strength	High	Moderate	Low
Flooding	None	Not more than once in 10 years	More often than once in 10 years

Appendix 4. Soil Limitations for Highways and Streets

Items affecting use	Degree of soil limitation		
	Slight	Moderate	Severe
Wetness	Water table below 20"	Water table below 10"	Water table above 10"
Flooding	None	Once each year	More than once each year
Slopes	0-12%	12-20% (if soil depth less than 40"); 12-30% (if soil depth more than 40")	Over 20% (if soil depth less than 40") Over 30% (if soil depth more than 40")
Depth to hard bedrock	More than 40"	20-40"	Less than 20"
Stoniness[1/]	Classes 0, 1, 2	Class 3	Classes 4 & 5
Shrink-swell potential	Low	Moderate	High
Potential frost heave[2/] (Unified groups)	GW, GP, GM, SW, SP, GC, SM, SC, CH	ML, CL, MH	

1/ See definition in Soil Survey Manual, USDA Handbook 18, 1951, pp. 217-221.

2/ Rate this item only for soils at elevations above 4,000 feet, or as local experience indicates.

Appendix 5. Soil Limitation Rating For Untreated Steel Pipe[1/]

Soil Property or quality	Degree of soil limitation		
	Low	Moderate	High
Drainage class and texture	Somewhat excessively or excessively drained - coarse OR Well drained - moderately coarse or medium OR Somewhat poorly drained - coarse	Well drained - moderately fine OR Moderately well drained - medium OR Somewhat poorly drained - moderately coarse OR Very poorly drained peats and mucks with water table at surface throughout the year	Moderately well or well drained - fine OR Moderately well drained - moderately fine OR Somewhat poorly drained - medium or moderately fine OR Poorly drained - coarse to moderately fine OR Somewhat poorly, poorly, or very poorly drained - fine OR Very poorly drained with fluctuating water table within 1 foot of surface OR Peats and mucks with fluctuating water table
Total acidity[2/] (meq. H+/100 g.)	Less than 8	8-12	Greater than 12
Conductivity saturation extract (mmhos/cm @ 25° C)	Less than 1	1-4	Greater than 4

[1/] Or other untreated steel in contact with soil.

[2/] Roughly equal to extractable acidity as determined by Soil Survey Laboratories, or sodium acetate base exchange capacity - sum of bases = extractable acidity.

Appendix 6. Soil Limitations for Pond Reservoir Areas

Items affecting use	Degree of soil limitation		
	Slight	Moderate	Severe
Permeability	Less than 0.63"/hr.	0.63 to 2.0"/hr.	Over 2.0"/hr.
Depth to bedrock	Over 60"	40-60"	Less than 40"
Slope	0-12%	12-30%	Over 30%
Reservoir site material (Unified groups)	GC, SC, CL, CH	GM, SM, ML, MH, OH	GP, GW, SP, SW, OL
Organic matter	Less than 2%	2-15%	Over 15%

Appendix 7. Soil Limitations for Pond Embankments

Items affecting use	Degree of soil limitation		
	Slight	Moderate	Severe
Soil material[1/] (Unified groups)	GC, SC, CL, CH	GM, SM, ML, MH	GP, GW, SP, SW
Shrink-swell potential	Low	Moderate	High
Organic matter	0-5%	5-15%	Over 15%
Coarse fragments over 6" dia. by volume	None	Less than 5%	Over 5%

[1/] Soils classed as OL, OH, or PT are not suitable for embankments.

Appendix 8. Soil Limitations for Terraces and Diversions

Items affecting use	Degree of soil limitation		
	Slight	Moderate	Severe
Depth to hard rock or limiting layer	Over 40"	20-40"	Less than 20"
Slope	0-12%	12-20%	20-30%
Soil material (Unified) groups)	GC, SC, CL, CH	CM, ML, SM, MH	GP, SW, SP, OL, OH
Stoniness	None	0-5%	Over 5%
Shrink-swell	Low	Medium	High

Appendix 9. Soil Limitations for Winter Grading

Items affecting use	Degree of soil limitation		
	Slight	Moderate	Severe
Depth to water table	More than 40"	20-40"	Less than 20"
Surface soil texture	Loam and coarser	Silt loam, clay loam, silty clay loam	Silty clay and clay
Coarse fragments in surface layer	0-20%	20-50%	50%+
Slope	0-12%	12-20%	Over 20%
Depth to hard rock	Over 40"	20-40"	Less than 20"

Appendix 10. Suitability for Topsoil

Items affecting use	Degree of suitability		
	Good	Fair	Poor
Depth of suitable material	Over 20"	10-20"	Less than 10"
Texture	sl, l, sil	sicl, cl, ls, scl	s, sic, c
Coarse fragments			
Less than 3" dia.	Less than 5%	5-20%	20-50%
More than 3" dia.	None	Less than 5%	5-20%
pH	5.6-7.8	7.8-8.4 5.5 or less	Over 8.5

