Wenatchee NF
Cool Dam

SOIL

RESOURCE INVENTORY



FOREST SERVICE • USDA
WENATCHEE NATIONAL FOREST

Chelan, Cle Elum, Ellensburg, Entiat,
Lake Wenatchee, and Leavenworth Ranger Districts

SOIL RESOURCE INVENTORY
WENATCHEE NATIONAL FOREST

Pacific Northwest Region
1976

Prepared by
Phillip D. McColley
Soil Scientist

PREFACE

This Soil Resource Inventory of the Wenatchee National Forest was made to provide some basic soils and related information for making management interpretations. The inventory is part of the regional soils program developed by the Soils Management Branch of the Division of Watershed Management to assist forest land managers in applying multiple use principles.

The objective of this Soil Resource Inventory is to provide soils information in a form useful to the land manager as an aid to multiple use management as directed by Public Law 86-517. This law states that the National Forests are to be administered to achieve and maintain in perpetuity a high level of annual or regular periodic output of the various renewable resources of the National Forests without impairment of the productivity of the land.

All renewable surface resources of the National Forest are dependent upon soil, which is a *non-renewable* resource. Soil develops at a very slow rate, about one inch every thousand years. This fact, plus the fact that most forest soils are thin to begin with, necessitates conservation, wise use, and preservation of this basic resource in order to produce sustained yields of water, timber, recreation, wildlife, and forage.

This report is divided into two parts. Volume I is a collection of technical information (soil maps, land type descriptions, interpretations, etc.). Volume II provides a broad overview of the soil forming factors on the Wenatchee National Forest. The overview is written in non-technical terms, so that it can be easily understood by all users.

Field mapping was conducted from April 1972 to October 1975, by Phillip D. McColley. During the course of the study, valuable assistance and cooperation was received from district personnel and other specialists.

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HOW TO USE THIS REPORT

THIS SOIL SURVEY contains information that can be applied to planning and to management. It includes portions of private land, so it will be useful to both the private and national forest land managers.

This report has four main parts: 1) Soil Map Sheets; 2) Landtype Descriptions; 3) Interpretations; and 4) Appendix. The actual content of each part is outlined in the Table of Contents. The first step is to identify the landtype or landtypes that occur in a study area.

LOCATING LANDTYPES

First, locate the study area on the *Index to Map Sheets*, then turn to the appropriate soil maps. The soil boundaries and map symbols identify the kind and extent of each unit. All areas marked with the same symbol have the same kinds of soils.

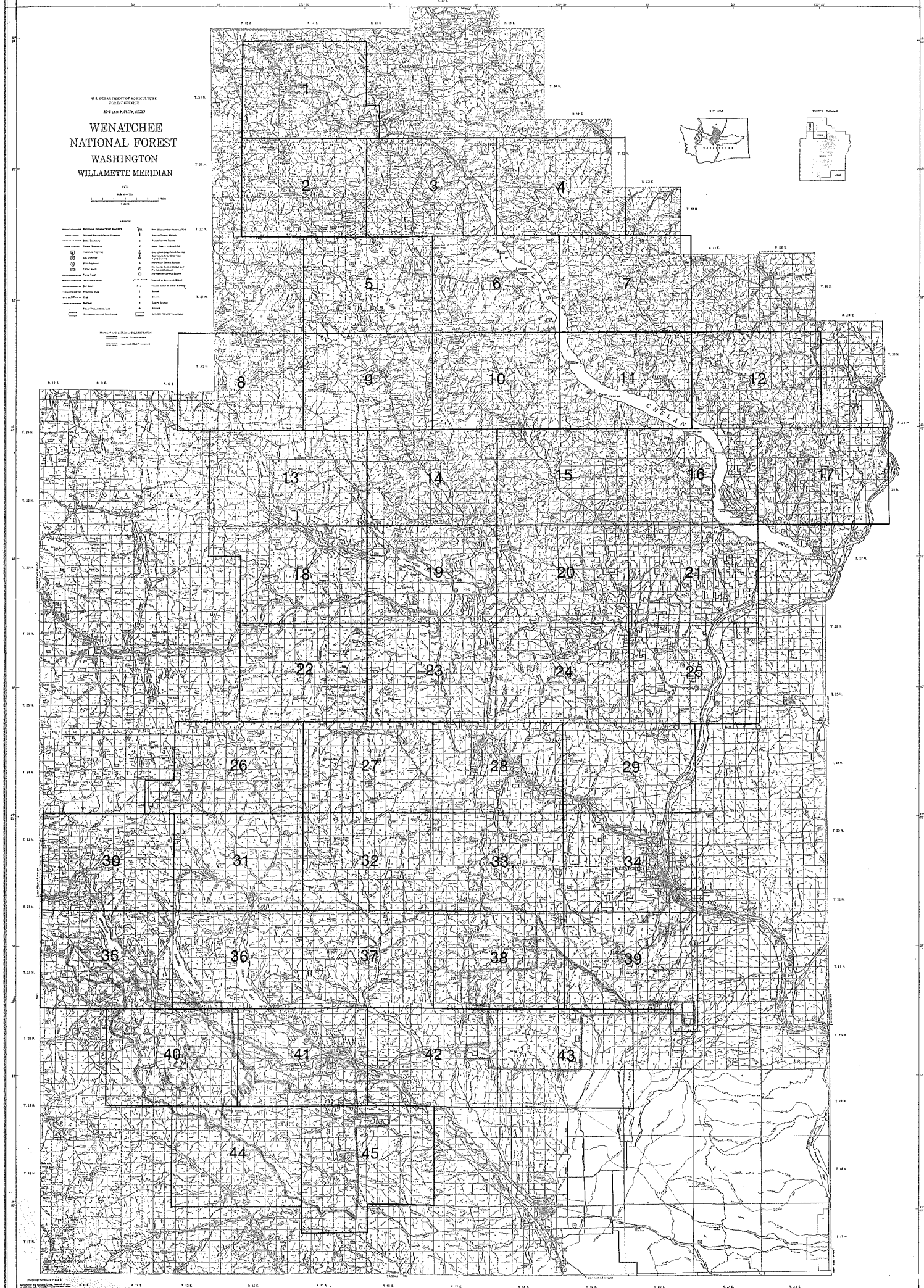
FINDING AND USING INFORMATION

Once the landtypes are identified, turn to the appropriate landtype description for further information. Each description has a small drawing of the soil profile and defines such things as soil depth, horizon thickness, texture, color, etc. In addition, some of the more important factors that affect use and management are covered.

Additional information can be found in the interpretations section. The four major categories of interpretations are: external characteristics; internal characteristics; erosion and hydrologic interpretations; and engineering interpretations. Each interpretation is defined and each landtype is given a rating. The ratings allow the landtypes to be grouped into units that have similar properties or management characteristics. The interpretations are also shown in a table at the end of each section.

The appendix is self explanatory.

SECTION I


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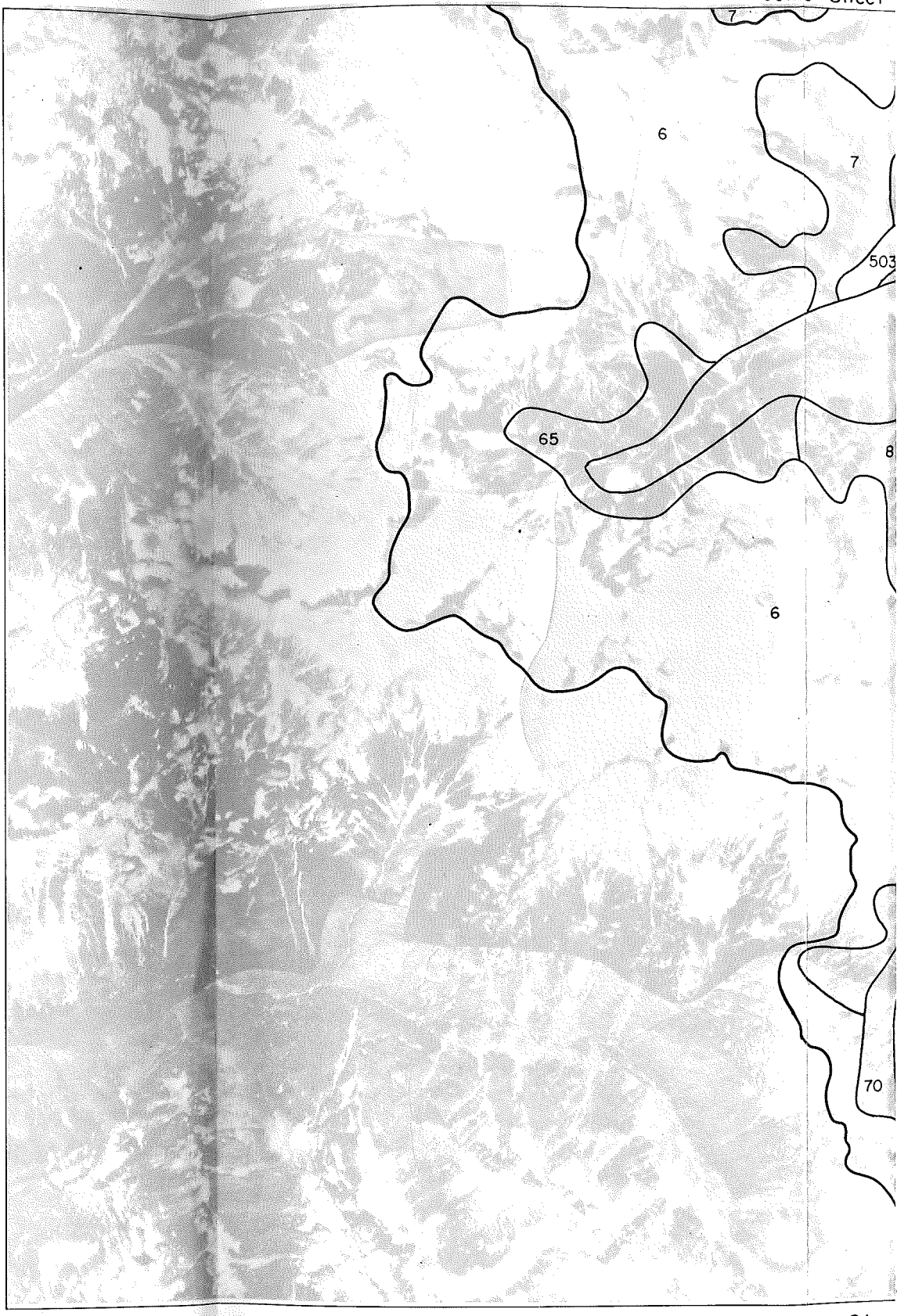
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SOIL RESOURCE INVENTORY

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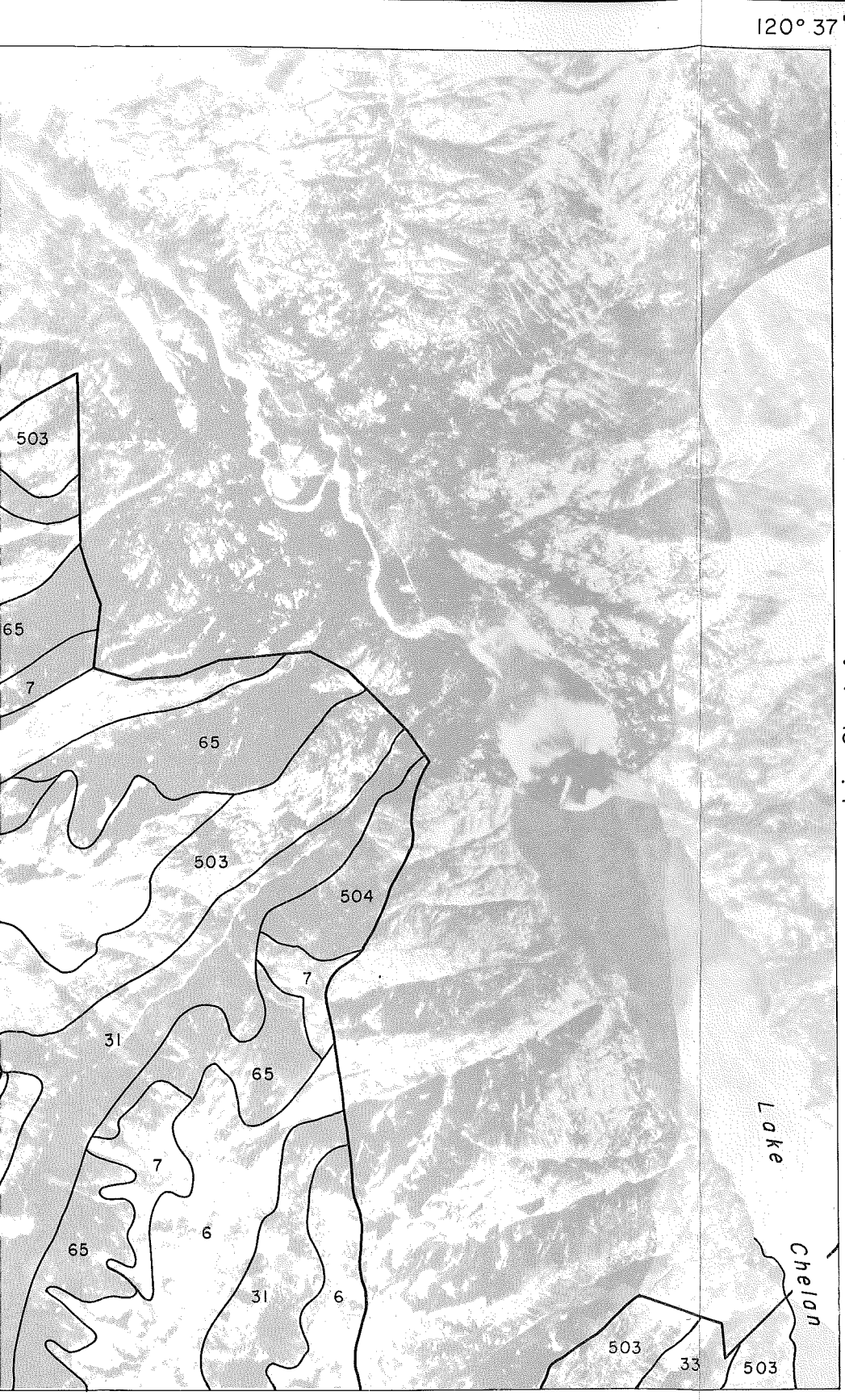
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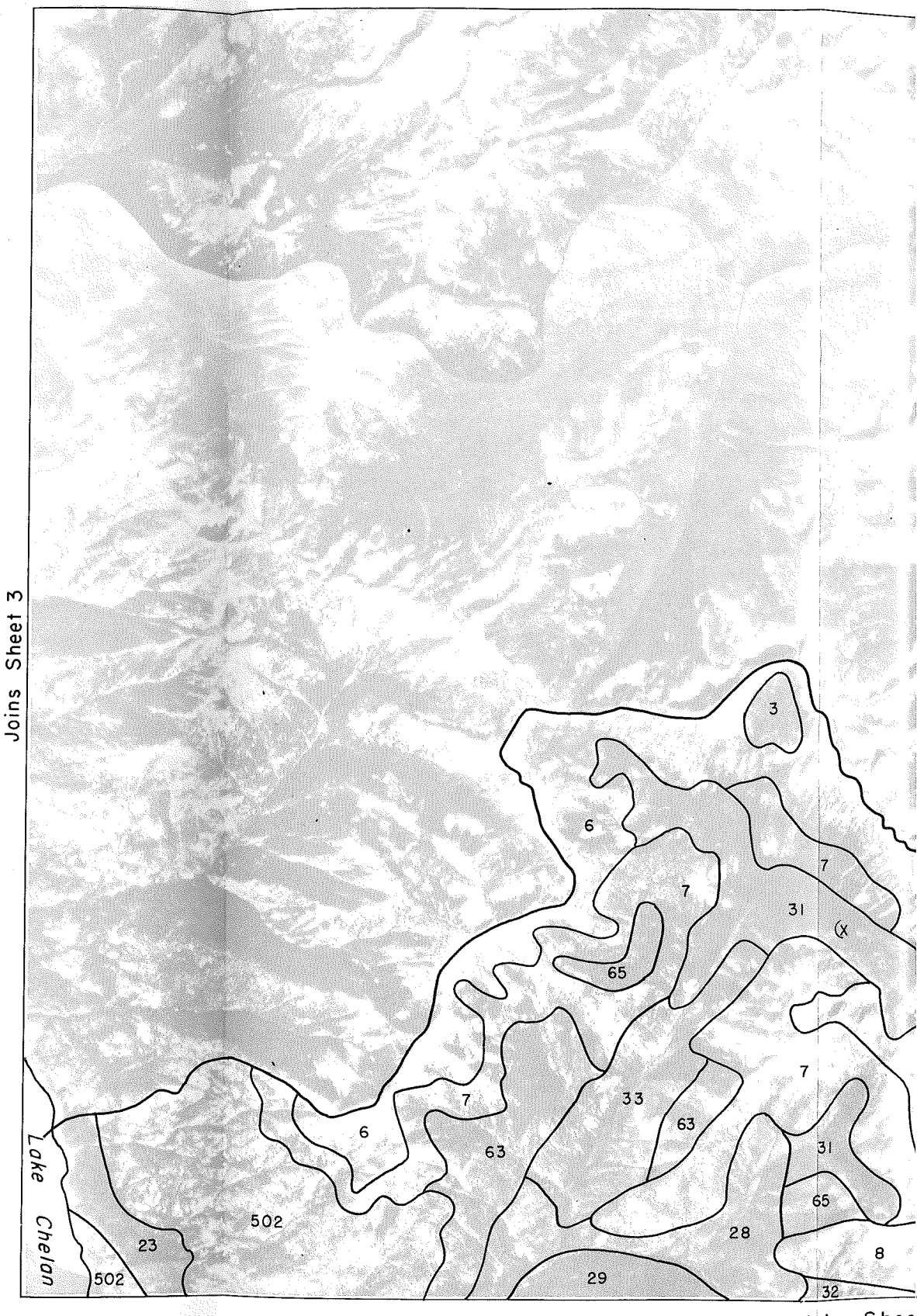
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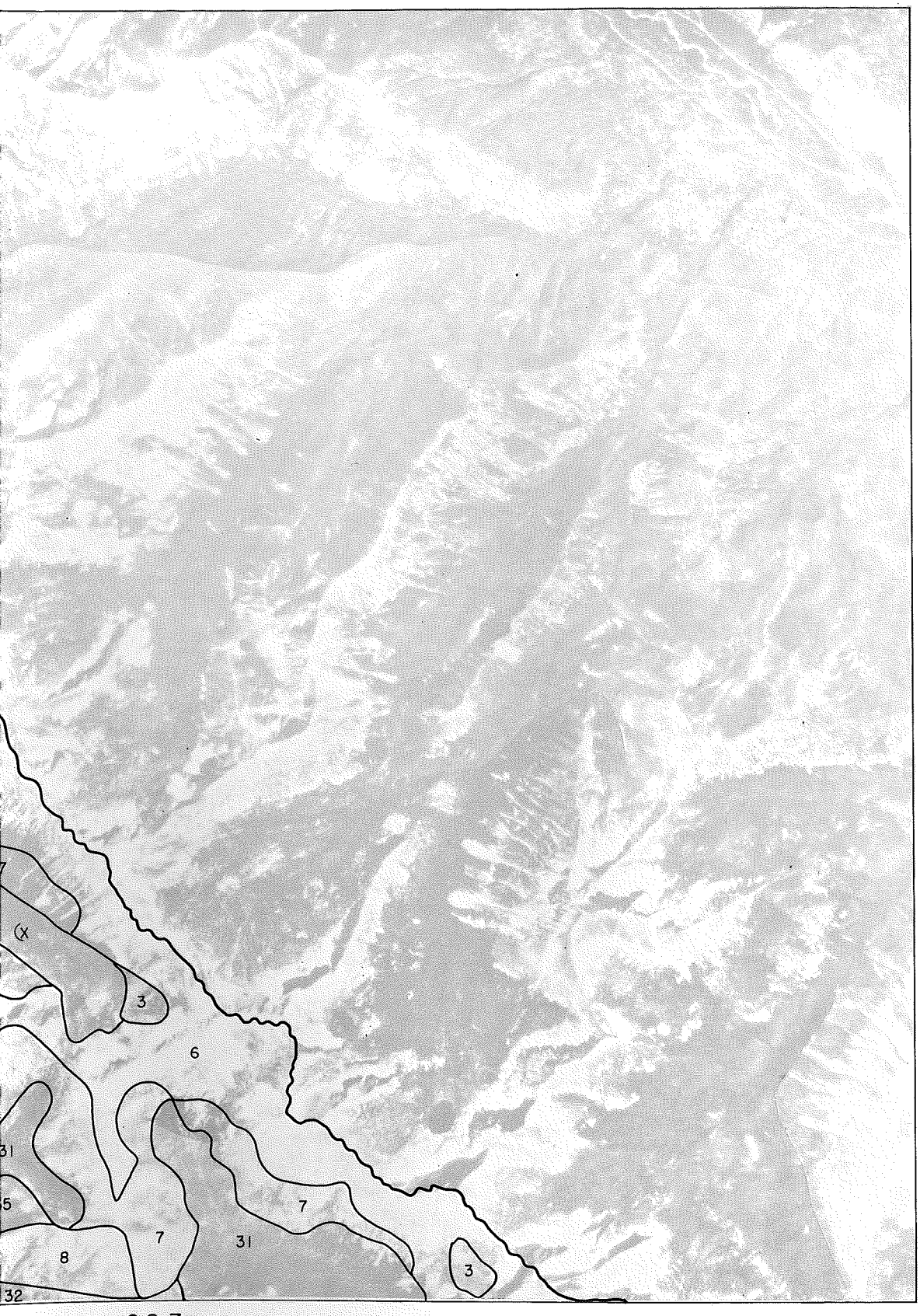
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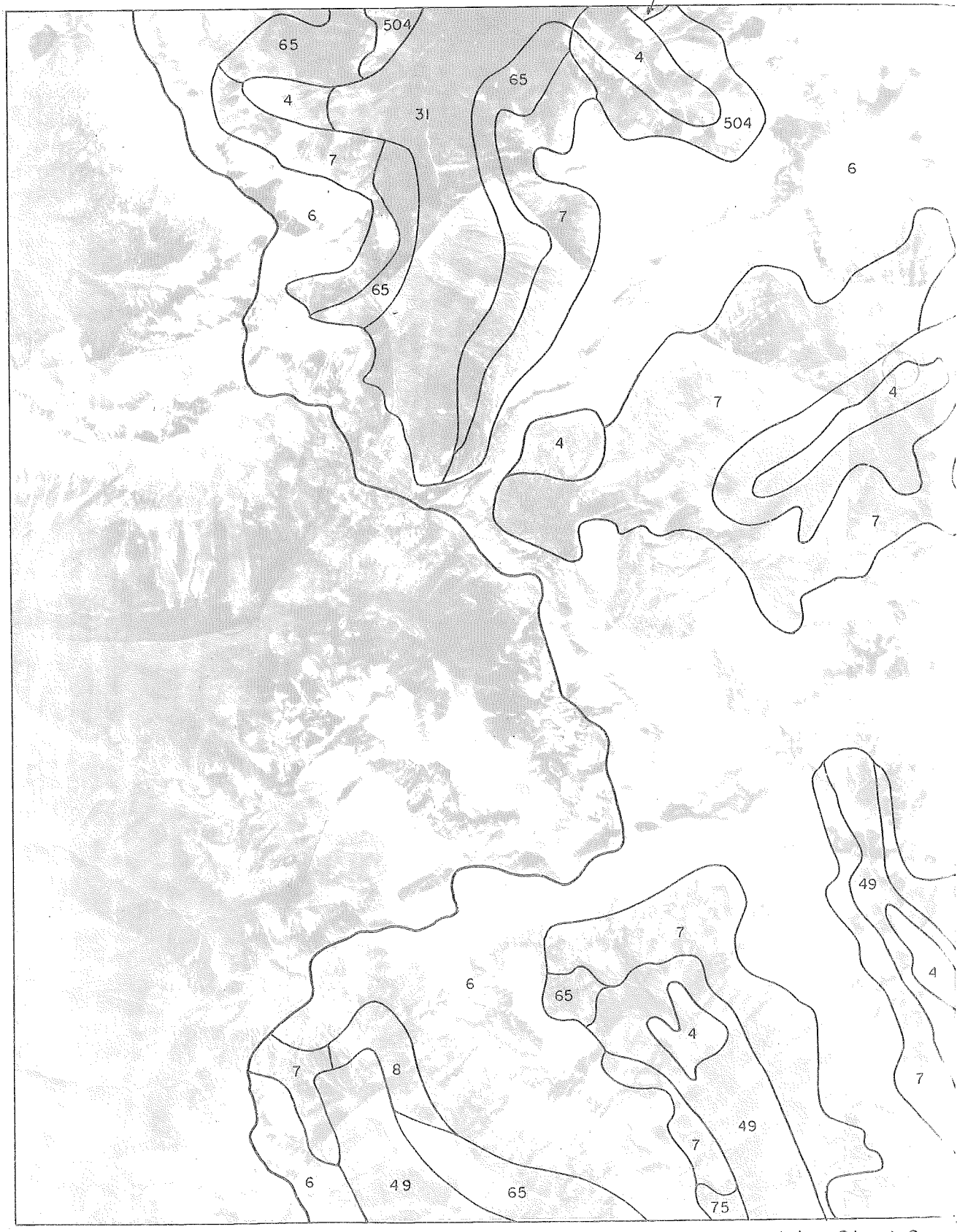
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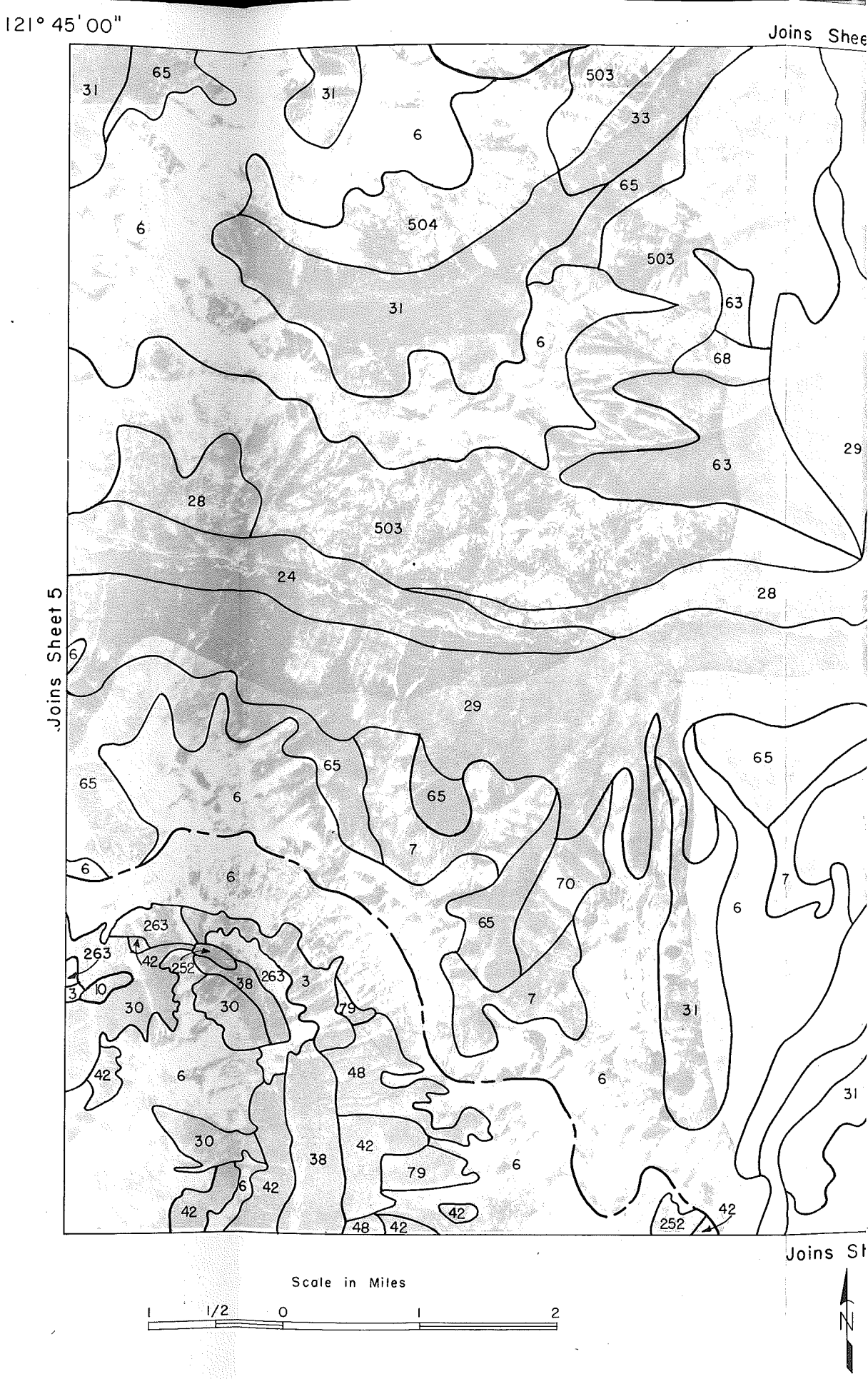