Appendix 11. Suitability for Sand and Gravel

Items affecting use	Degree of suitability		
	Good	Fair	Poor
Depth of overburden	Less than 20"	20-60"	Over 60"
Amount of fines (silt & clay)	Less than 5%	5-10%	10-15%
Water table	Over 60"	20-60"	Less than 20"

Appendix 12. Suitability for Road Fill

Items affecting use	Degree of suitability		
	Good	Fair	Poor
AASHO classification 1/	A-1, A-2-4, A-2-5	A-3, A-2-6, A-2-8, A-4, A-5	A-6,A-7
Unified classification 1/	GW, GP, GM, SW, SP, SM	GC, SC, ML, CL	MH, CH, OL, OH, ML, CL
Depth of suitable material	Over 40"	20-40"	Less than 20"
Shrink-swell potential	Low	Moderate	High
Sheer strength	High	Moderate	Low
Compressibility	Slight	Moderate	High
Susceptibility to frost action	Slight	Moderate	High

1/ Organic soils are not suited for road fill.

Appendix 13. Suitability for Farming

Items affecting use	Degree of suitability		
	Good	Fair	Poor
Slope [1/]	0-12%	12-20%	20-35%
Texture	sl, l, sil, sicl, cl	ls, sic	c, s
Rooting depth	Over 40"	20-40"	Less than 20"
Coarse fragments	Less than 20% gravel; less than 10% cobbles Non-stony	20-50% gravel 10-25% cobbles Stony	More than 50% gravel; more than 25% gravel. Very stony
Water table	Below 30"	10-30"	Less than 10"
Climate	Generally 18-60" ppt.	Generally over 60" or 10-18" ppt.	Less than 10" ppt.
Flooding	Non-overflow	Winter overflow	Summer overflow
Capability	I & II	III	IV, VI, VII, VIII

[1/] Slope limitations may be different for some speciality crops.

Appendix 14. Suitability for Woodland

Items affecting use	Degree of suitability		
	Good	Fair	Poor
Site class	I, II, III	IV	V
Slope	0-25%	25-50%	50%+
Equipment limitations	None or slight	Moderate	Severe, special equipment needed
Wetness	Water table below 30"	Water table below 20"	Water table above 20"
Soil depth	40" or more	20-40"	Less than 20"
Texture of surface	sl, l, sil, sicl, cl	ls, sic	c, s
Coarse fragments on surface	0-20%	20-50%+	

Appendix 15. Suitability for Improved Permanent Pasture

Items affecting use	Degree of suitability		
	Good	Fair	Poor
Soil depth	20" or more	12-20"	Less than 12"
Slope	0 to 40%	40-70%	
Texture of surface layer	sl, l, sil, sicl, cl	ls, sic, c	s
Moisture-supplying capacity	6" or more	3-6"	Less than 3"
pH	6.0-8.5	8.5-9.1 4.8-5.9	9.1+
Stand density (canopy cover)	Pine-bnchgr., pine-sedge, oak-grass Open	Pine-fir-sedge, mixed oak-conifer Medium	Fir-pine forest, mixed fir forest Dense

Appendix 16. Guide for Irrigability Interpretations

	Irrigation suitability ratings			
	Excellent	Good/fair	Poor	Very poor and nonirrigable
Soil or land characteristics	Slight limitations	Moderate limitations	Severe limitations	Very severe limitations
Texture of root zone	Fine sandy loam to friable clay loam	Loamy sand and permeable clay	Loamy sand and clay (sand with over 3-inch AWHC)	Sand with less than 3-inch AWHC
Depth to clean sand, gravel, or cobbles, impermeable sediments, hard rock, hardpan, or caliche (If hardpan can be modified by deep tillage, it should be rated less severely.)	40 inches plus (deep)	20-40 inches (moderately deep)	10-20 inches (shallow)	Less than 10 inches (very shallow)
Stoniness of tillage layer (more than 10 inches in diameter)	No problem in tillage	Cultivation not impractical but some clearing needed	Cultivation impractical unless cleared (up to 50 cu. yds/acre)	Clearing not practical
Rockiness (Small outcrops within soil type)	No problem in tillage	Up to 2% of surface	2-10% of surface	More than 10% of surface
Available water-holding capacity (to a maximum depth of 4 feet)	More than 6"	4.5 to 6"	3 to 4.5"	Less than 3"
Permeability	Moderately slow to moderately rapid	Slow and rapid	Very slow and very rapid	Other factors are more important
Sodium, alkalinity, and salinity	Less than 10% slick spots in complex	10-25% slick spots or ESP less than 15%	25% plus slick spots or ESP more than 15%	None set
Slope	Generally less than 4%; upper limit varies from 3 to 5%	Generally less than 12%; upper limit varies from 10 to 15%	Generally less than 20%; upper limit varies from 15 to 25%	Generally more than 20-25%
Water table	Below major rooting zone during growing season	Practical to maintain below major rooting zone during growing season (requires drainage)	Can maintain below 18" most of growing season	Above 18" most of growing season