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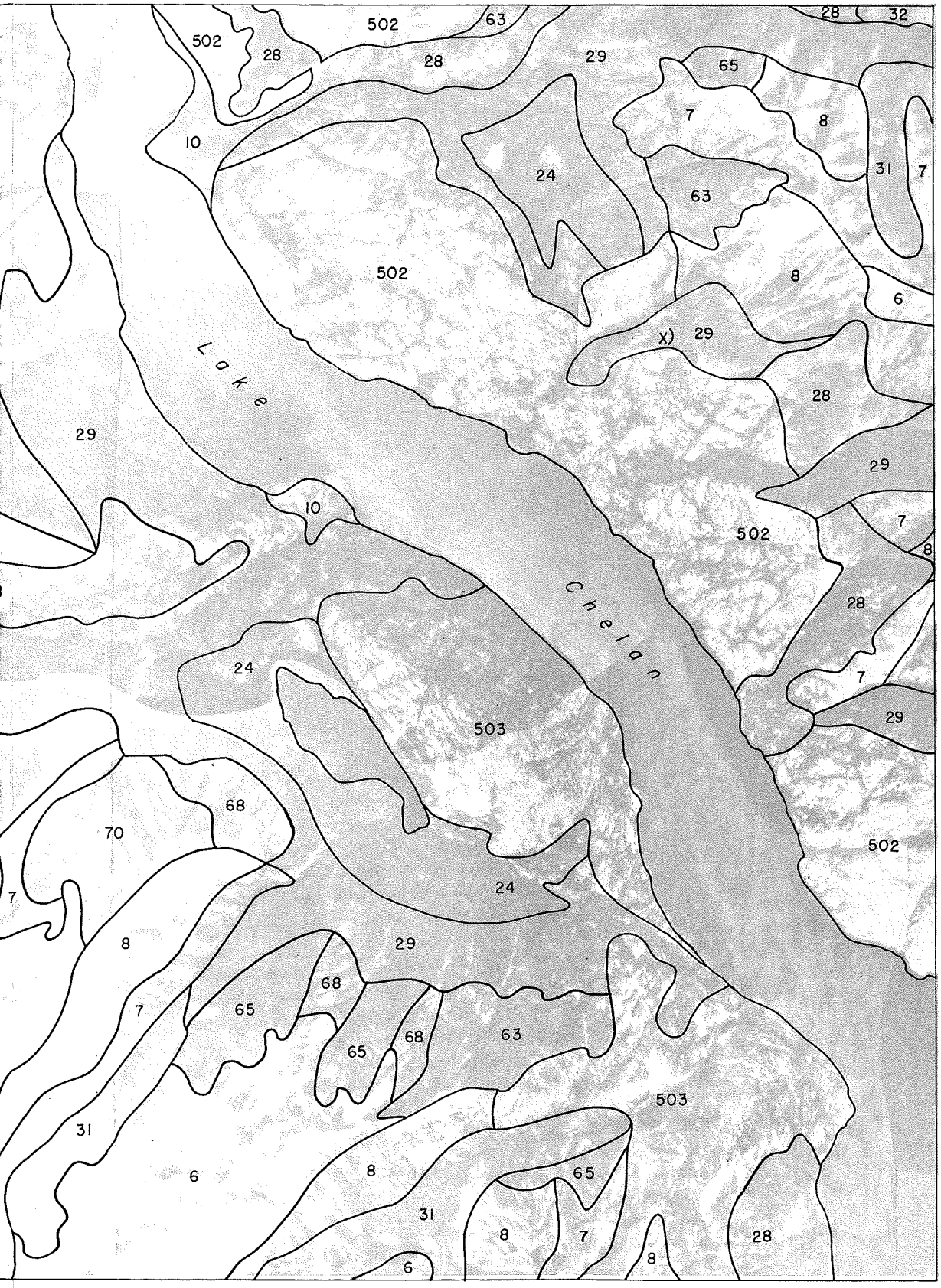
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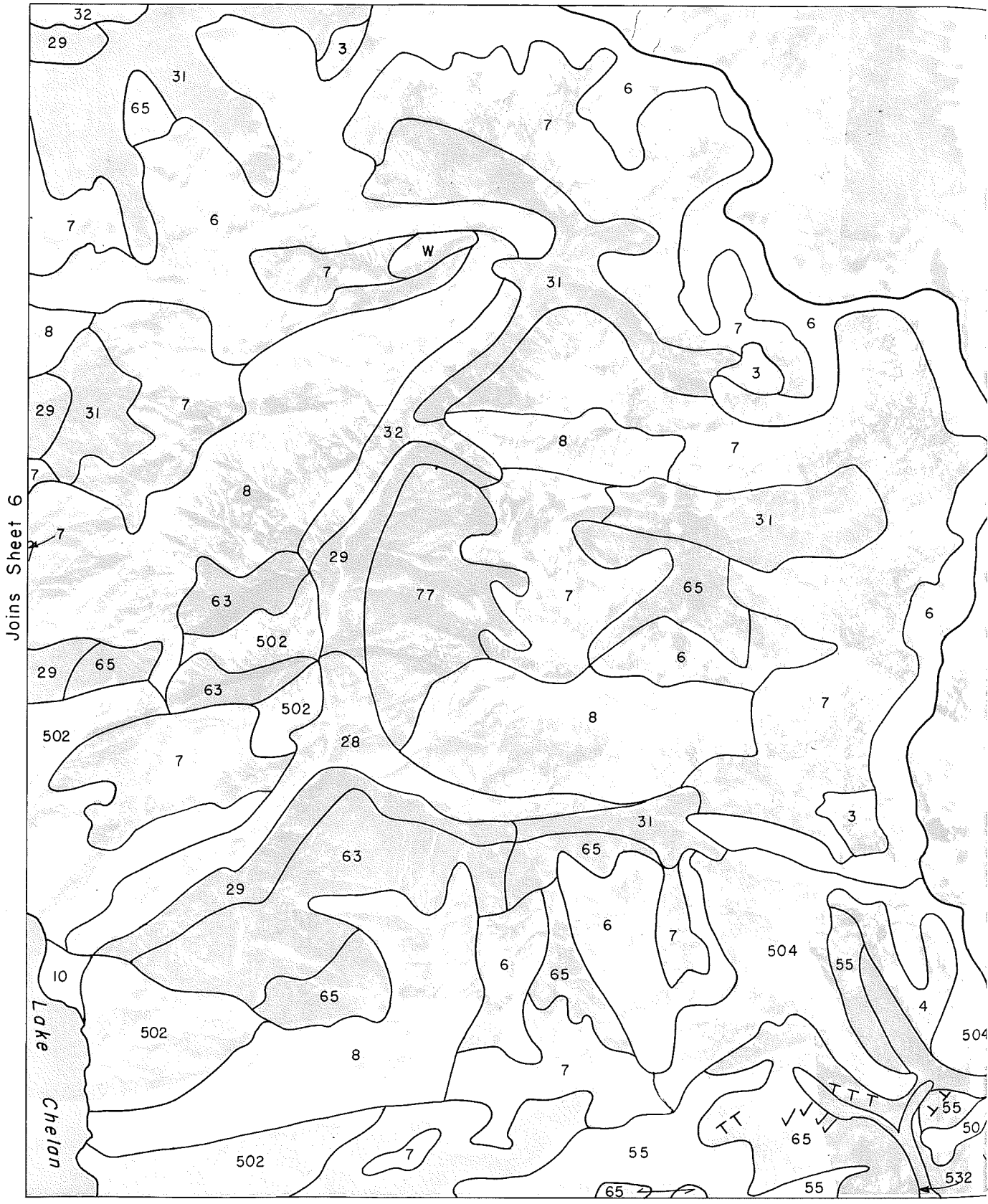
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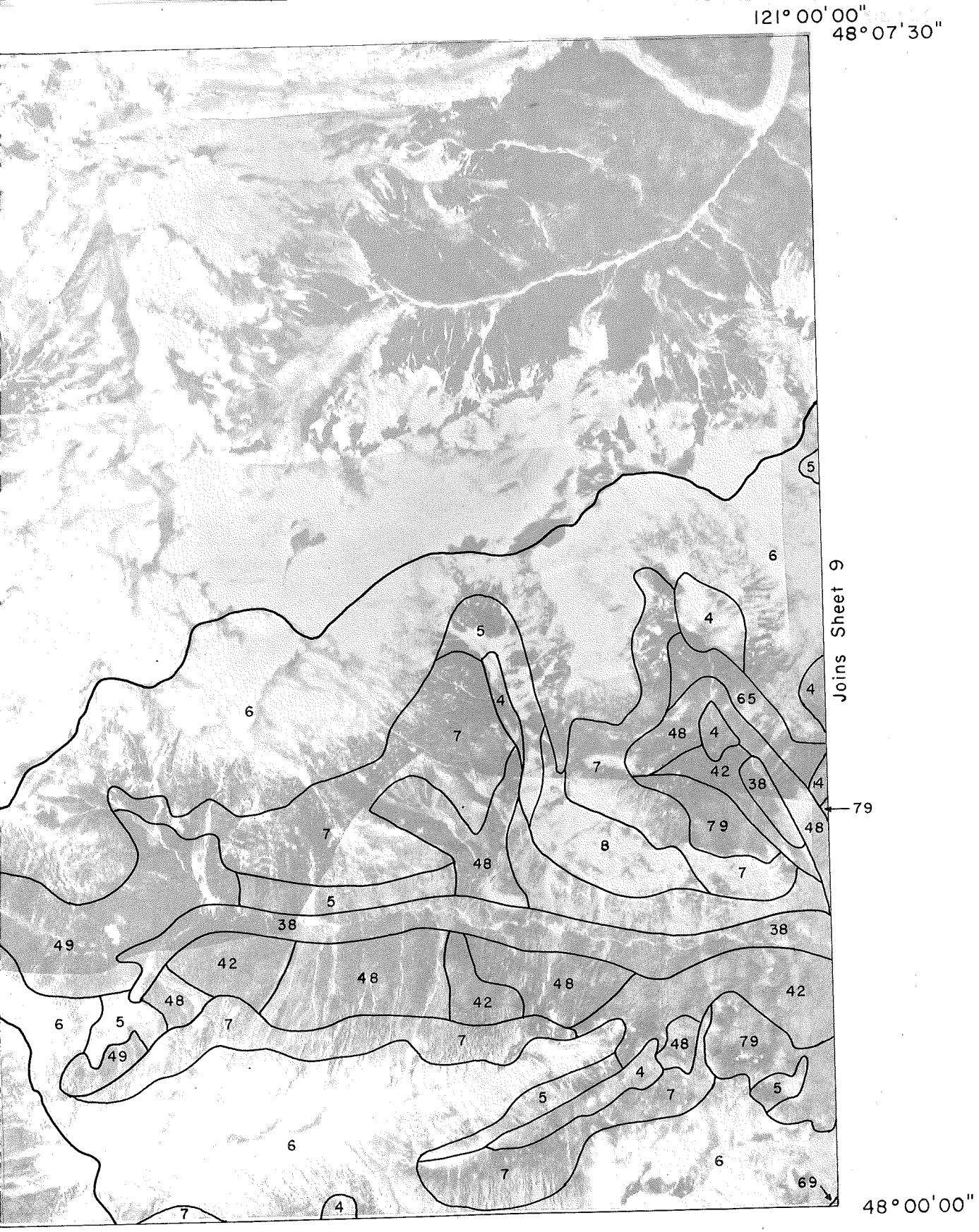


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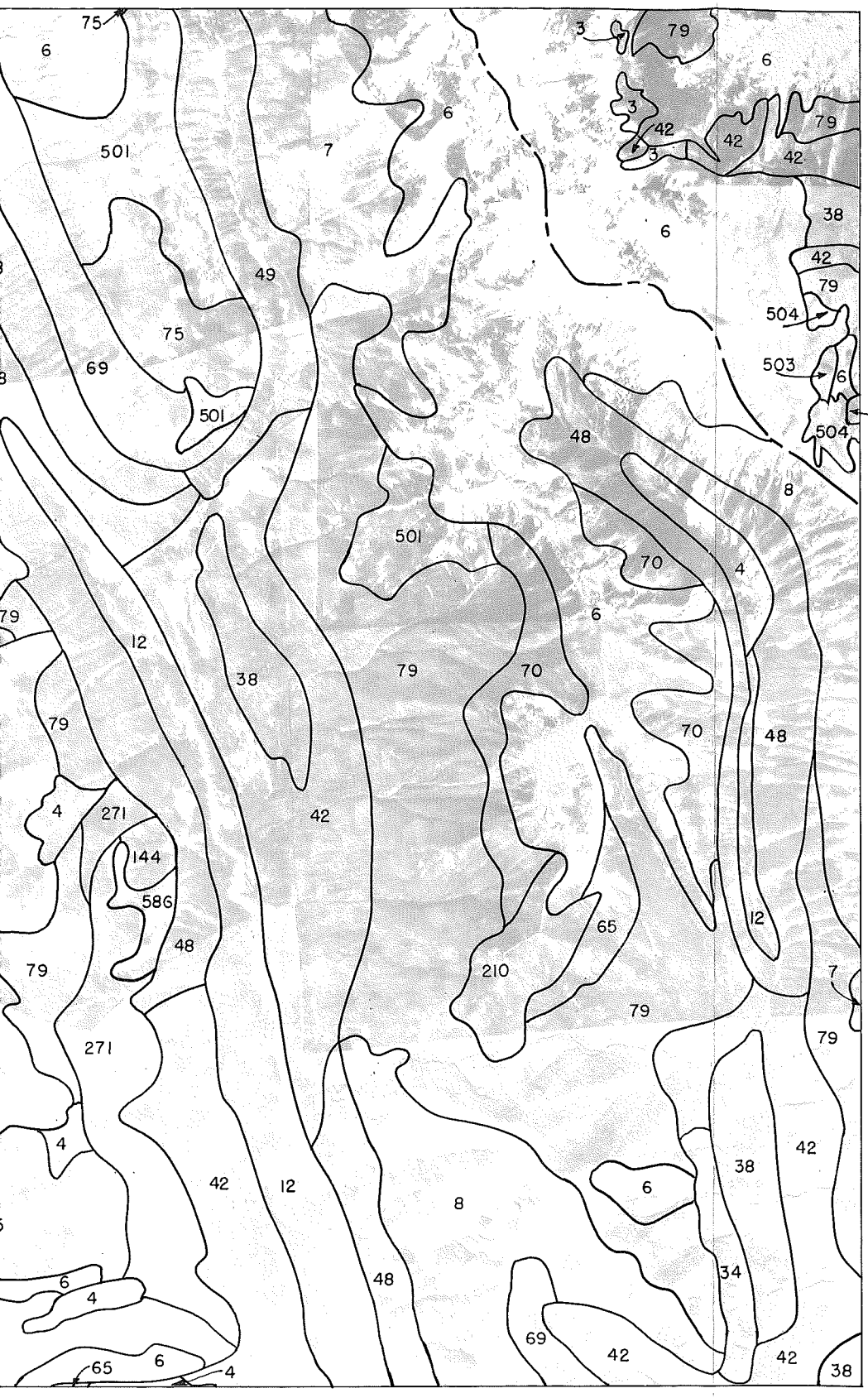
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Sheet 6

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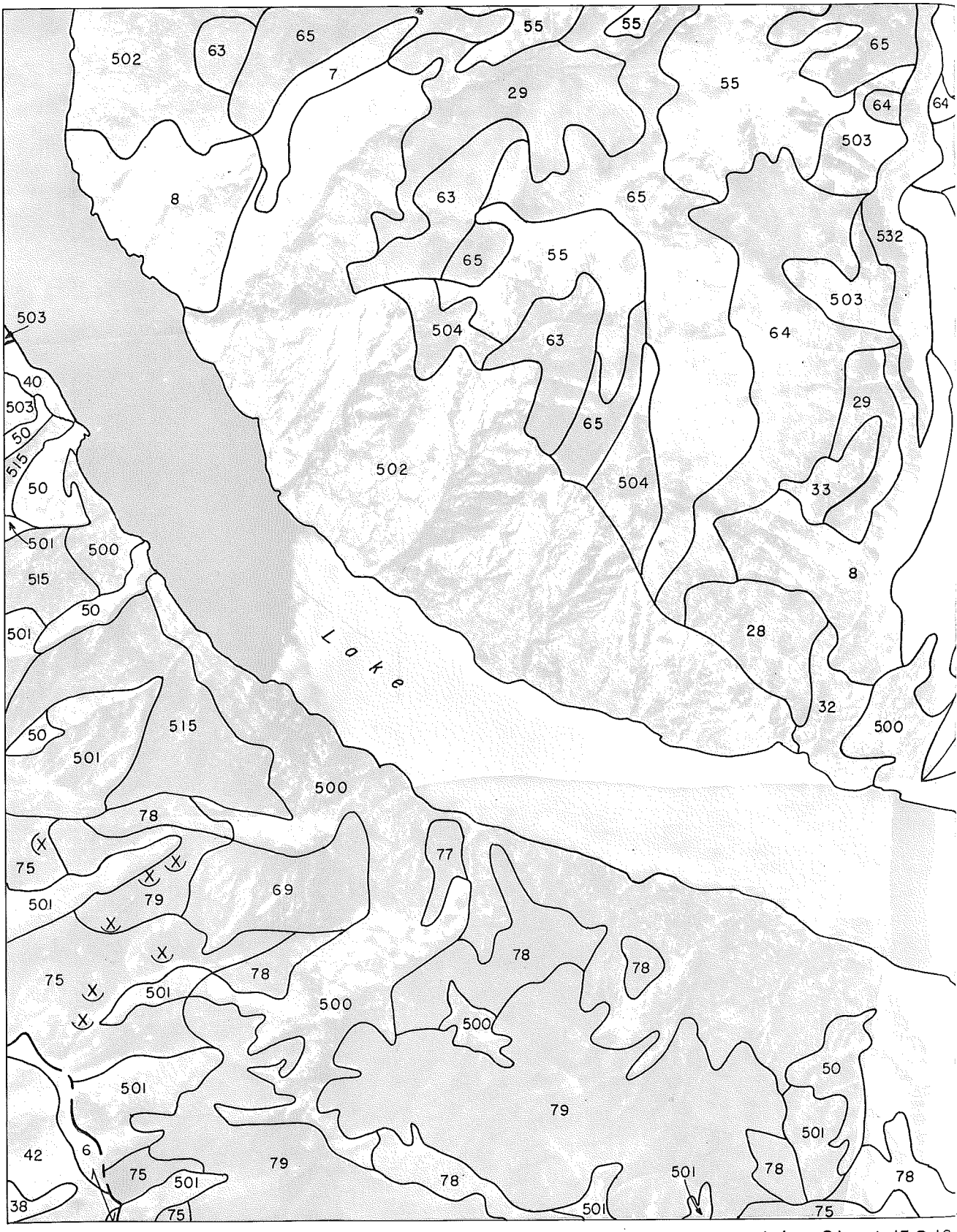
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WENATCHEE NATIONAL FOREST
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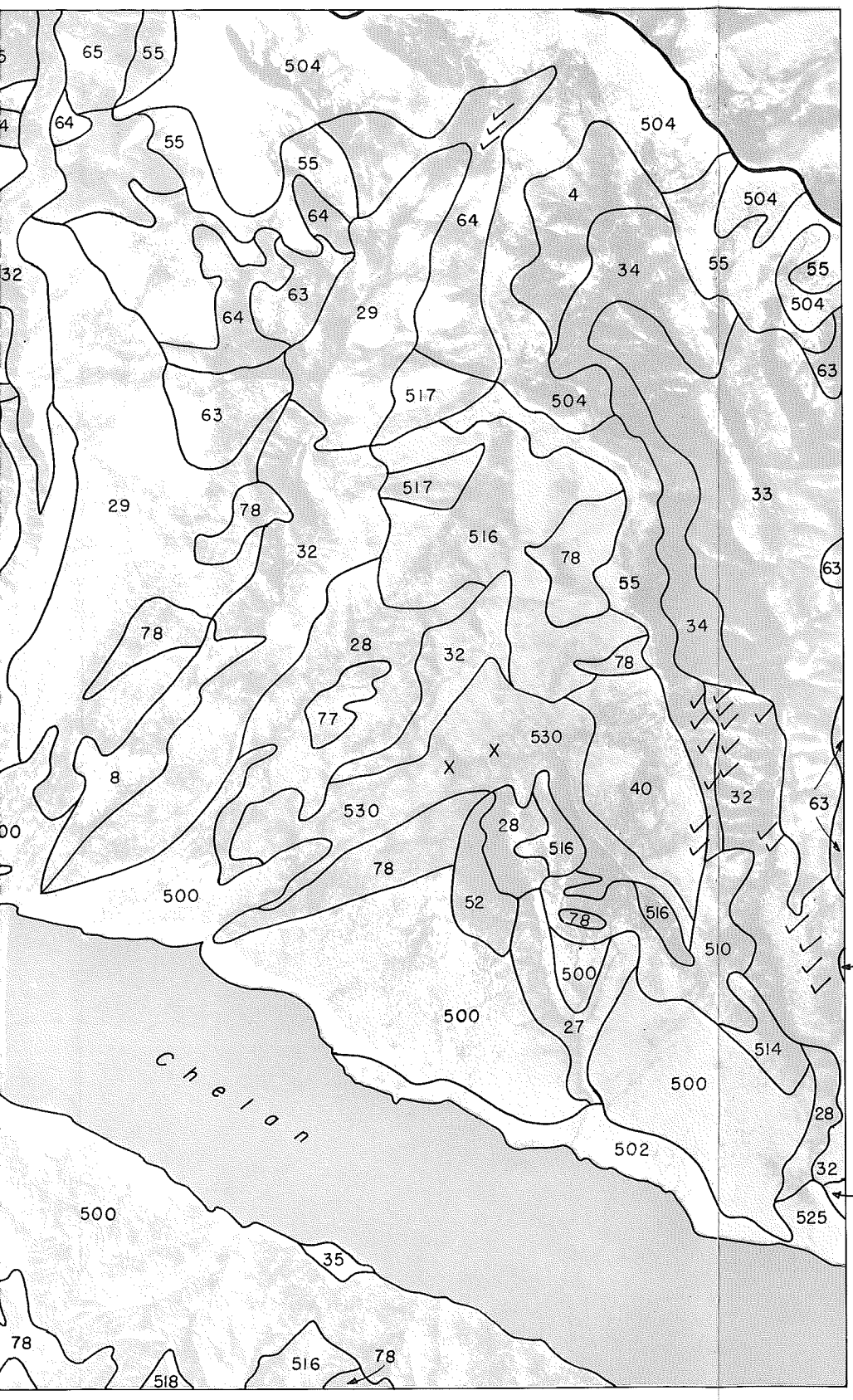
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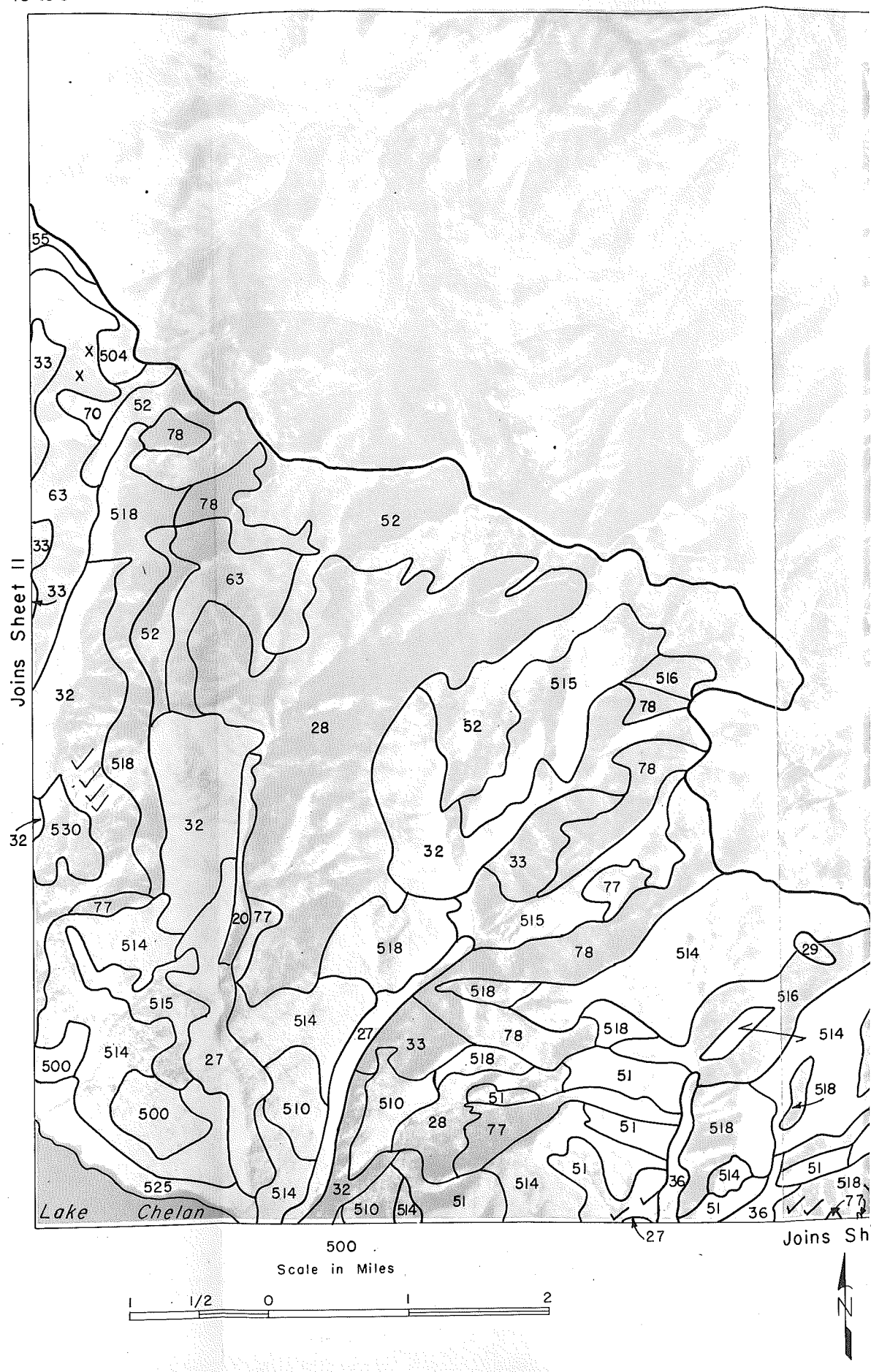
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SOIL RESOURCE INVENTORY


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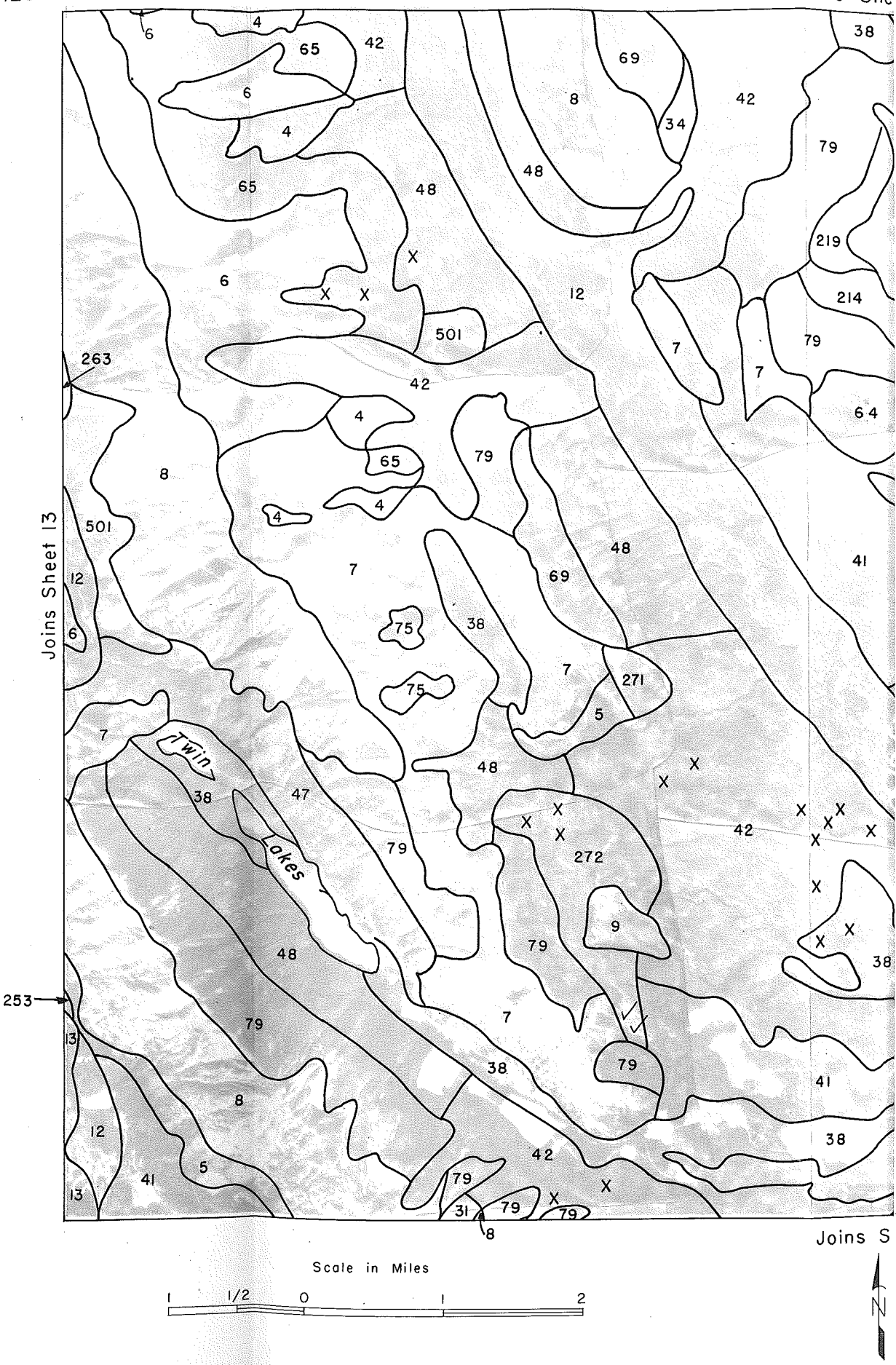
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WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

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WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

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WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

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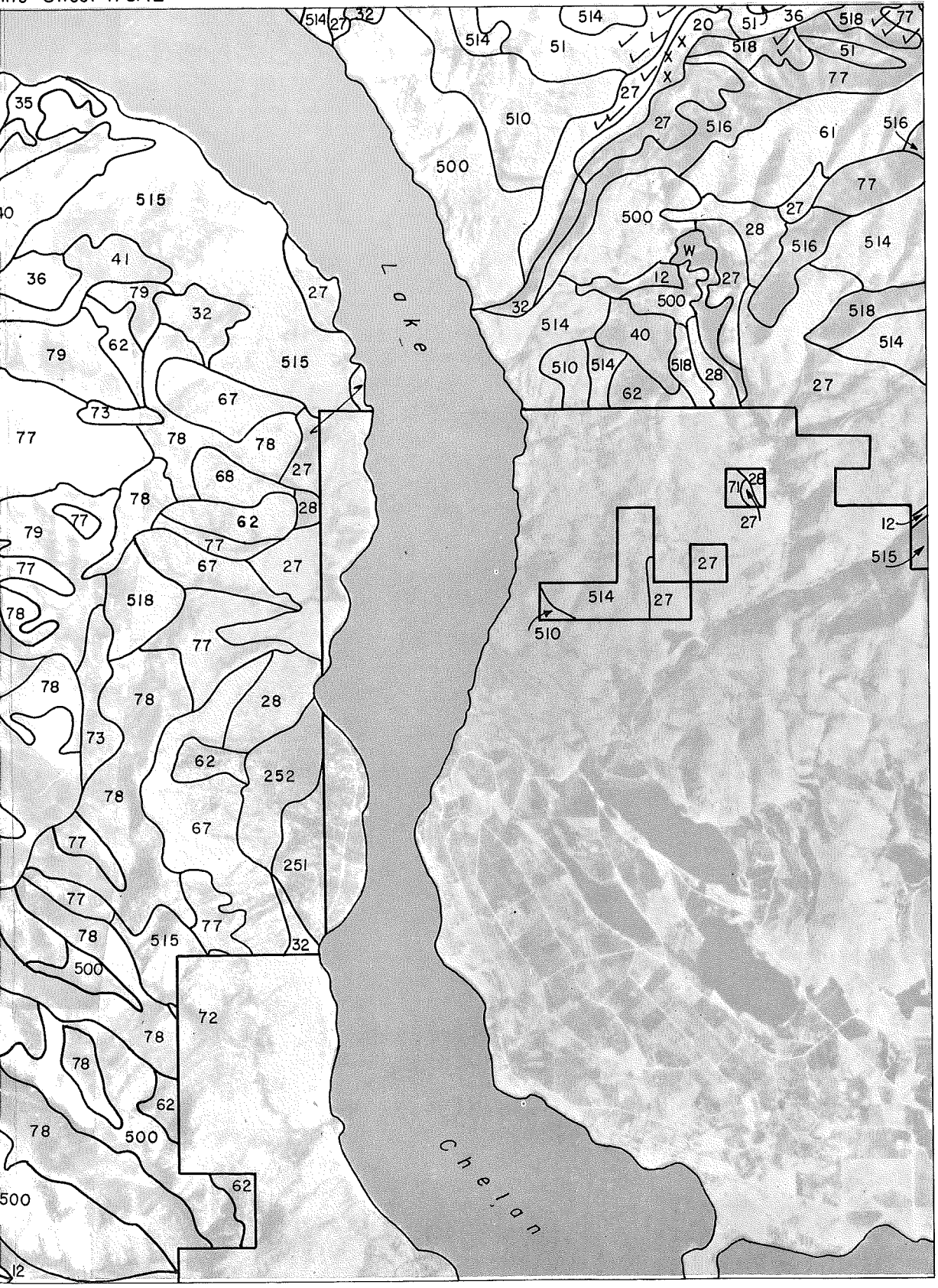


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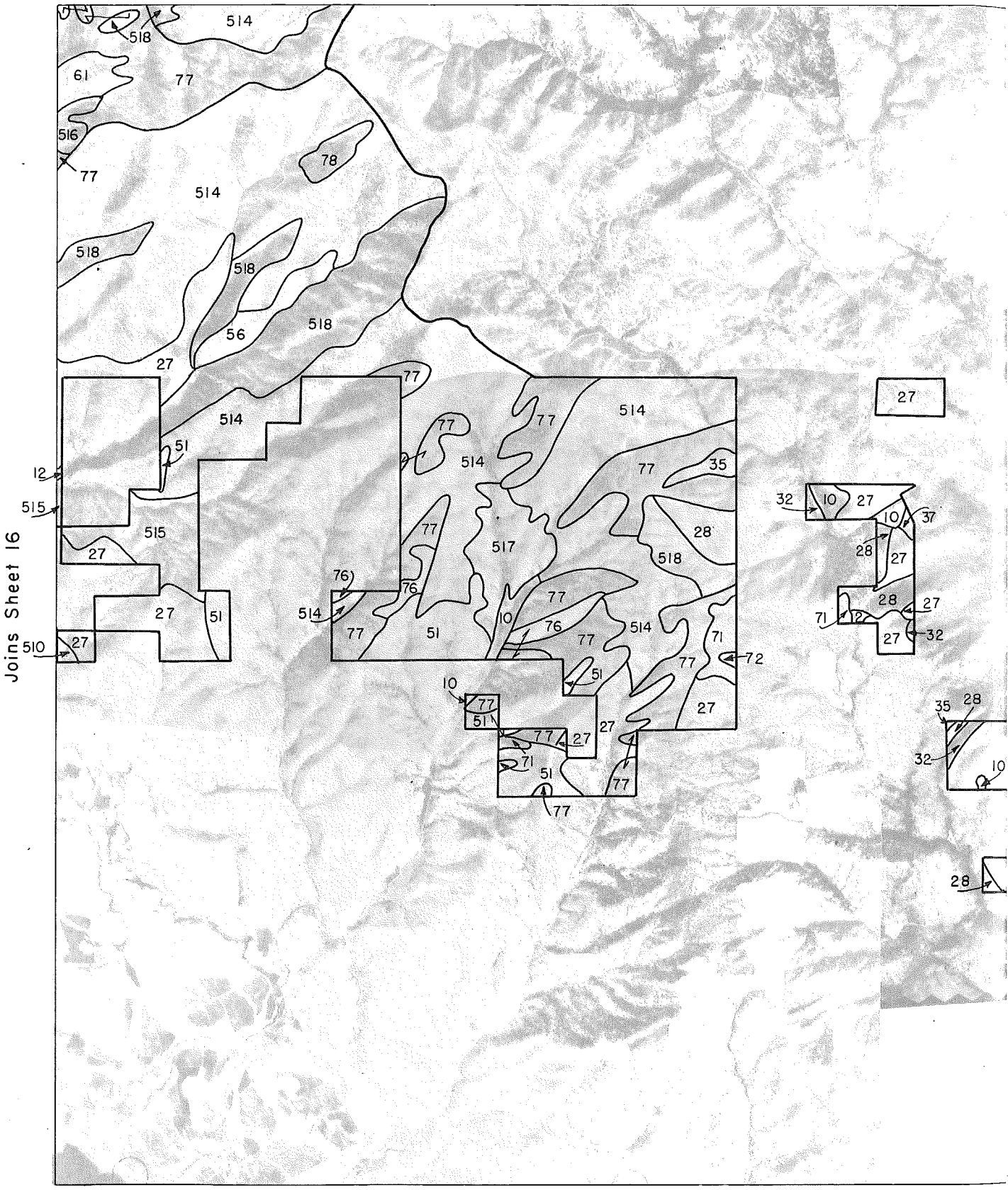