Appendix 16. (Cont.) Guide for Irrigability Interpretations

	Irrigation suitability ratings			
	Excellent	Good/Fair	Poor	Very poor and nonirrigable
Overflow	None in growing season and not harmful in winter	Generally none in growing season	Overflow 2 or 3 times in 10 years	More than 3 in 10 years
Depth to impermeable barrier affecting internal drainage (Applies in physiographic positions with problem potential, i.e., certain basins, fans, pediment slopes, etc.)	8 feet	6-8 feet	4-6 feet	Less than 4 feet

Appendix 17. Soil Limitations for Playgrounds

Items affecting use	Degree of soil limitation		
	Slight	Moderate	Severe
Wetness	Excessive, somewhat excessive, well, & moderately well drained soils. Water table below 30" during season of use	Moderately well & somewhat poorly drained soils. Water table below 20" during season of use	Somewhat poorly, poorly, & very poorly drained soils. Water table above 20" during season of use
Flooding	None during season of use	May flood once in 2 years during season of use	Floods more than once in 2 years during season of use
Permeability	Very rapid to moderate inclusive	Moderately slow and slow	Very slow
Slope	0-3%	3-7%	7%+
Surface soil texture	sl, fsl, vfsl, l, sil	cl, scl, sicl, ls	sc, sic, c, organic soils, sand, and loamy sand subject to blowing
Depth to bedrock	Over 40"	20-40"	Less than 20"
Coarse fragments	Relatively free of fragments	Up to 20% coarse fragments	20%+
Stoniness[1/]	Class 0	Classes 1 & 2	Classes 3, 4,& 5
Rockiness[1/]	Class 0	Class 1	Classes 2,3,4,& 5

[1/] Soil Survey Manual, USDA Handbook 18, 1951.

Appendix 18. Soil Limitations for Camp Areas

Items affecting use	Degree of soil limitation		
	Slight	Moderate	Severe
Wetness	Excessive, somewhat excessive, well, & moderately well drained soils. Water table below 30" during season of use	Moderately well & somewhat poorly drained soils. Water table below 20" during season of use	Somewhat poorly, poorly, & very poorly drained soils. Water table above 20" during season of use
Flooding	None	None during season of use	Floods during season of use
Permeability	Very rapid to moderate inclusive	Moderately slow & slow	Very slow
Slope	0-7%	7-12%	12-20%+
Surface soil texture	sl, fsl, vfsl, l, sil	cl, scl, sicl, ls, and sand other than loose sand	Organic, sc, sic, c, loose sand, & soils subject to severe blowing
Coarse fragments on surface	0-20%	20-50%	50%+
Stoniness 1/	Classes 0 & 1	Class 2	Classes 3, 4, & 5
Rockiness 1/	None	Classes 1 & 2	Classes 3,4, & 5

1/ Soil Survey Manual, USDA Handbook 18, 1951.

Appendix 19. Soil Limitations for Picnic Areas

Items affecting use	Degree of soil limitation		
	Slight	Moderate	Severe
Wetness	Excessive, somewhat excessive, well, & moderately well drained soils. Water table below 20" during season of use	Moderately well & somewhat poorly drained soils. Water table during season of use may be less than 20" for short periods	Poorly & very poorly drained soils. Water table above 20" and often near the surface for month or more during season of use
Flooding	None during season of use	May flood 1 or 2 times for short periods during season of use	Floods more than 2 times during season of use
Slope	0-7%	7-12%	12-20%

Appendix 19. (Cont.) Soil Limitations for Picnic Areas

Items affecting use	Degree of soil limitation: Slight	Moderate	Severe
Surface soil texture	sl, fsl, vfsl, l, sil	cl, scl, sicl, ls, & sand other than loose sand	sc, sic, c, loose sand, organic soils, & soils subject to severe blowing
Coarse fragments on surface	0-20%	20-50%	50%+
Stoniness[1/]	Classes 0,1, & 2	Class 3	Classes 4 & 5
Rockiness[1/]	Classes 0 & 1	Class 2	Classes 3,4, & 5

1/ Soil Survey Manual, USDA Handbook 18, 1951.

Appendix 20. Soil Limitations for Paths and Trails

Items affecting use	Degree of soil limitation: Slight	Moderate	Severe
Wetness	Excessive, somewhat excessive, well, & moderately well drained soils. Water table below 20" during season of use	Somewhat poorly drained soils. Water table during season of use may be above 20" for short periods	Poorly & very poorly drained soils. Water table above 20" and often near surface for month or more during season of use
Flooding	May flood once a year during season of use	May flood 2 or 3 times during season of use	Floods more than 3 times during season of use
Slope	0-12%	12-30%	30%+
Surface soil texture	sl, fsl, vfsl, l, sil	sicl, scl, cl, ls	sc, sic, c, sand, organic soils
Coarse fragments on surface	0-20%	20-50%	50%+
Rockiness or stoniness[1/]	Class 0 & 1	Class 2	Classes 3, 4, & 5

1/ Soil Survey Manual, USDA Handbook 18, 1951.