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SOIL RESOURCE INVENTORY

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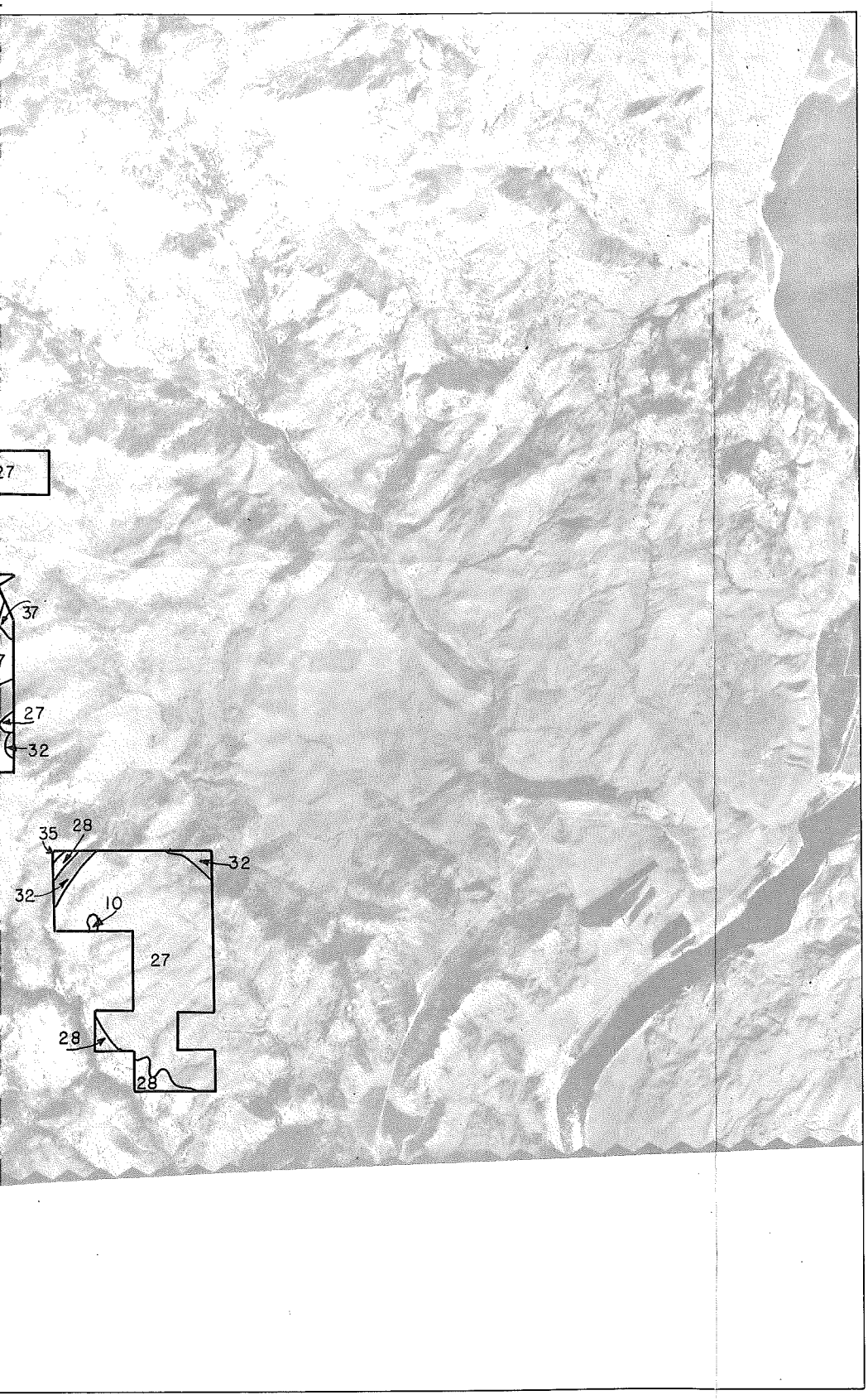


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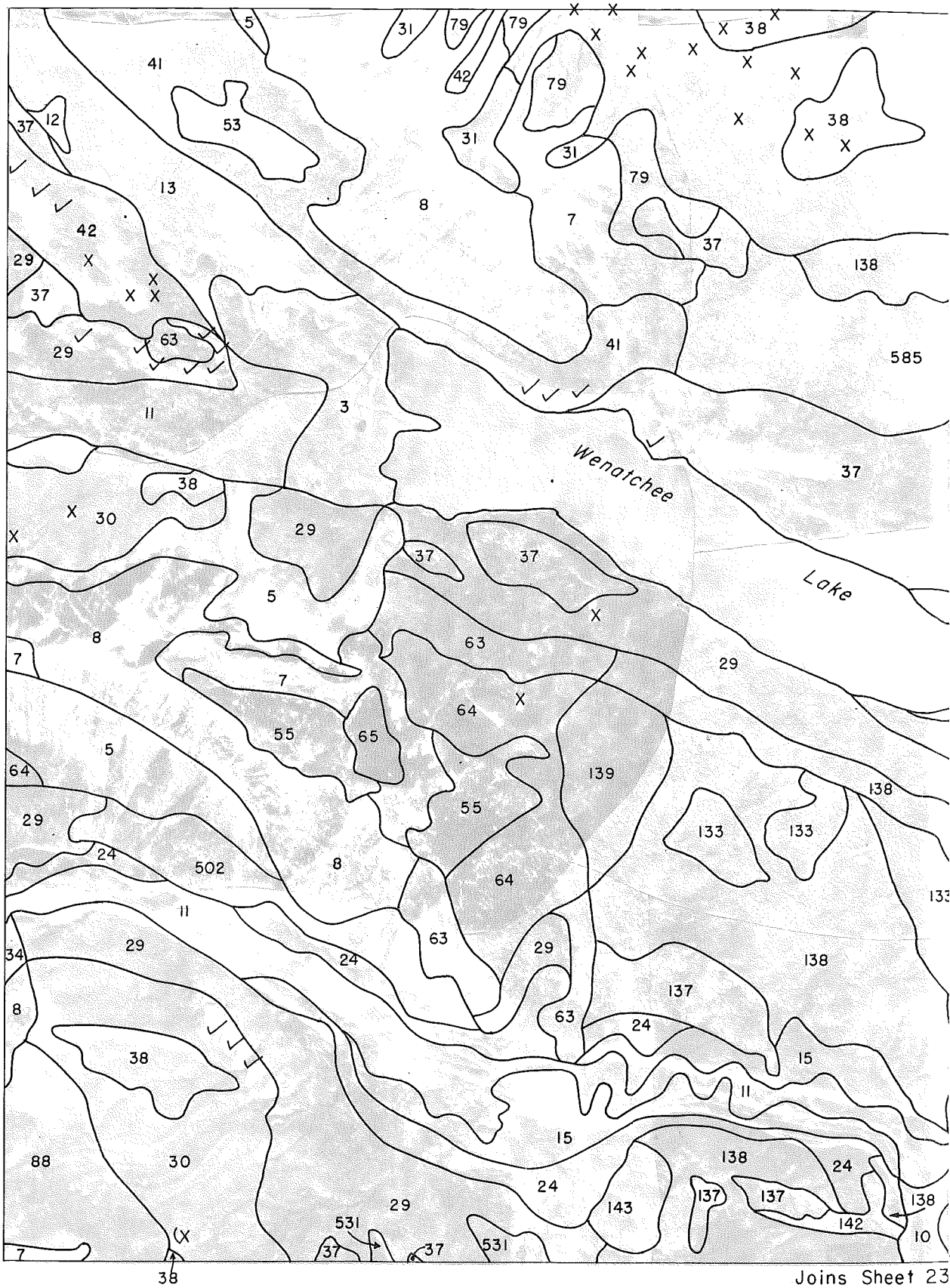

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SOIL RESOURCE INVENTORY

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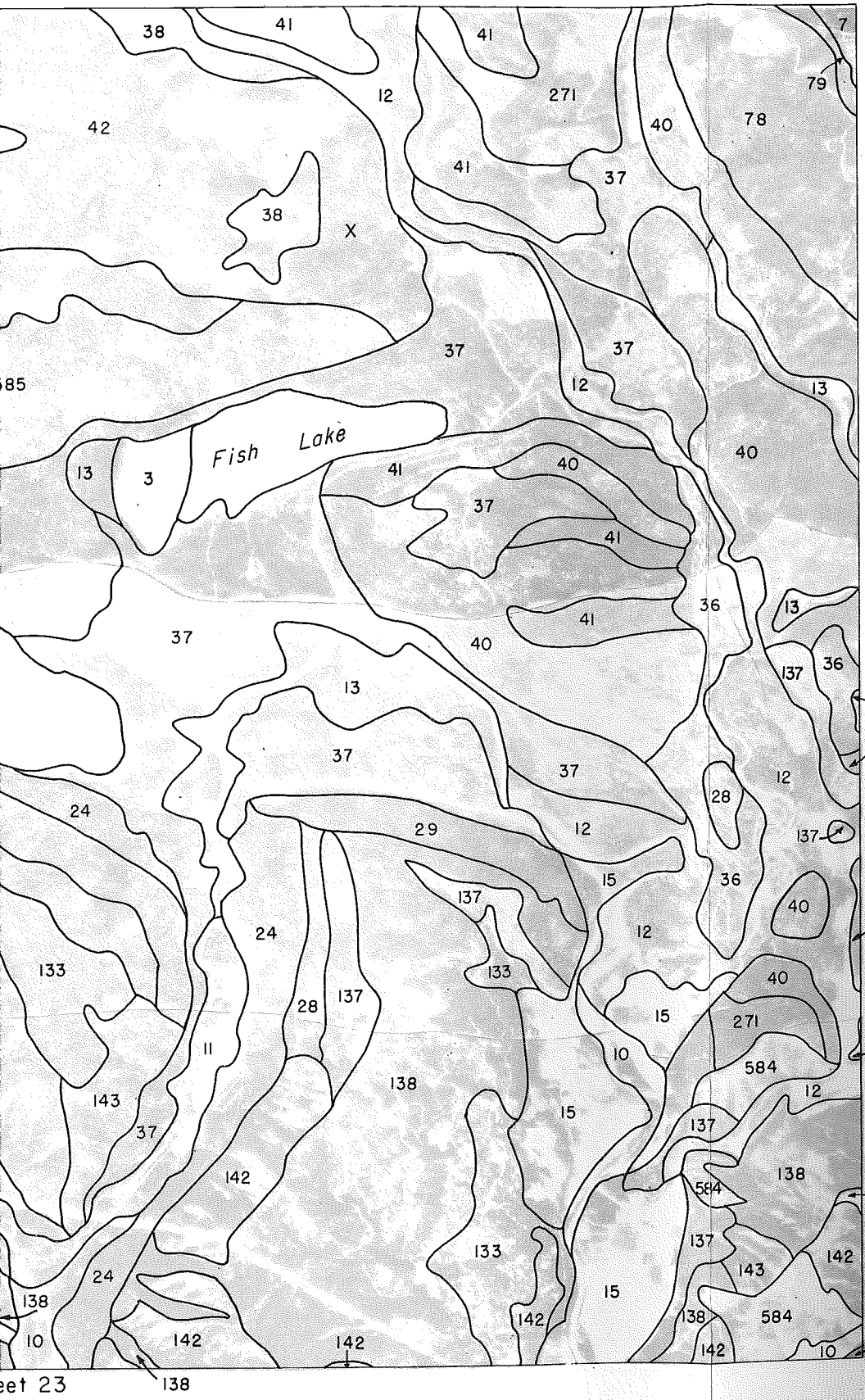
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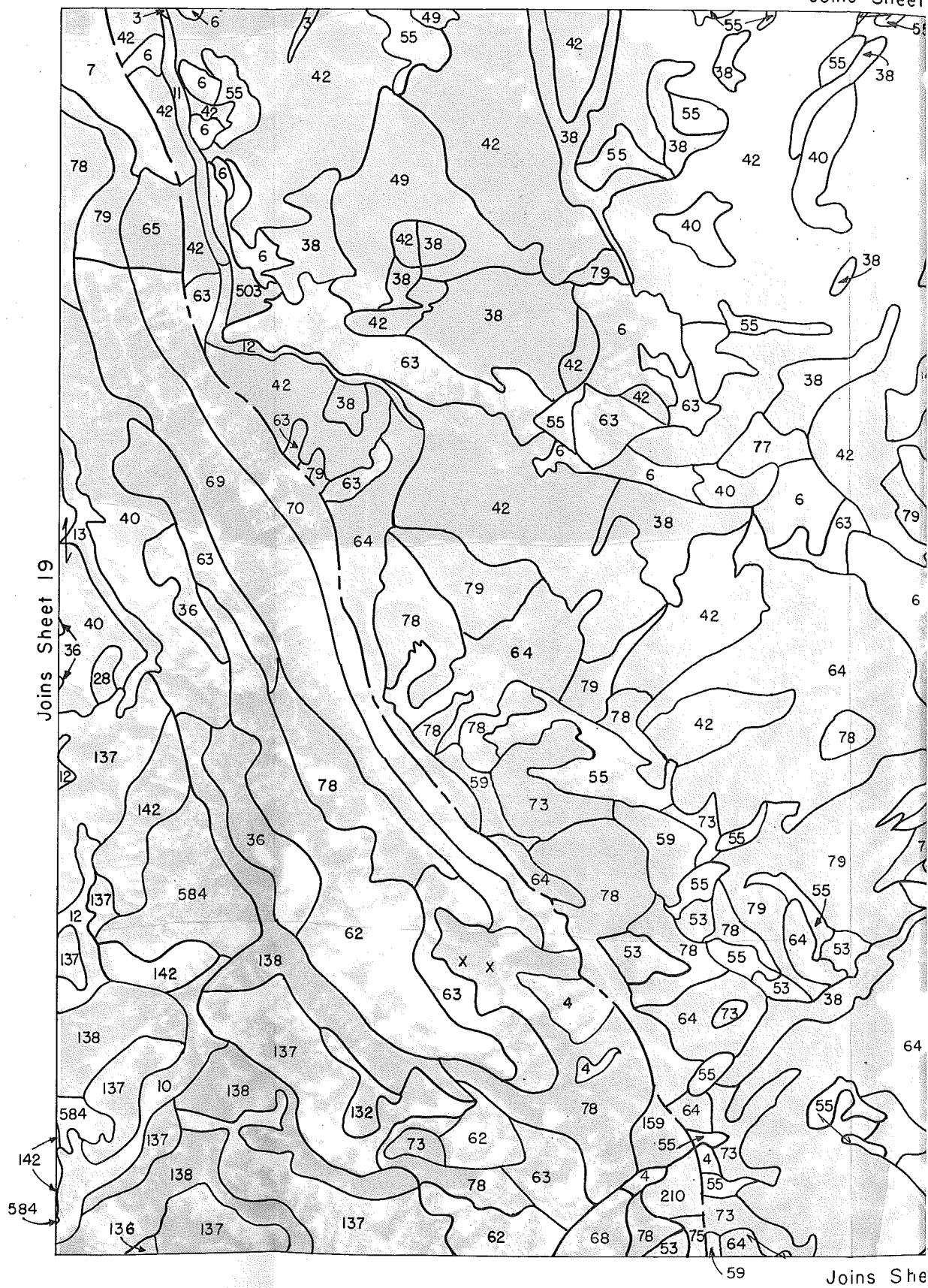
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WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

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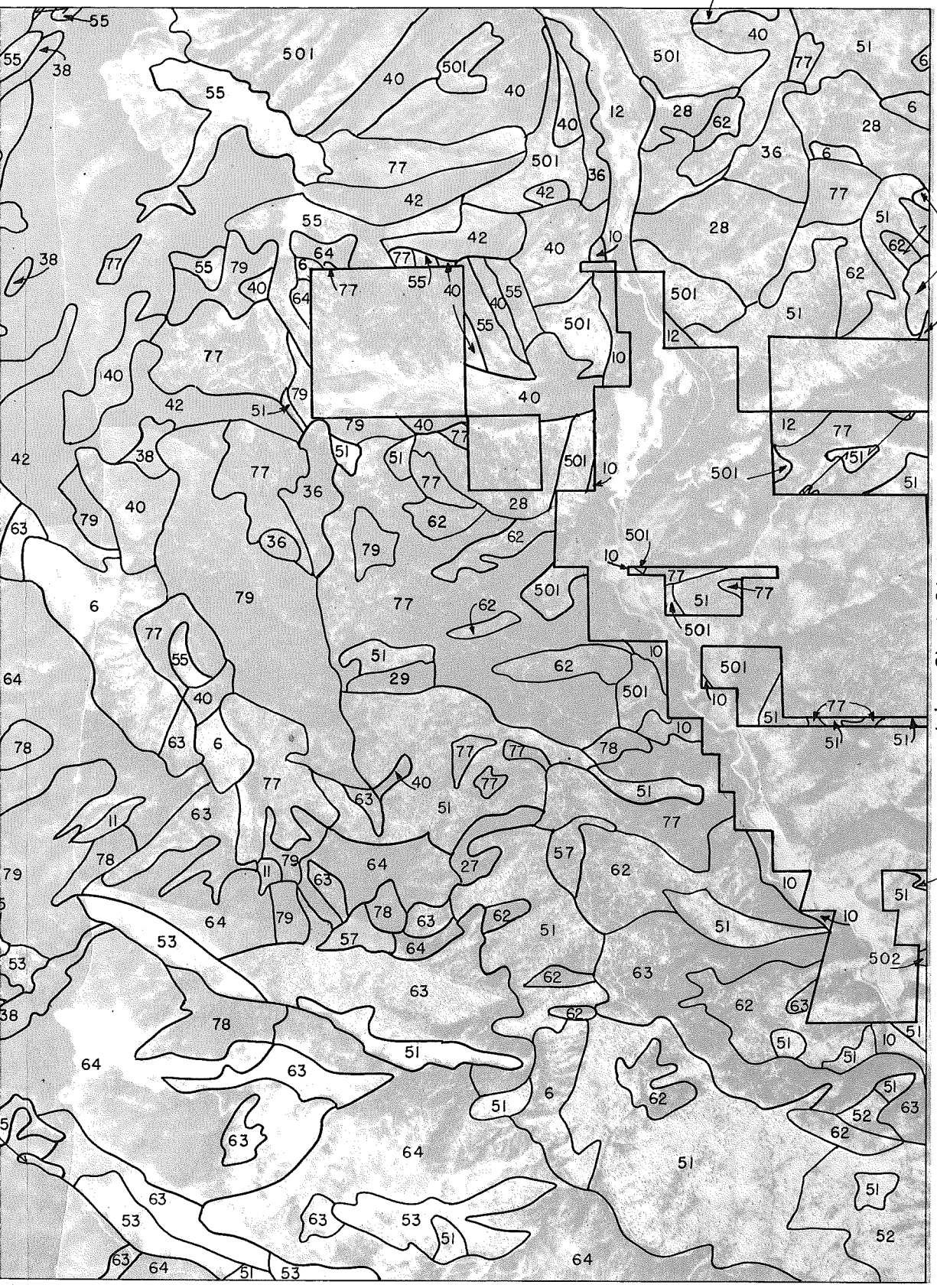
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WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

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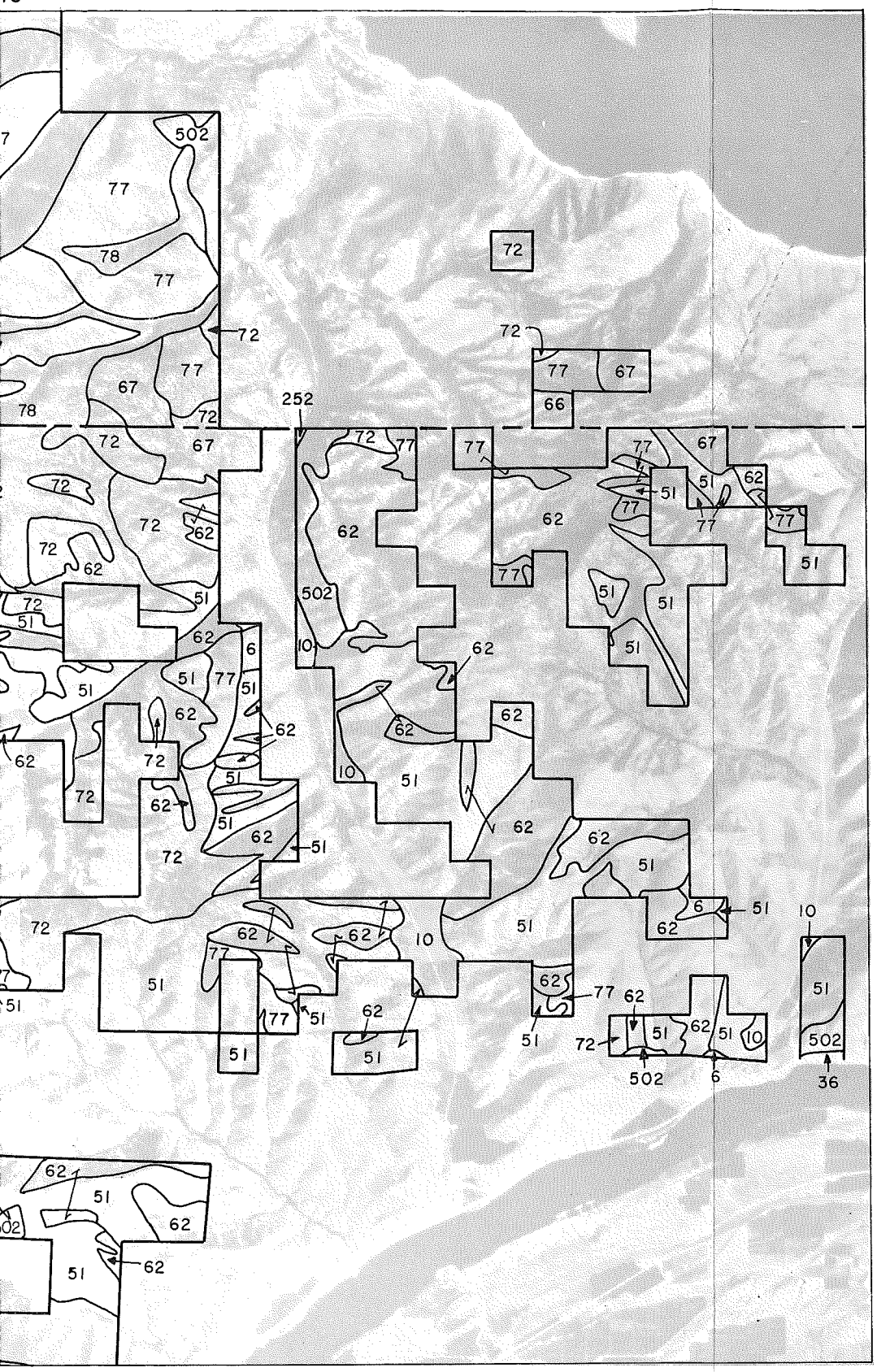
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WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

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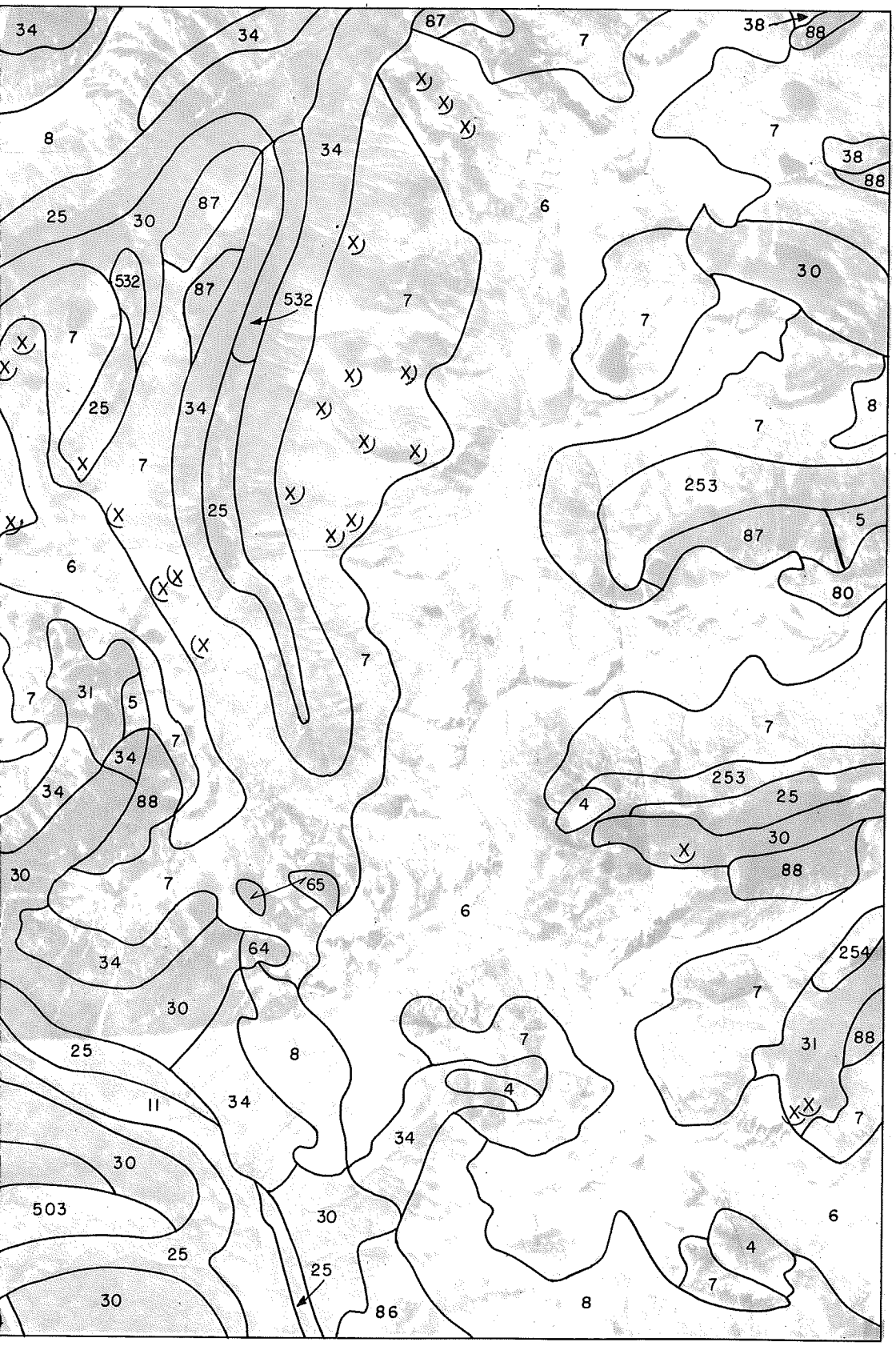
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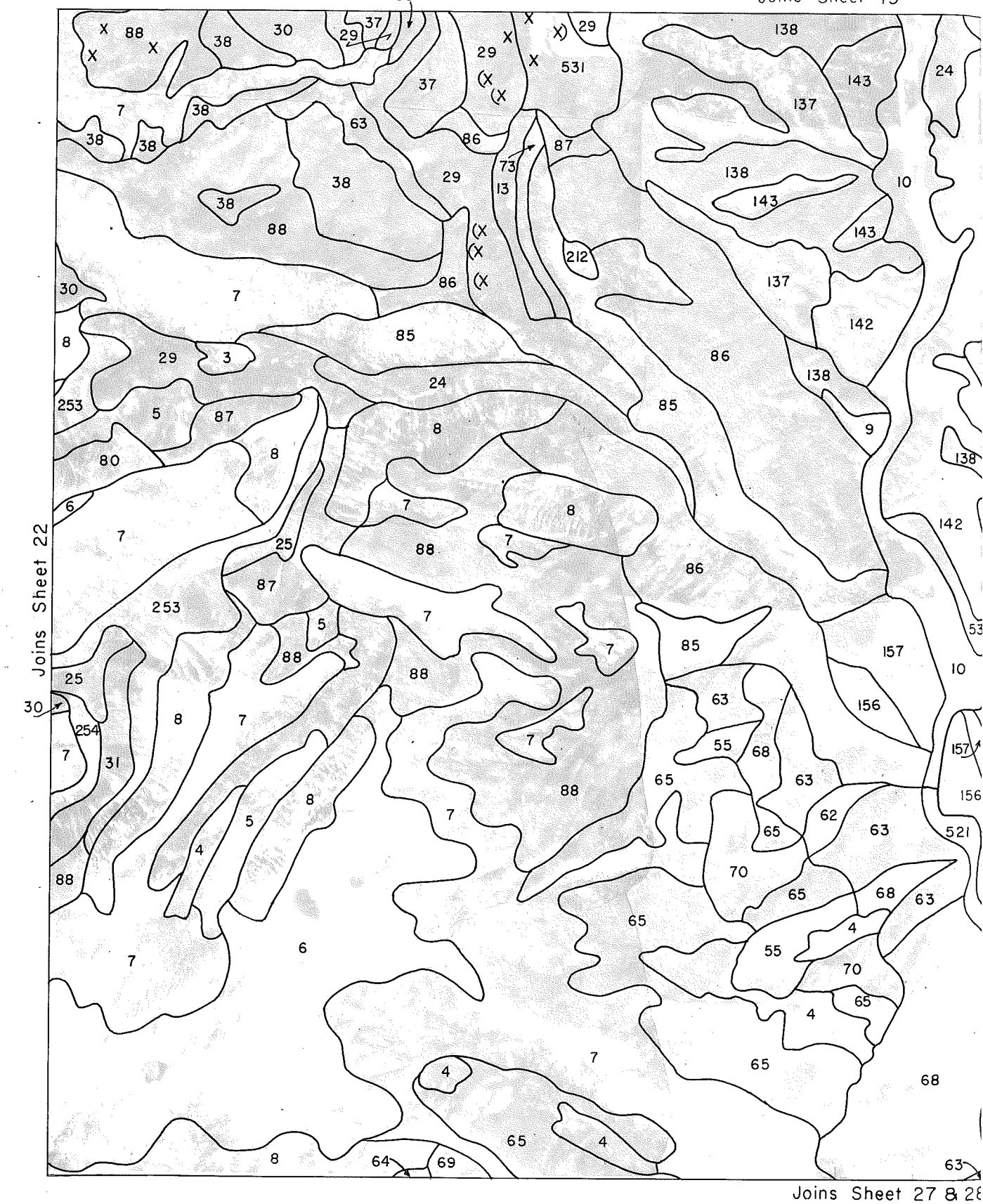


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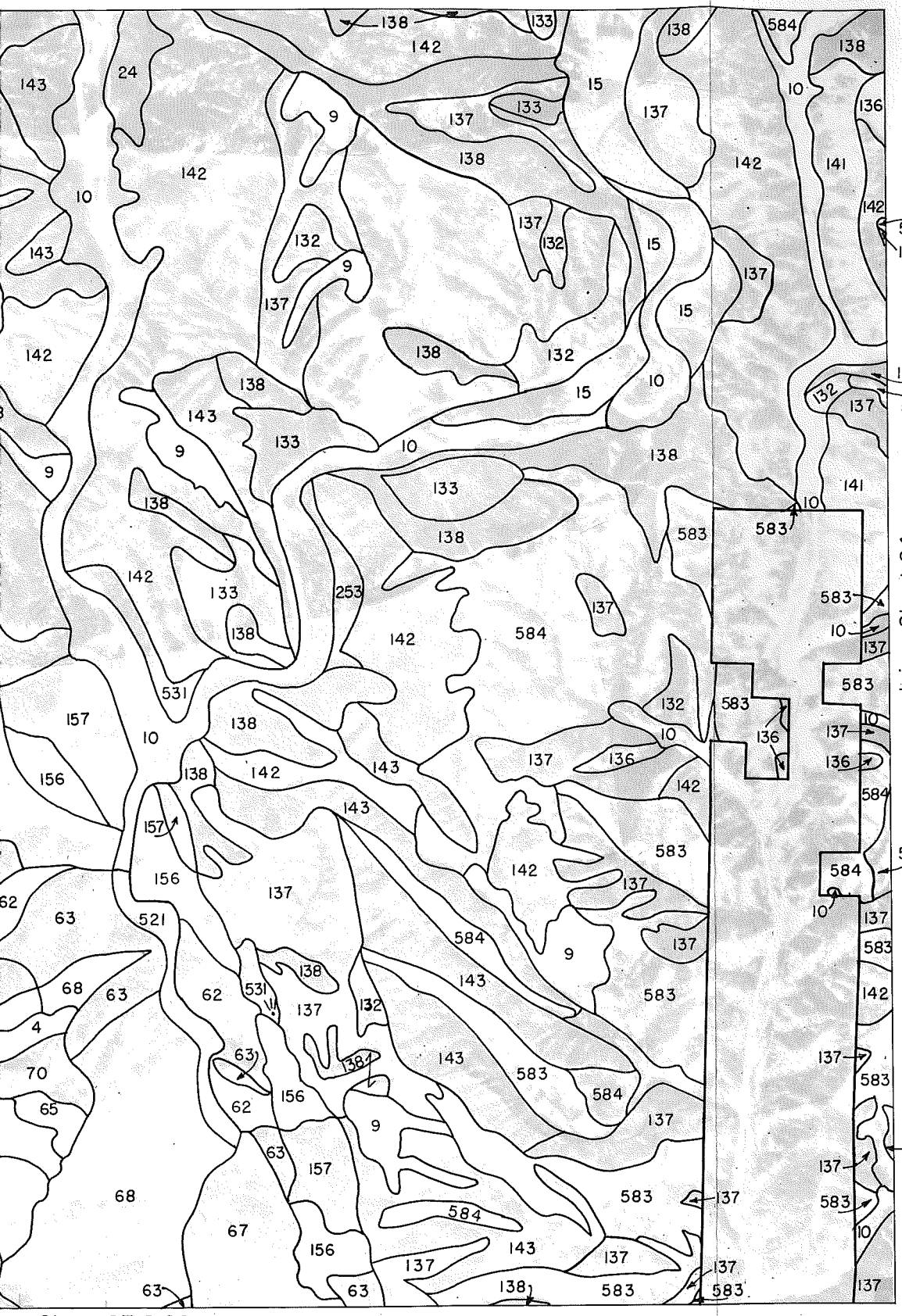
heets 26 & 27

WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY


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heet 19

120°37'30"
47°45'00"



47°37'30"

ns Sheet 27 & 28

WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

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Sheet 20

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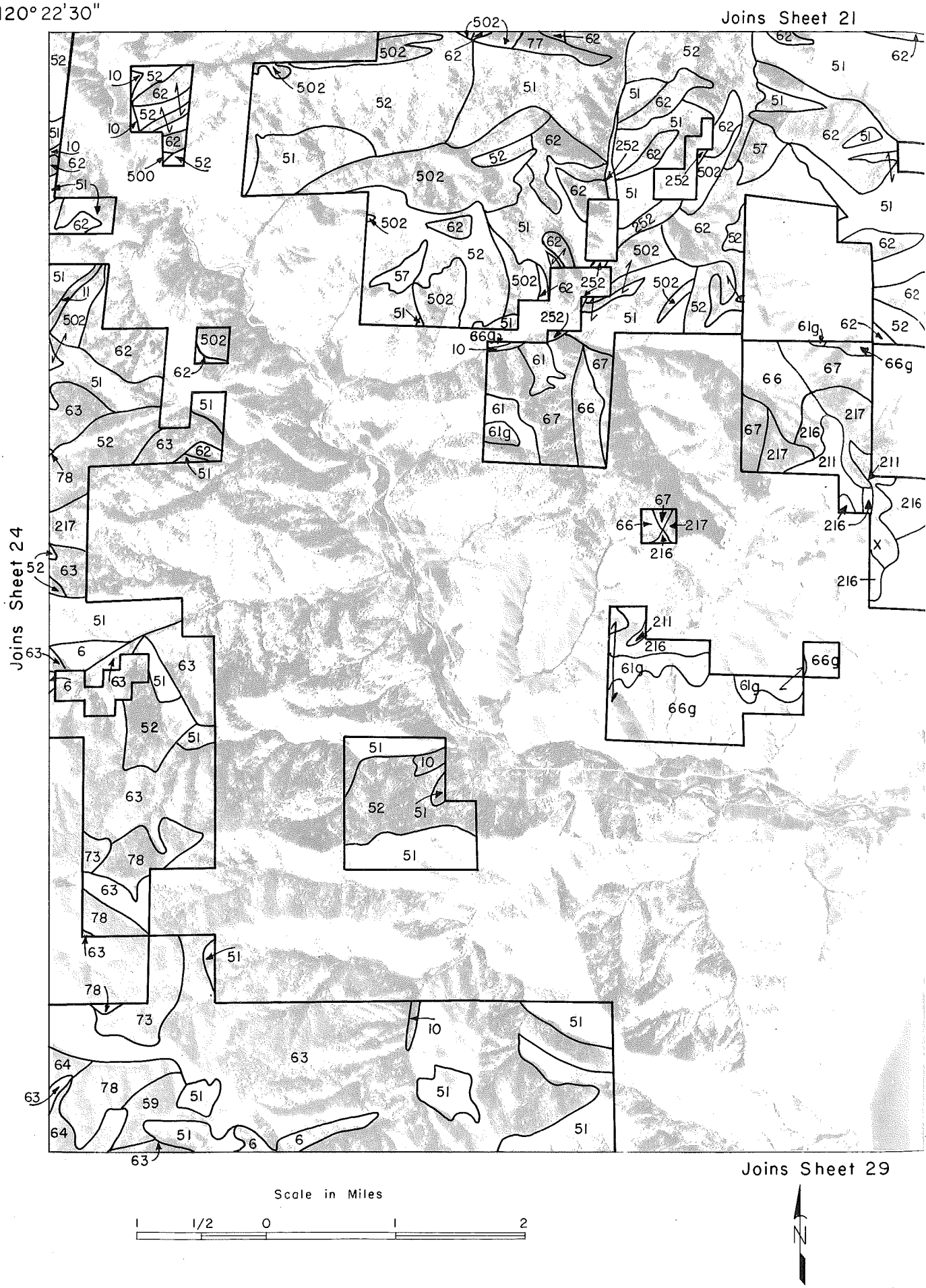
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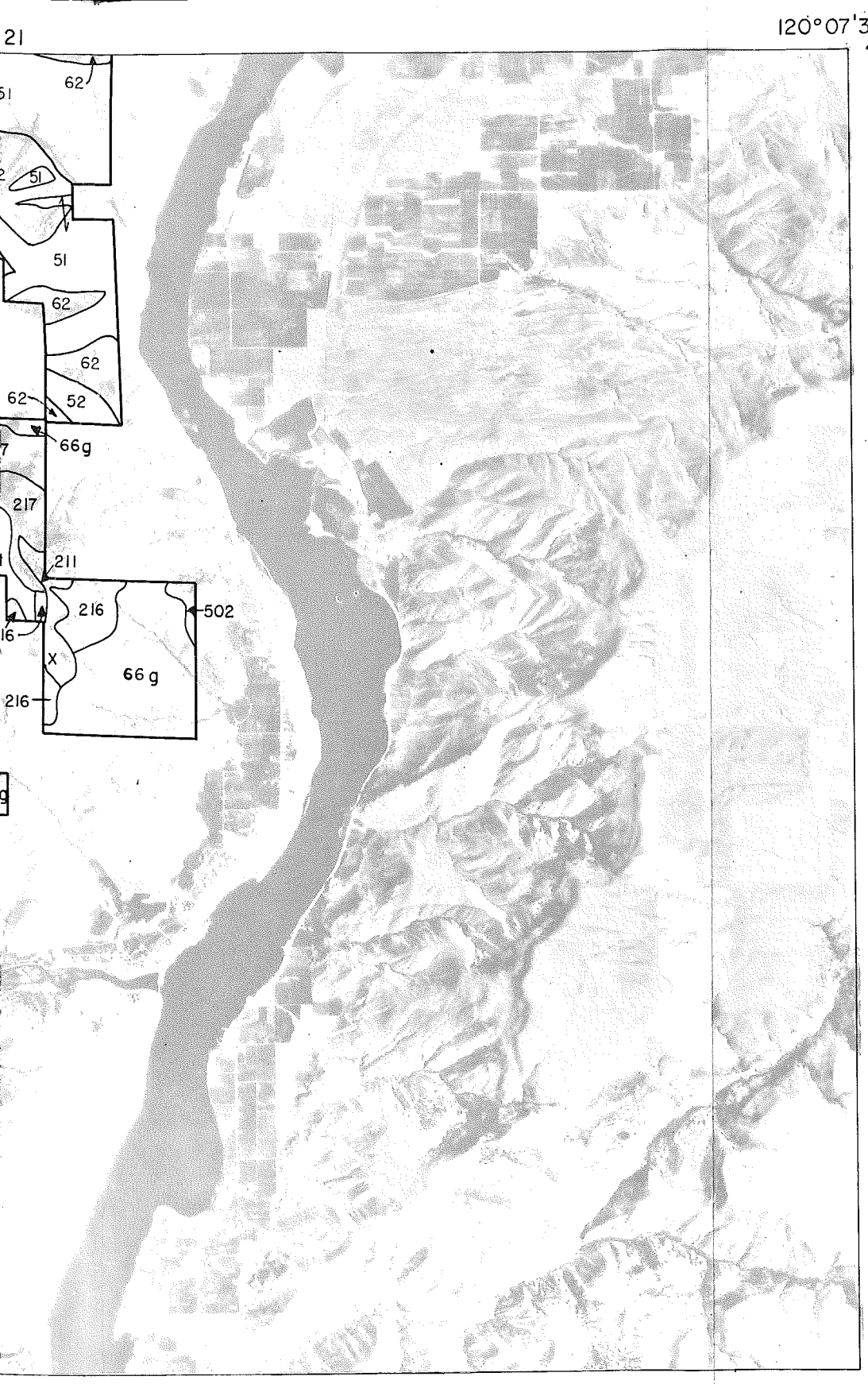
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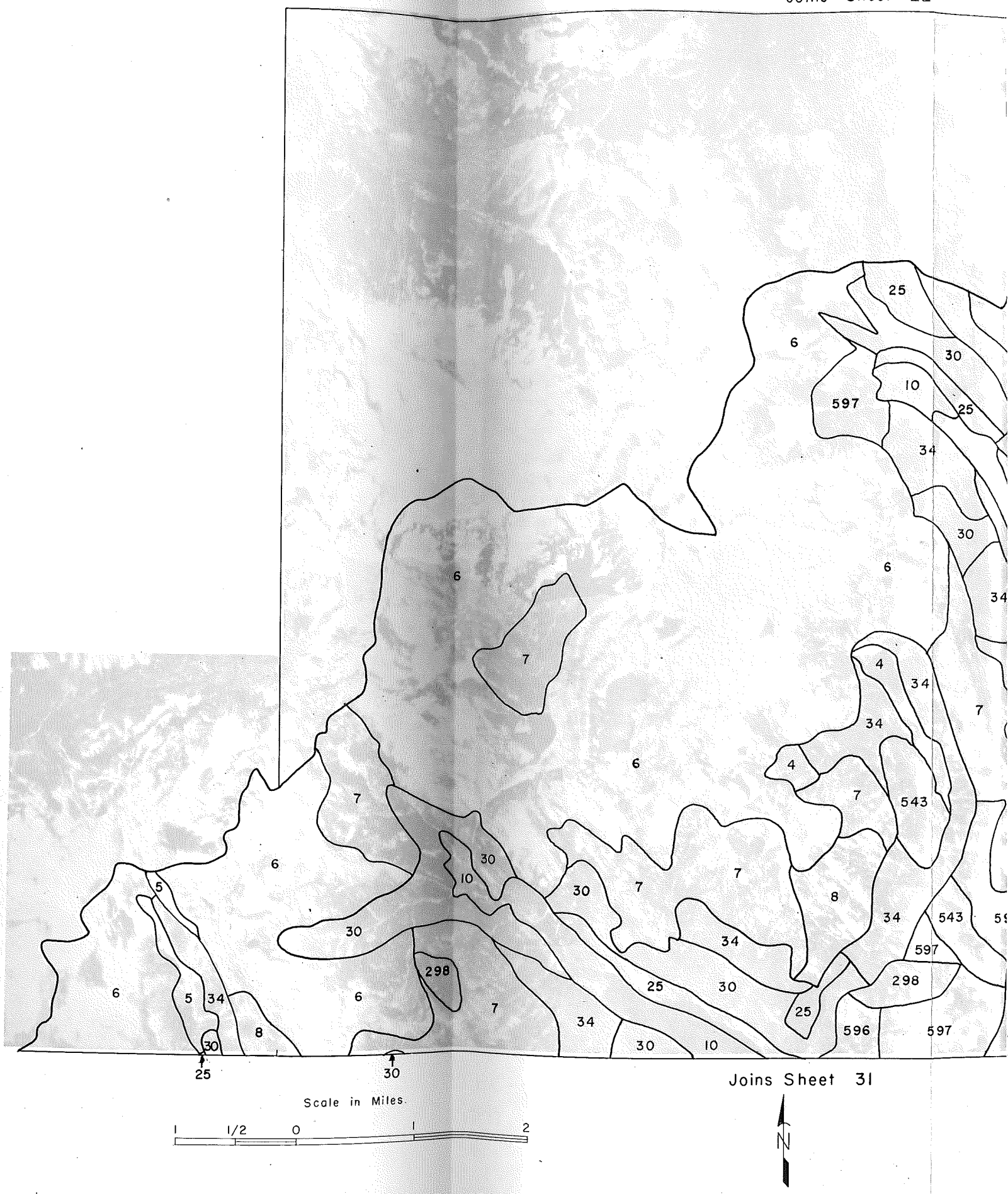
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WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY


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7
34
6
4
7
543
6
30
10
5
30
7
7
30
8
34
543
30
34
597
298
25
30
298
6
5
34
6
7
25
596
597
34
8
30
30
10
25
30
Joins Sheet 31
Scale in Miles
1
1/2
0
1
2
N

121° 15' 00"

Joins Sheet 22



Joins Sheet 31

Scale in Miles

1 1/2 0 1 2

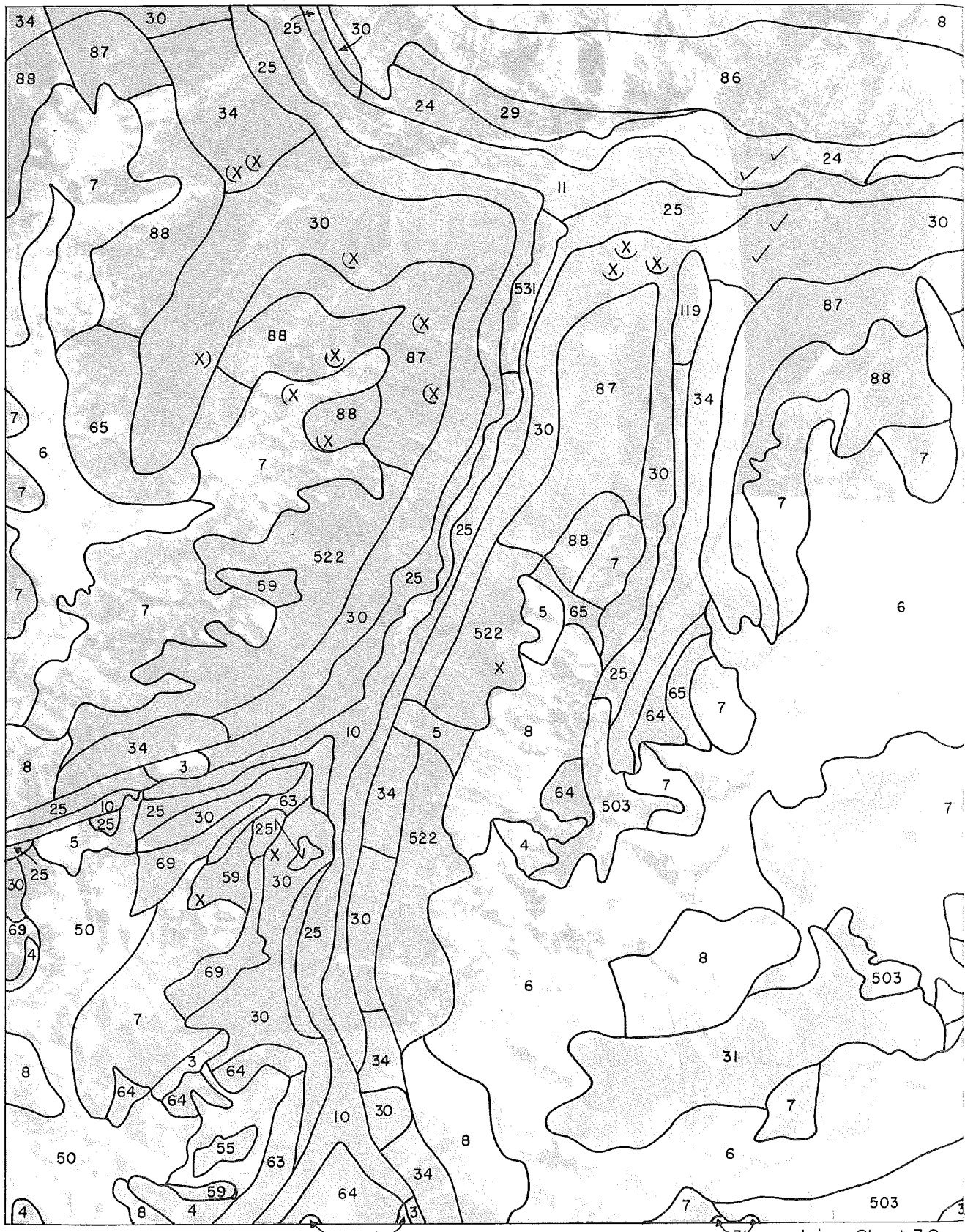
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WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

121° 00' 00"

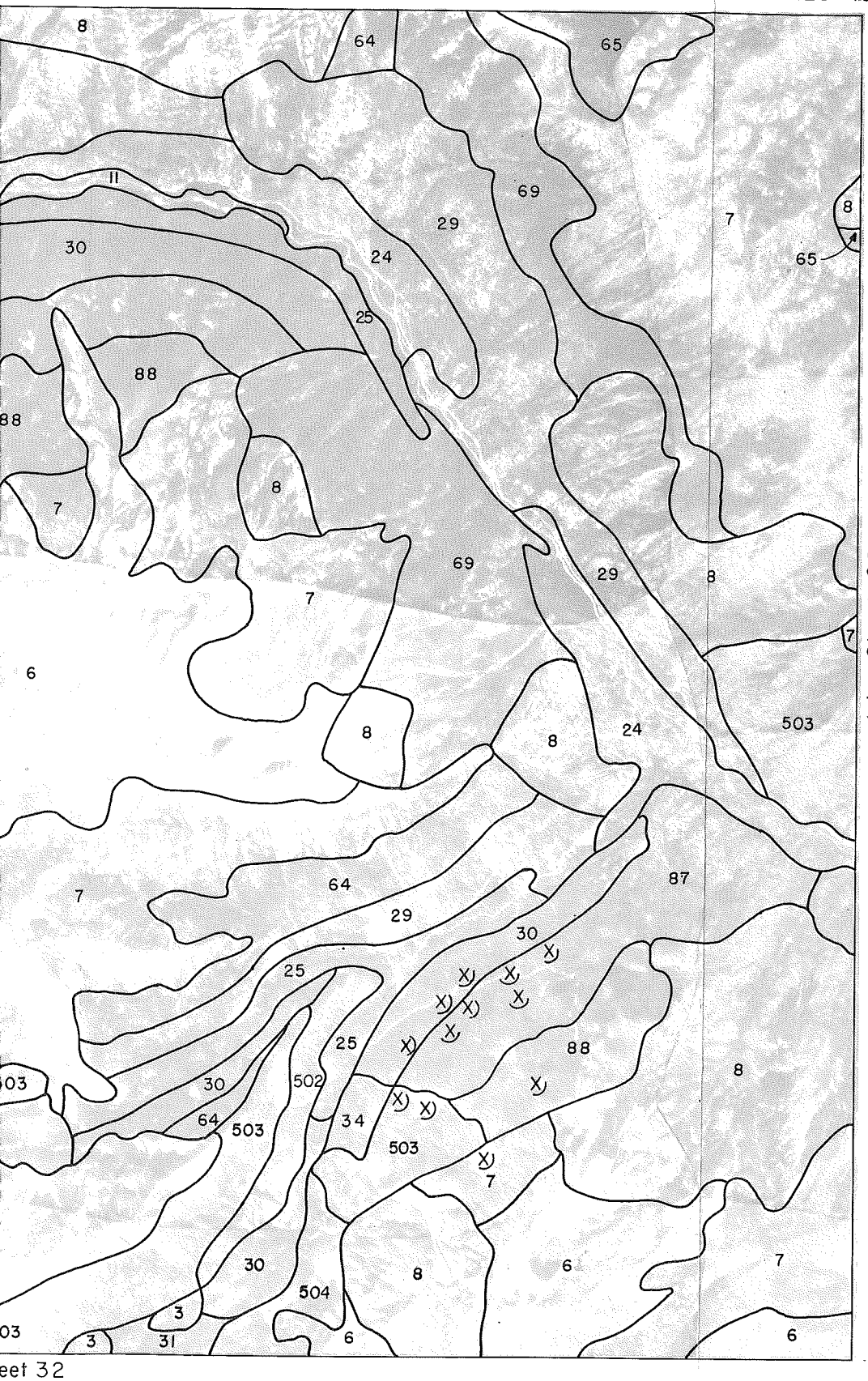
Joins Sheet 22 & 23



22 & 23

120°45'00"

47° 37'30"



Joins Sheet 28

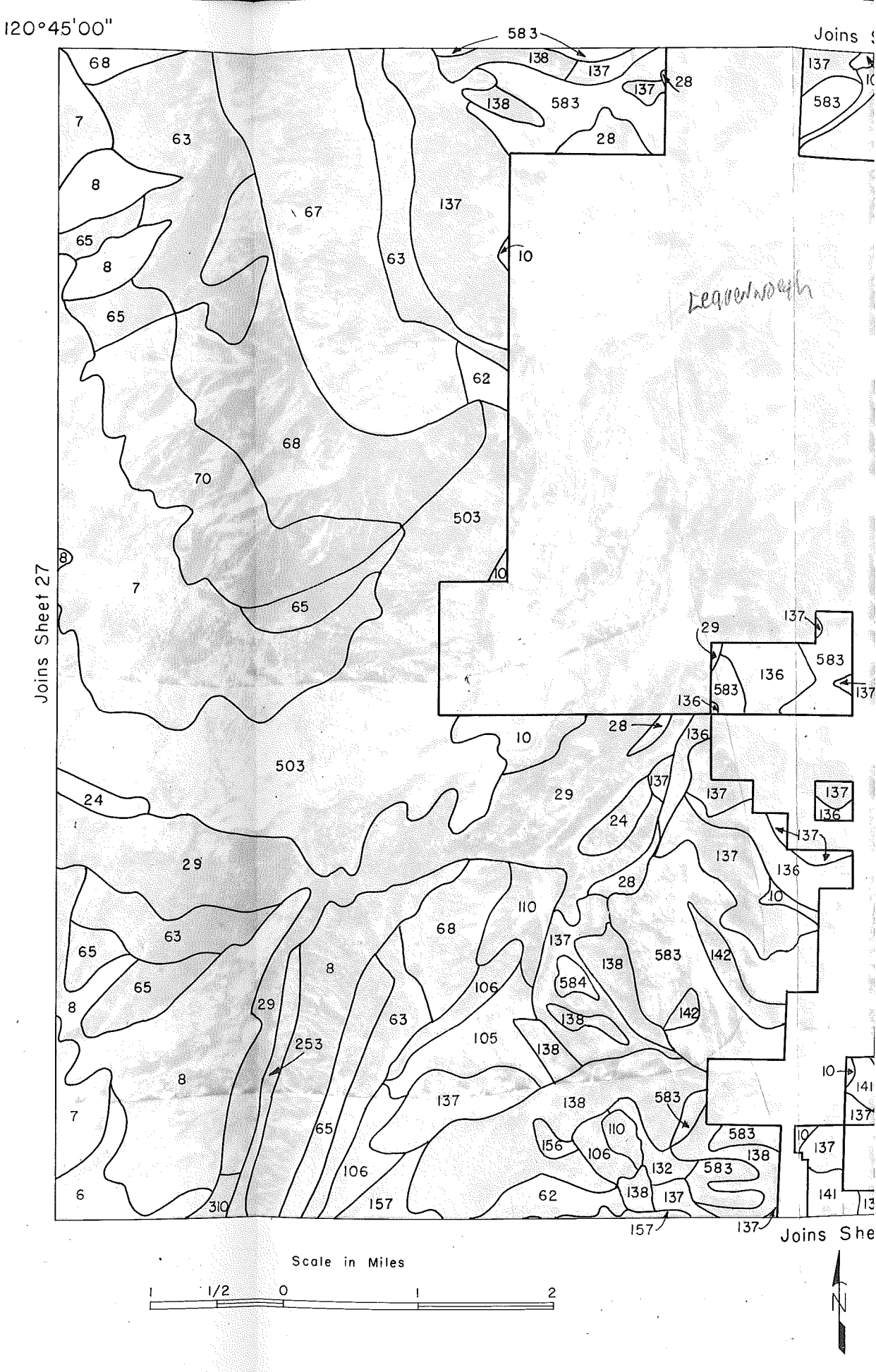
47°30'00"

eet 32

WENATCHEE NATIONAL FOREST

SOIL RESOURCE INVENTORY

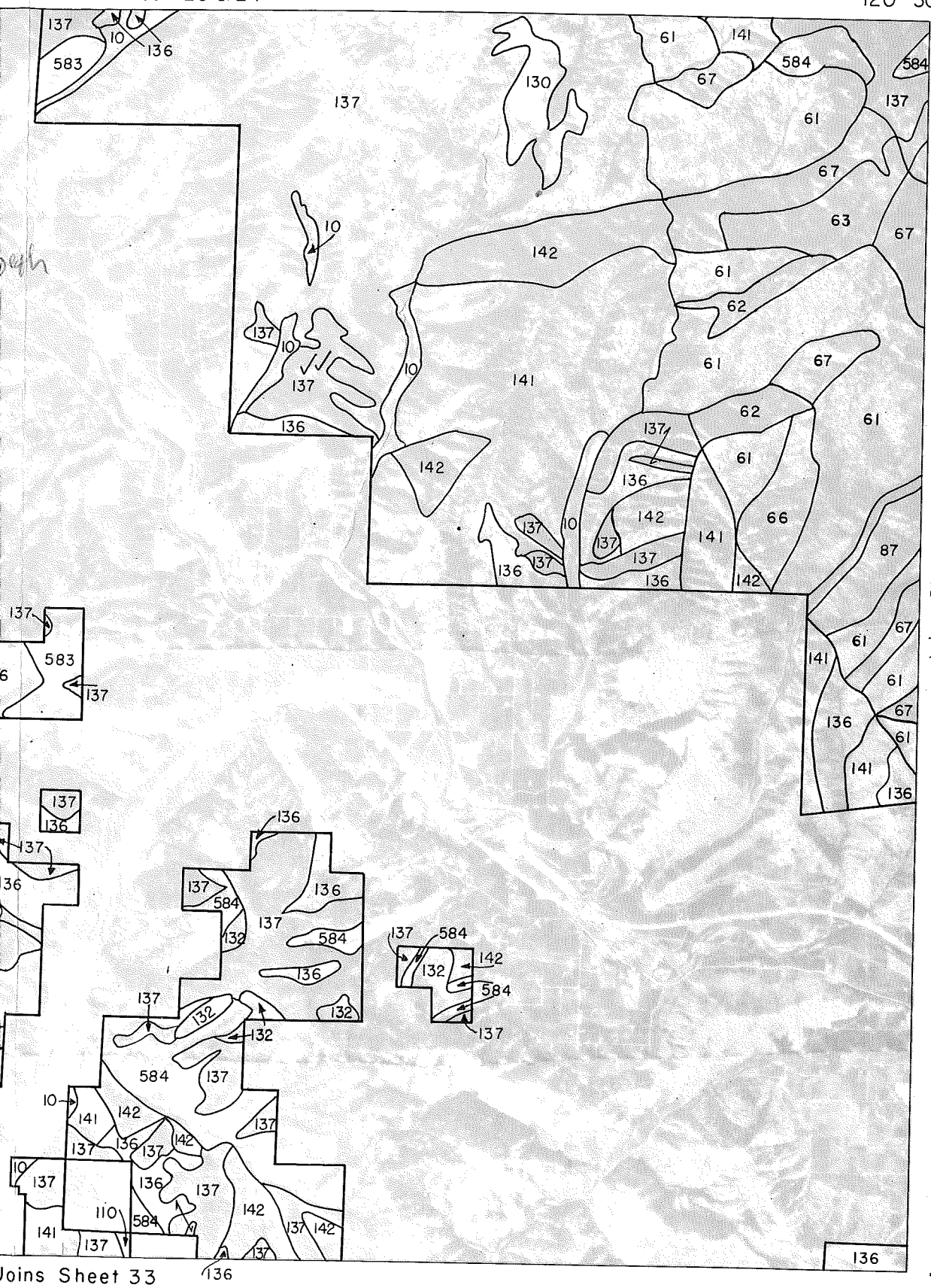
27


120°45'00"
Joins Sheet 27
Joins She
Scale in Miles
1 1/2 0 1 2
N

Joins Sheet 23 & 24

120°30'00"

47°37'30"



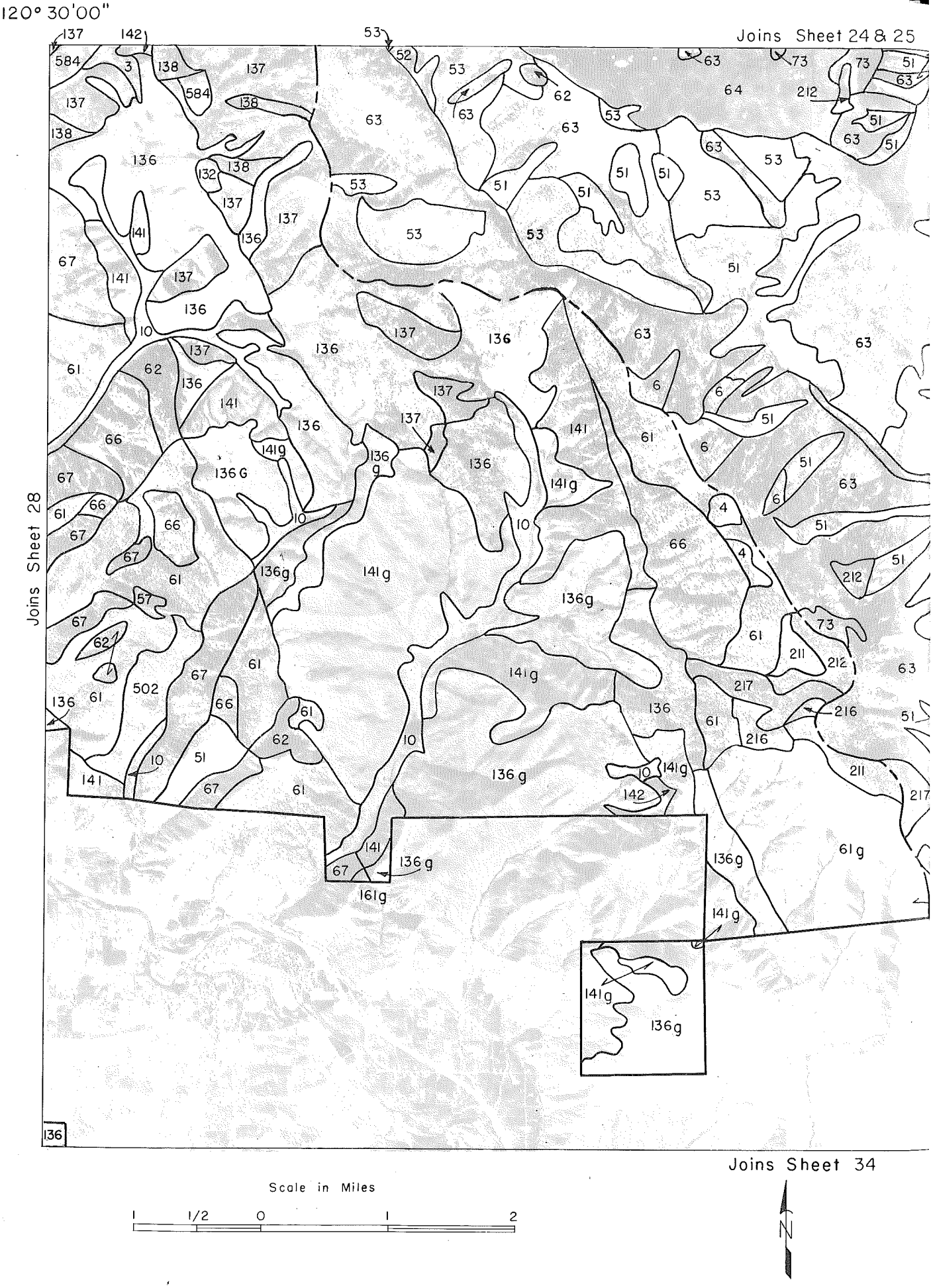
Joins Sheet 29

Joins Sheet 33

47°30'00"

N

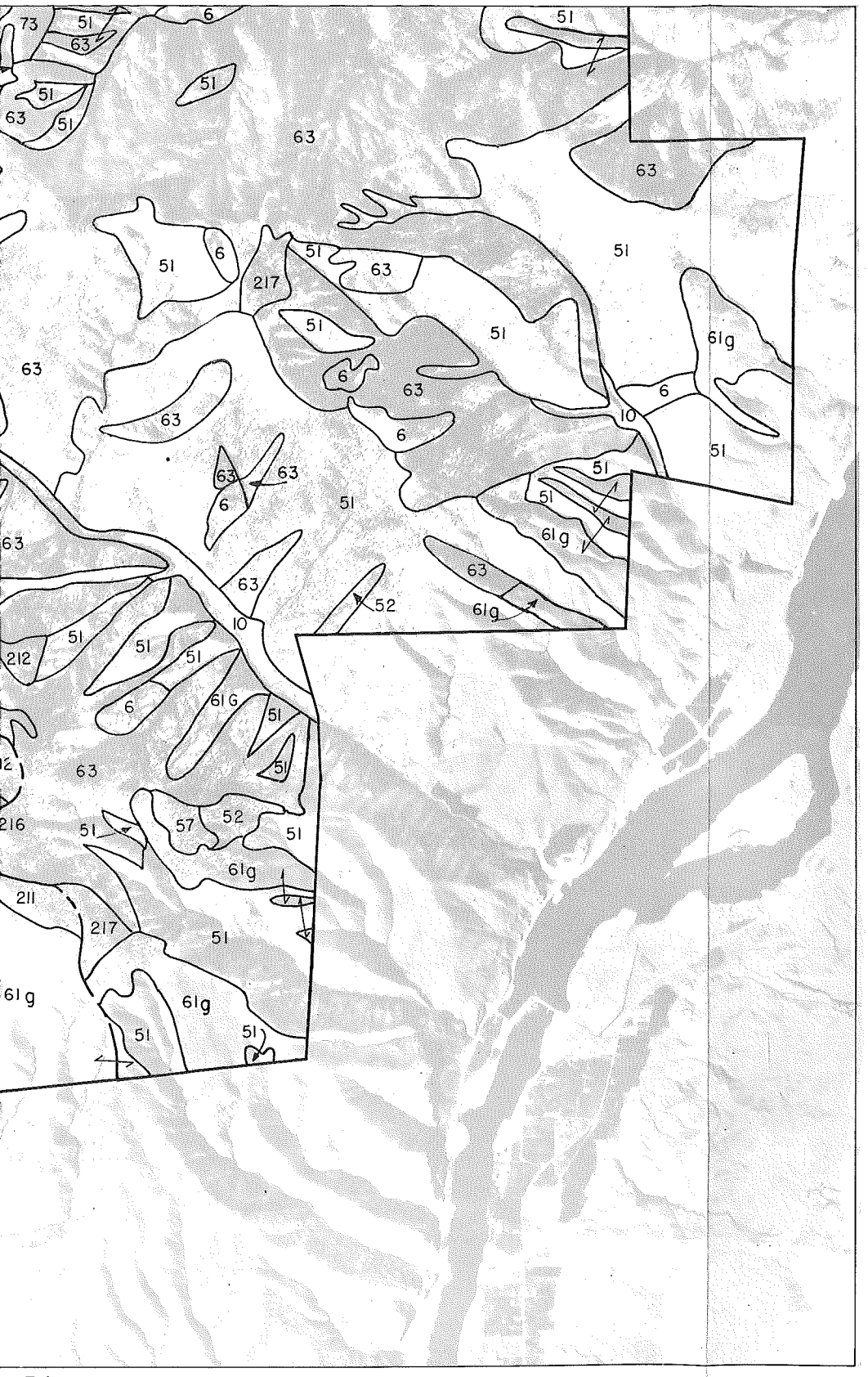
WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY


120° 30'00"
Joins Sheet 24 & 25
Joins Sheet 28
Joins Sheet 34
Scale in Miles
1 1/2 0 1 2
N

t 24 & 25

120° 15' 00"

47° 37' 30"



47° 30' 00"

t 34

WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

121° 30'00"

Joins S



Joins Sheet

Scale in Miles

1 1/2 0 1 2

N

Joins Sheet 26

121°15'00"

47°30'00"



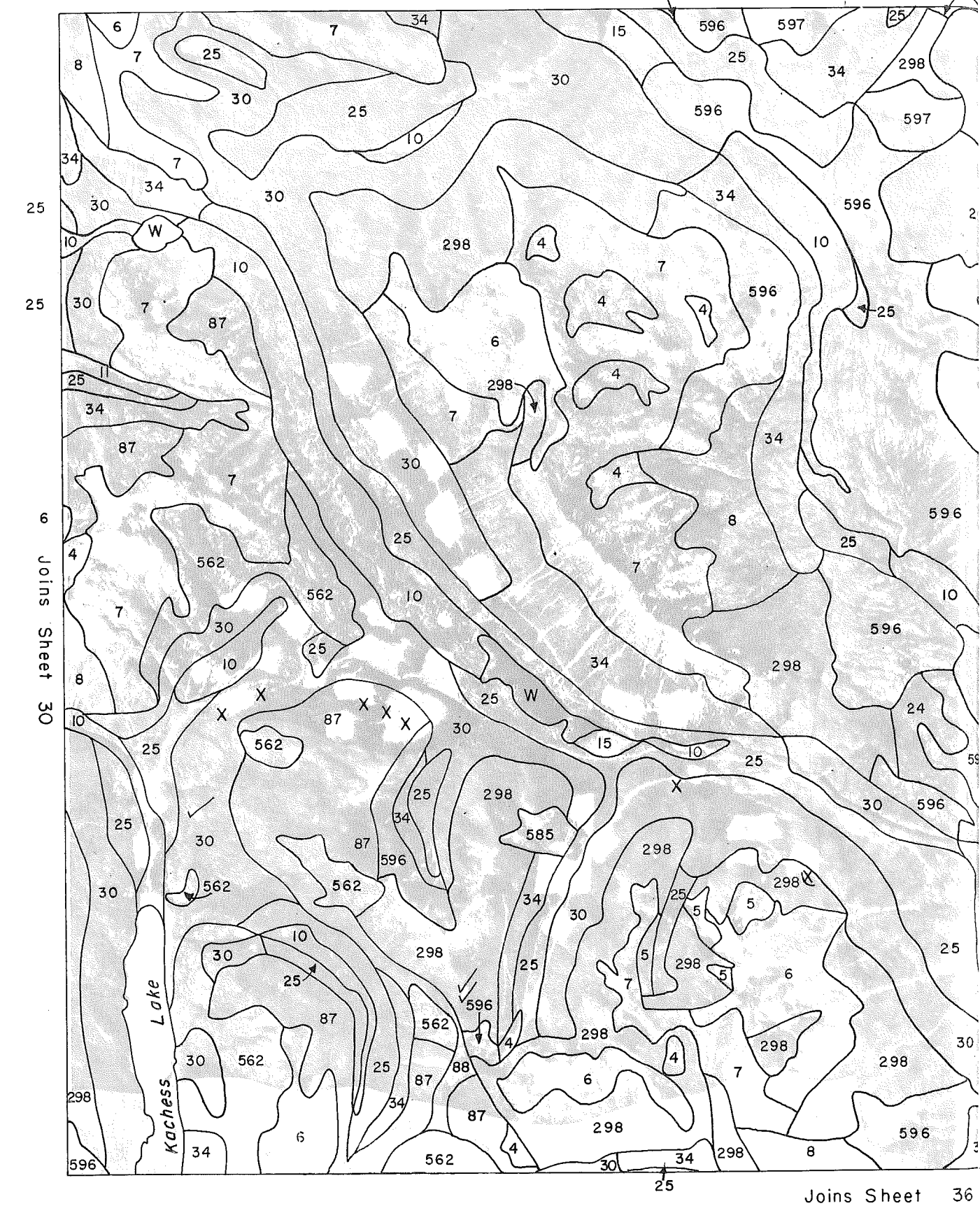
Joins Sheet 31

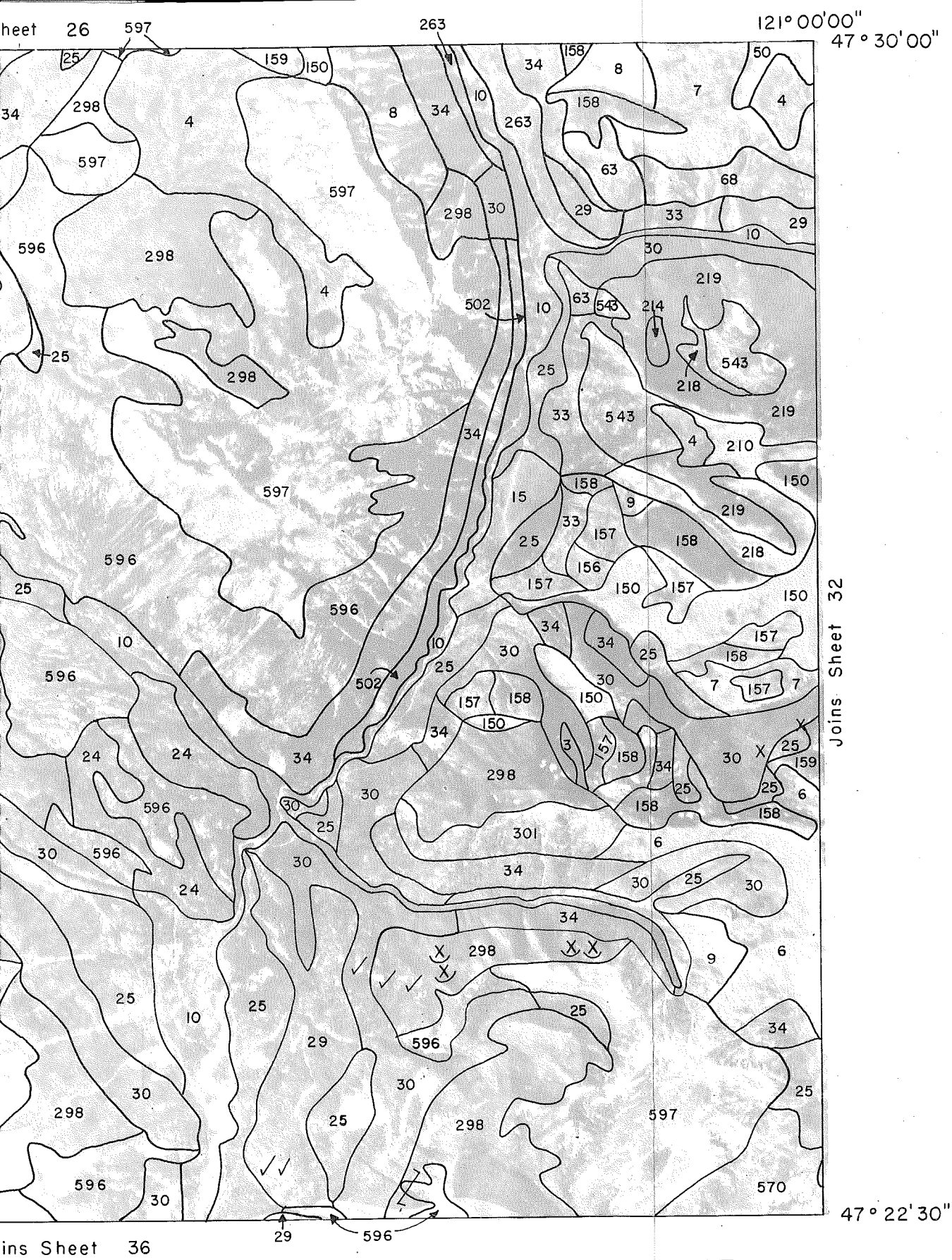
47°22'30"

Sheet 35

WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

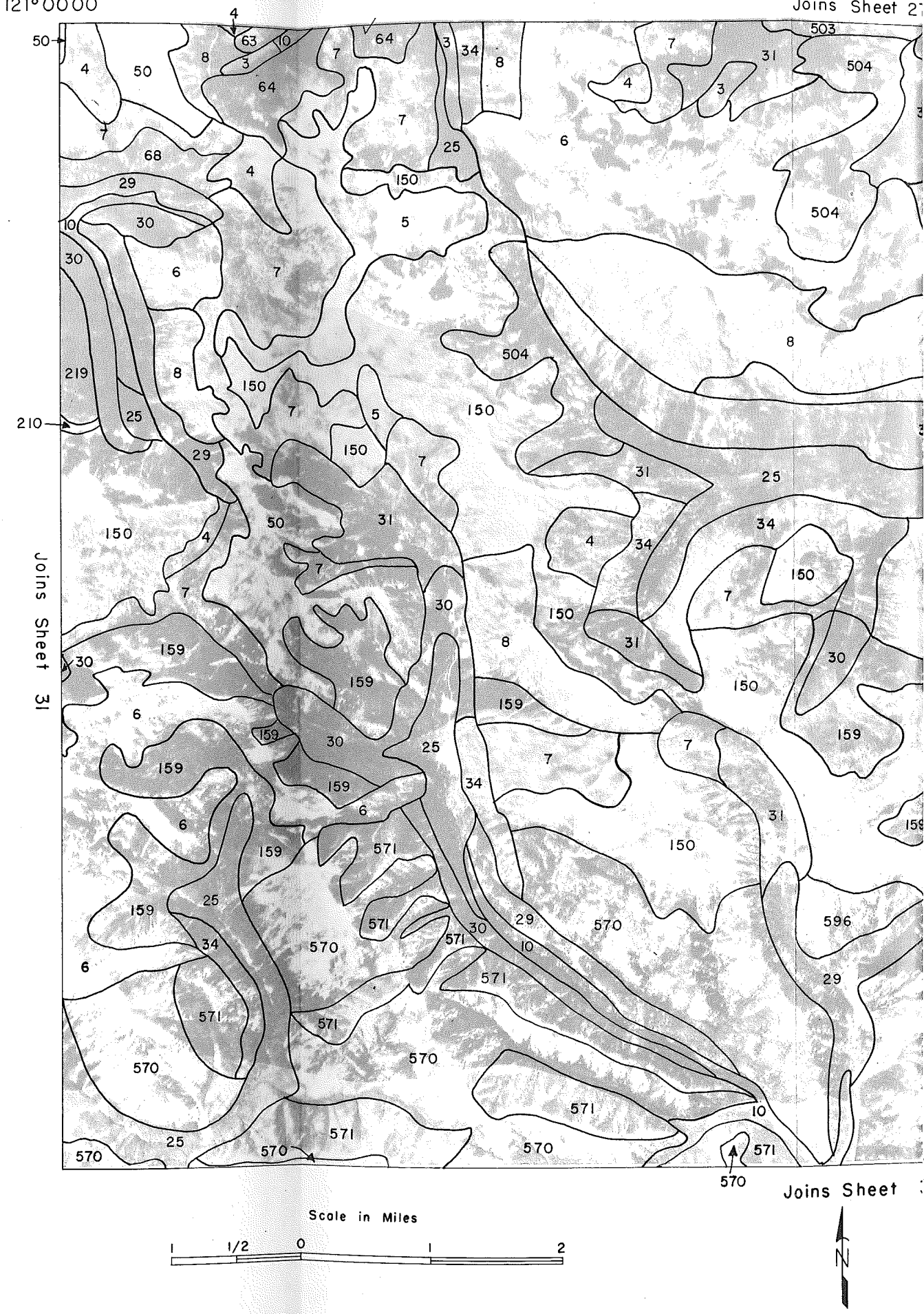
30


121° 15'00"
Joins Sheet 26
Joins Sheet 30
Joins Sheet 36
Lake Kachess
Scale in Miles
1 1/2 0 1 2
N



WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

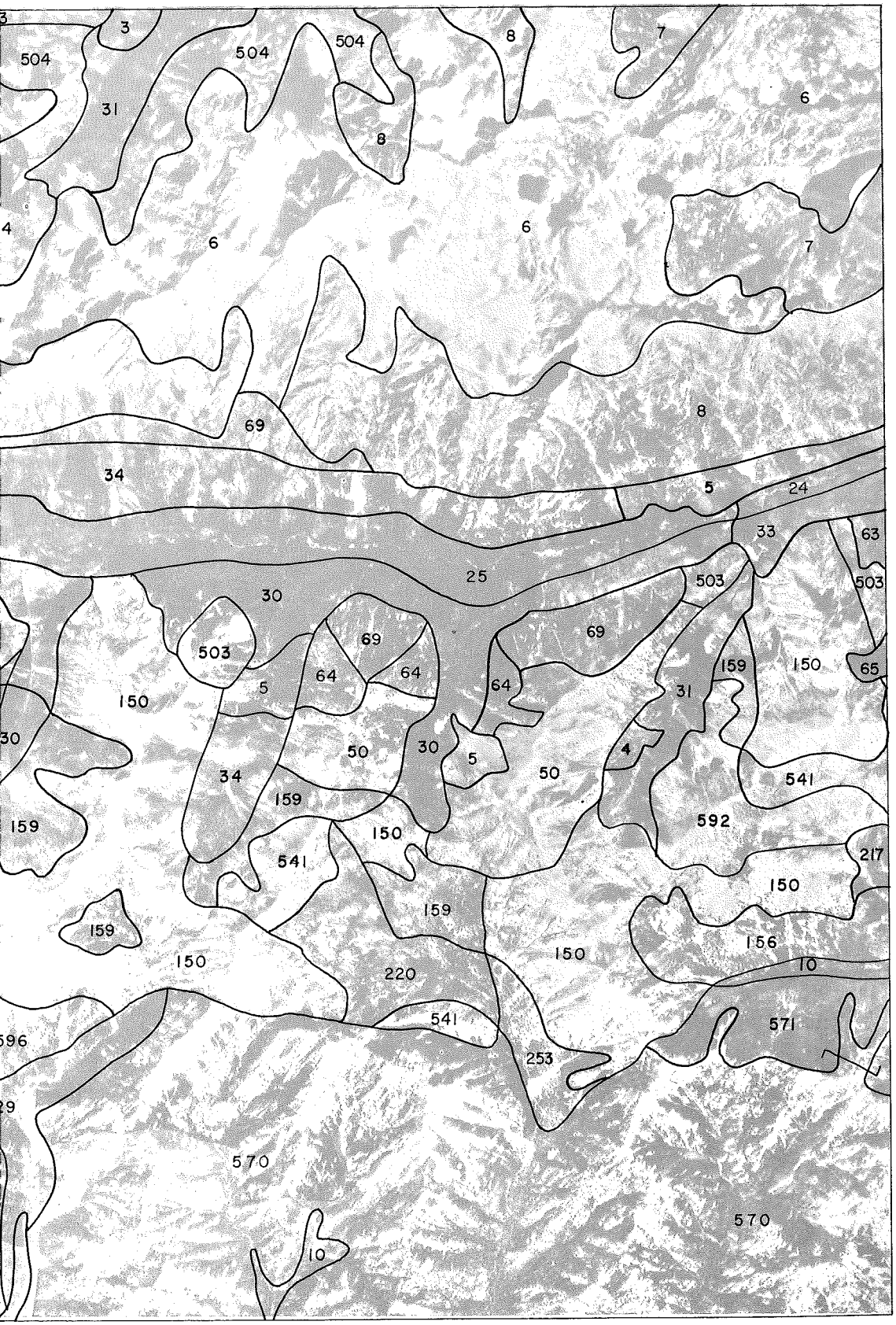
31


121°00'00"
Joins Sheet 27
Joins Sheet 31
Joins Sheet
50
210
4
63
10
64
7
3
34
8
503
504
31
6
25
150
5
68
29
30
219
504
8
159
571
570
596
Scale in Miles
1
1/2
0
1
2
N

s Sheet 27

120°45'00"

47°30'00"



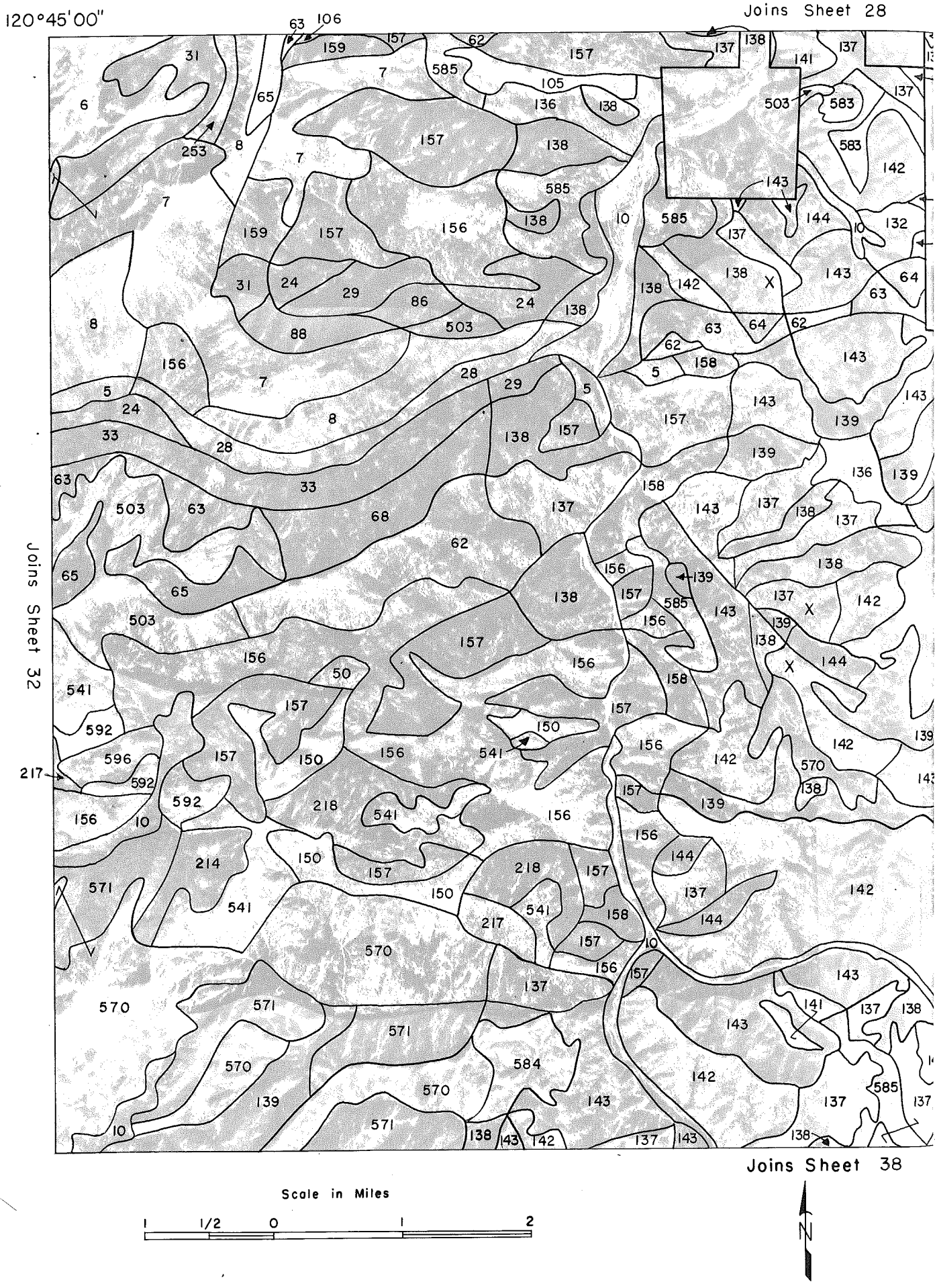
Joins Sheet 33

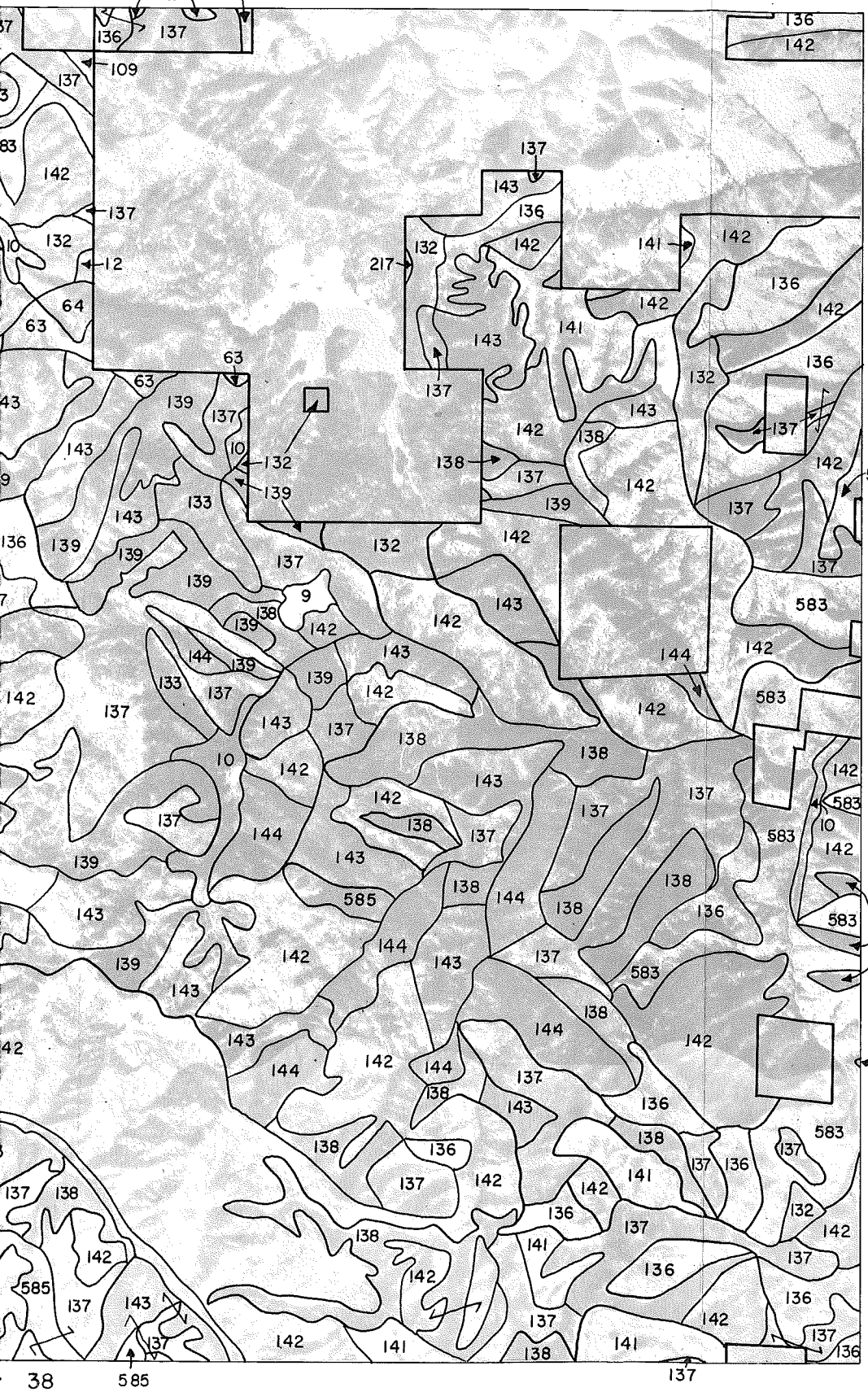
47° 22' 30"

s Sheet 37

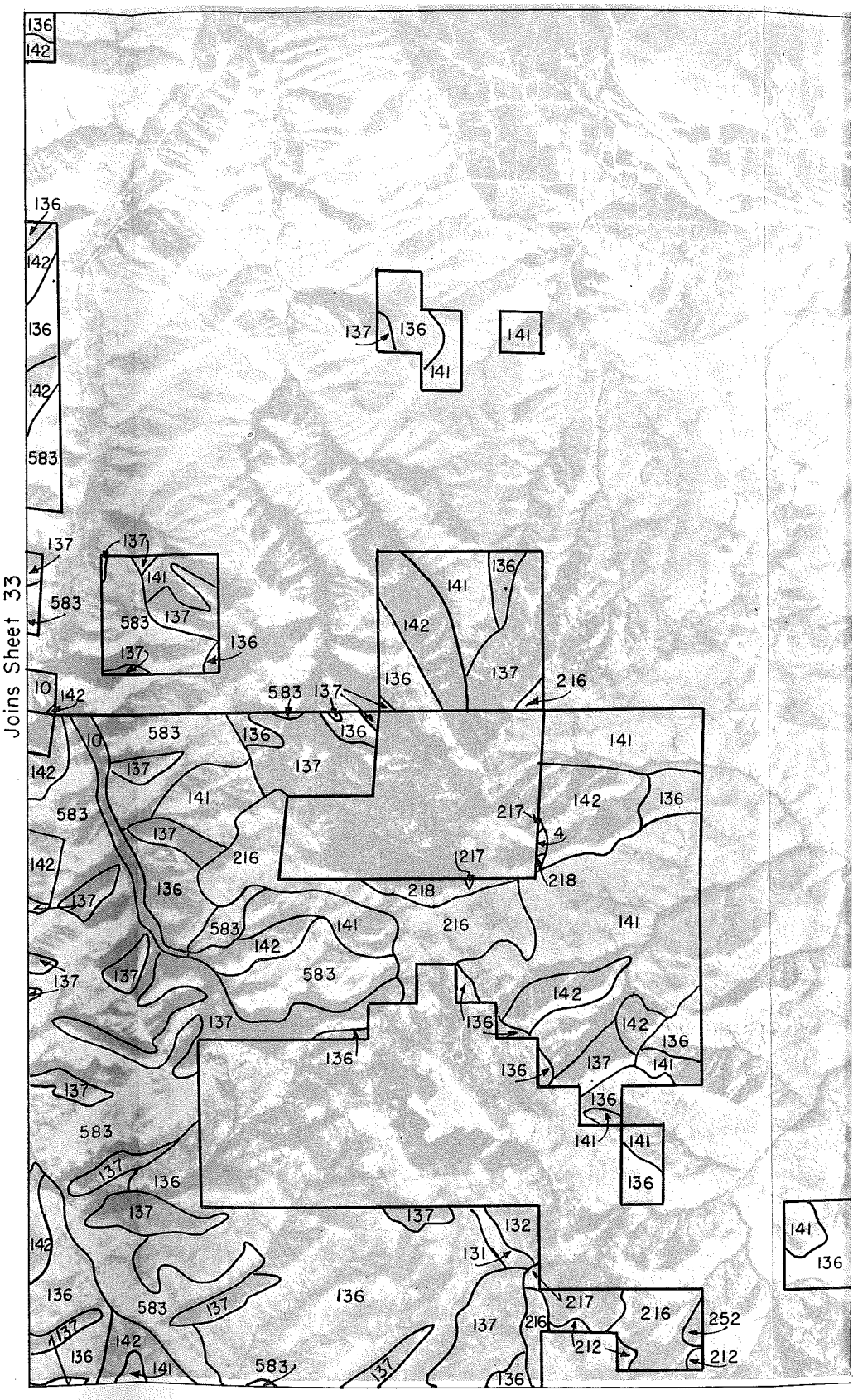
WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

32

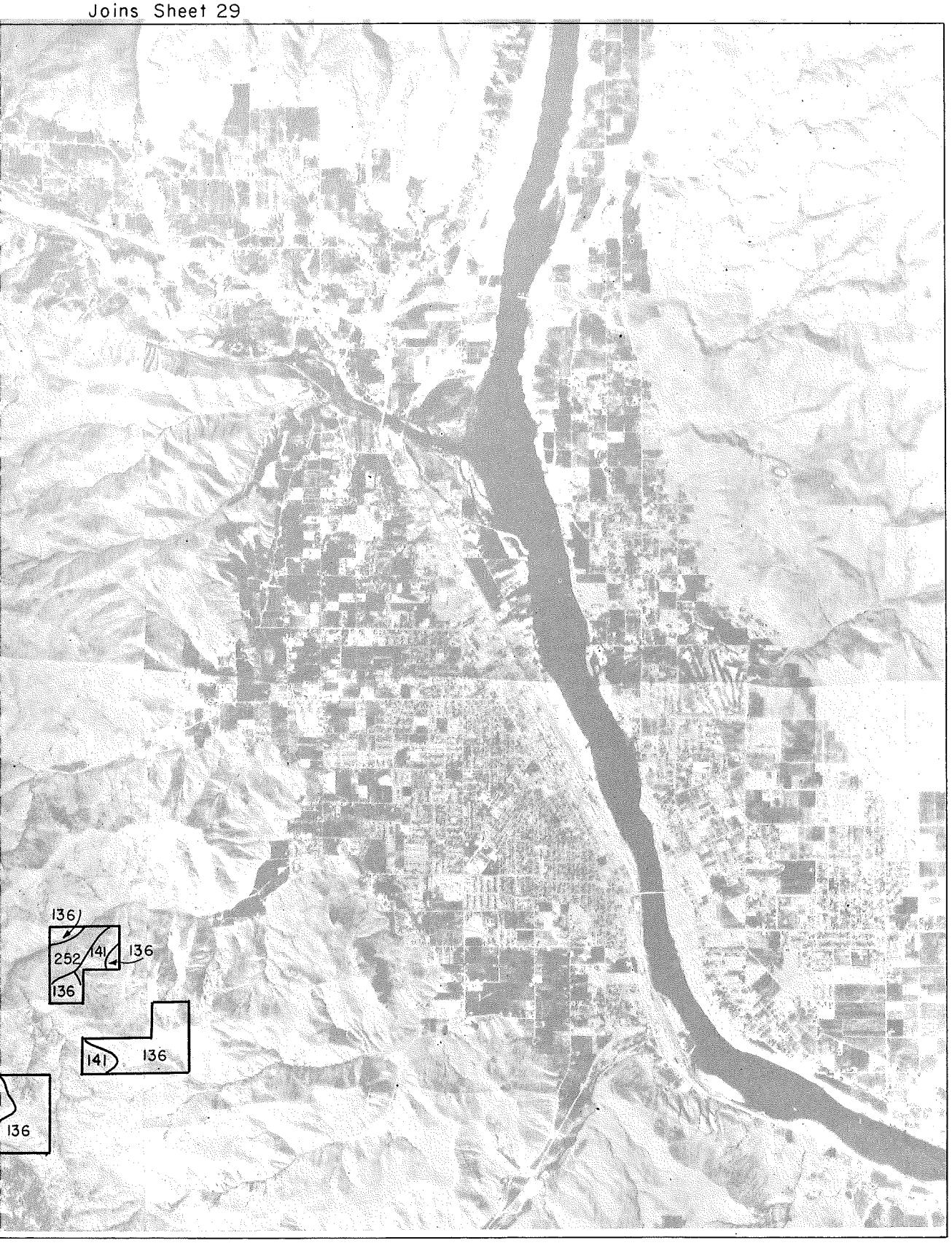

120°45'00"
Joins Sheet 28
Joins Sheet 32
Joins Sheet 38
Scale in Miles
1 1/2 0 1 2
N



WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY


Joins Sheet 33
Scale in Miles
1
1/2
0
1
2

Joins Sheet 29



Joins Sheet 39

N

WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

121° 30' 00"

Joins Sheet 30

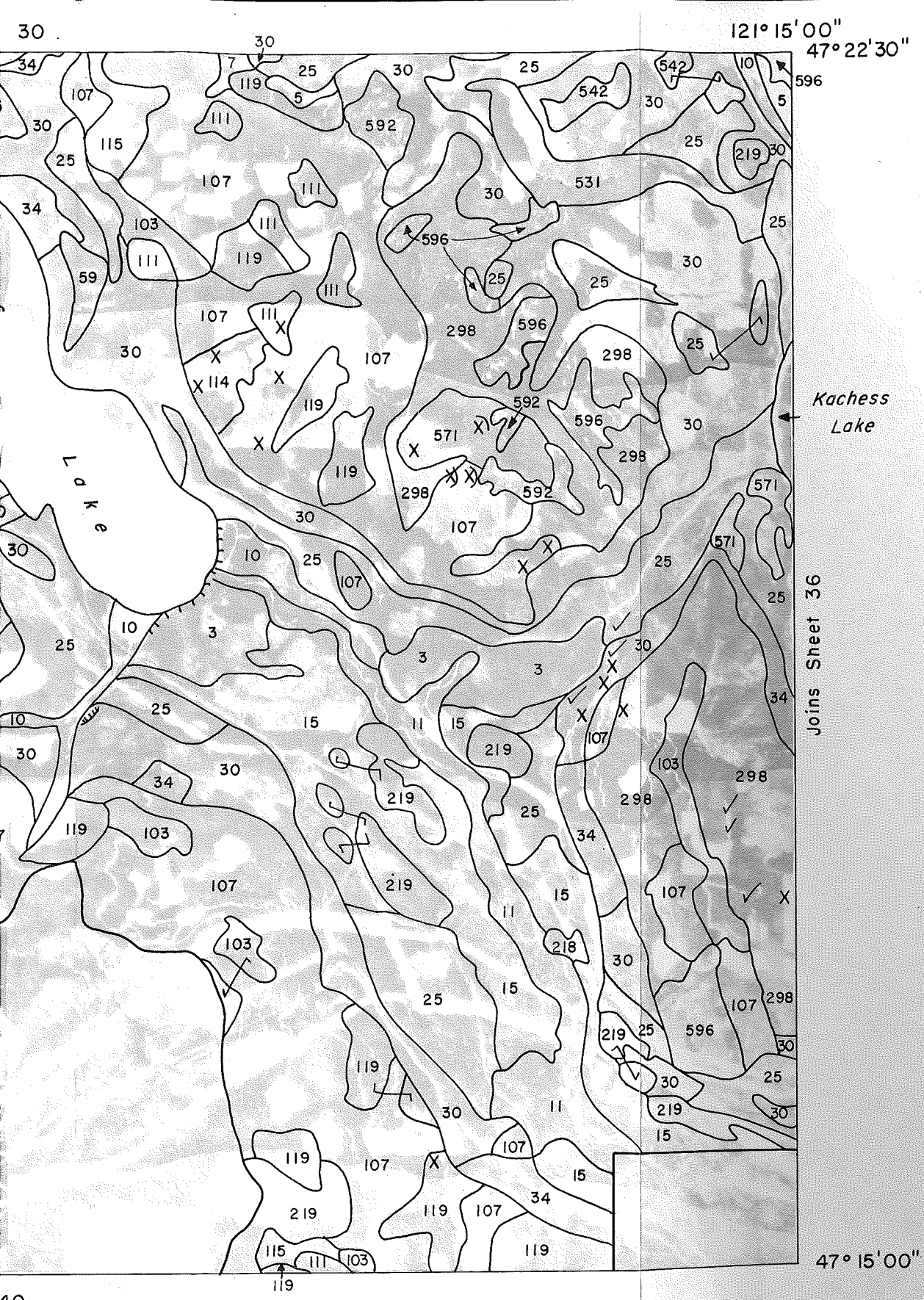


Joins Sheet 40

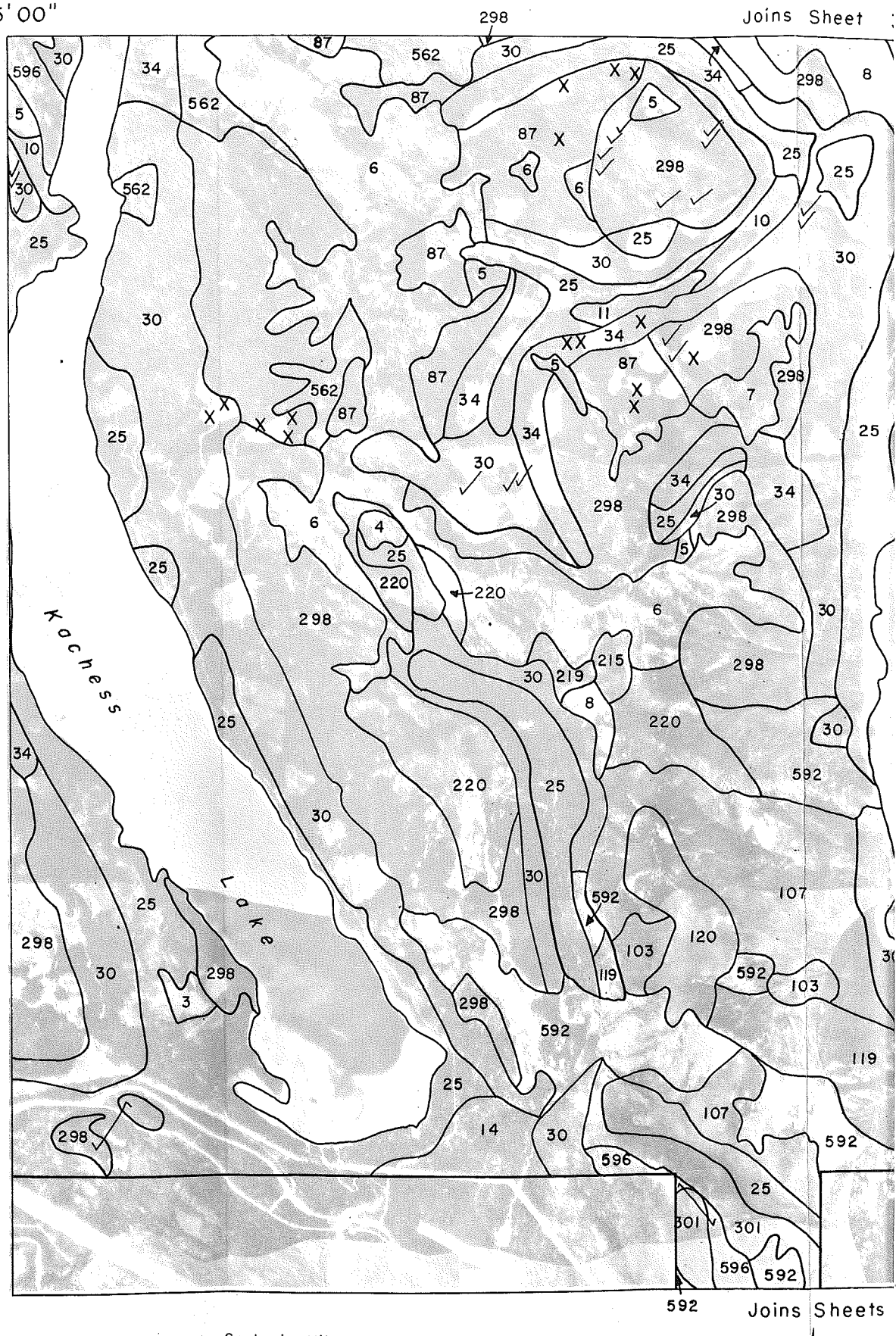
Scale in Miles

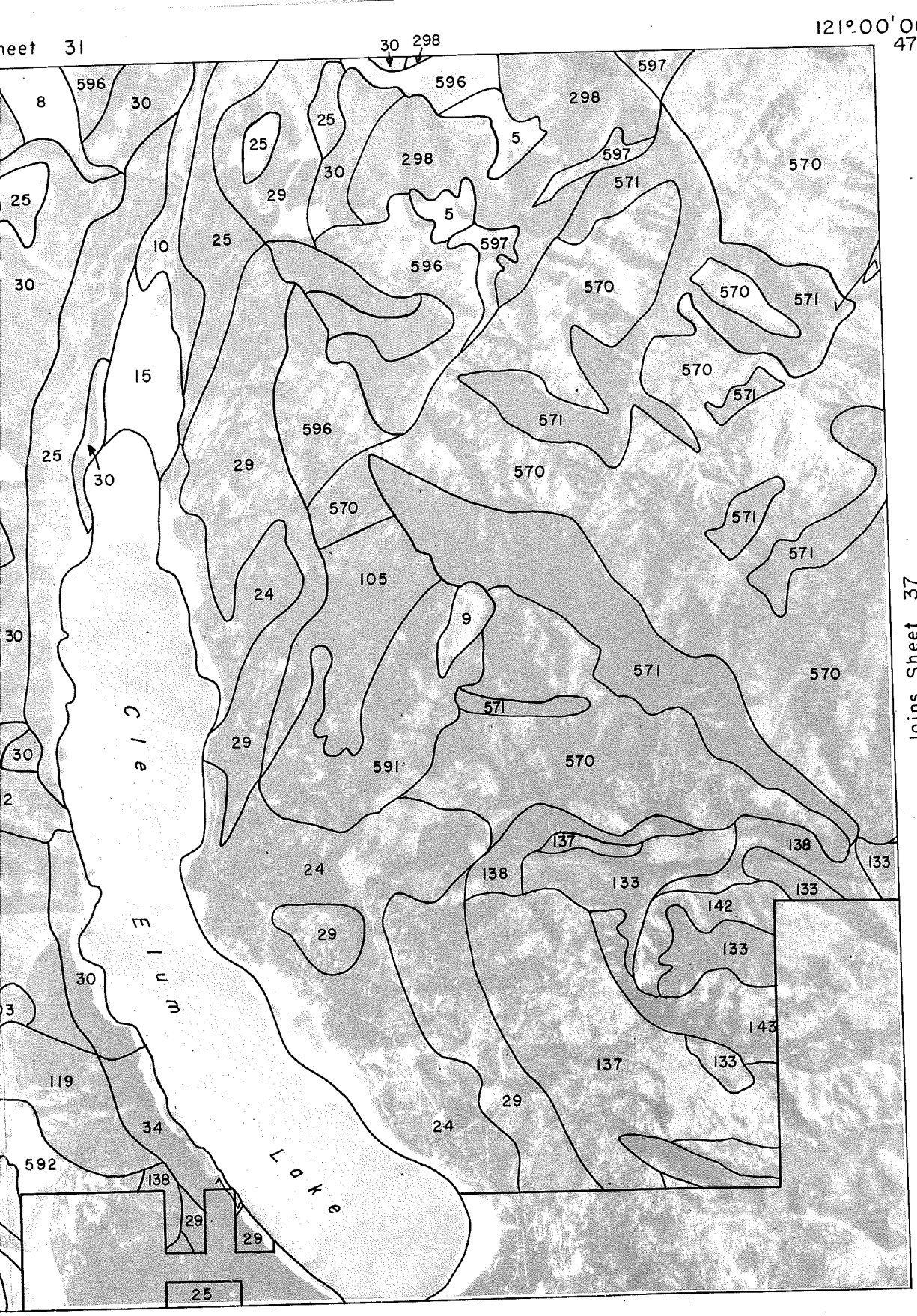
1 1/2 0 1 2

N



WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

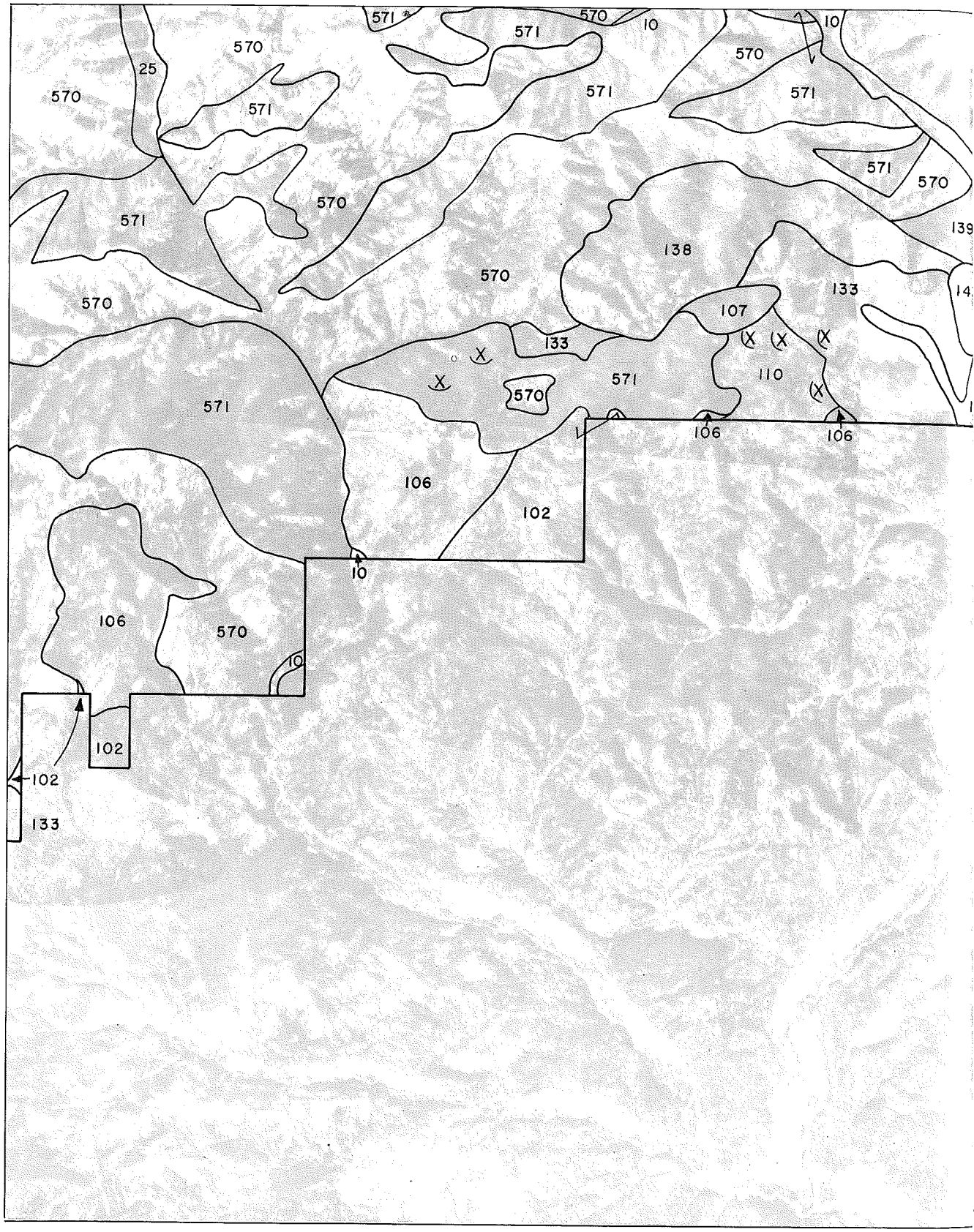

121° 15' 00"
Joins Sheet
Joins Sheet 35
Kaches s
Lake
Joins Sheets
592
Scale in Miles
1 1/2 0 1 2
N



WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

36

Joins Sheet 32



Joins Sheet 36

Joins Sheets 41 &

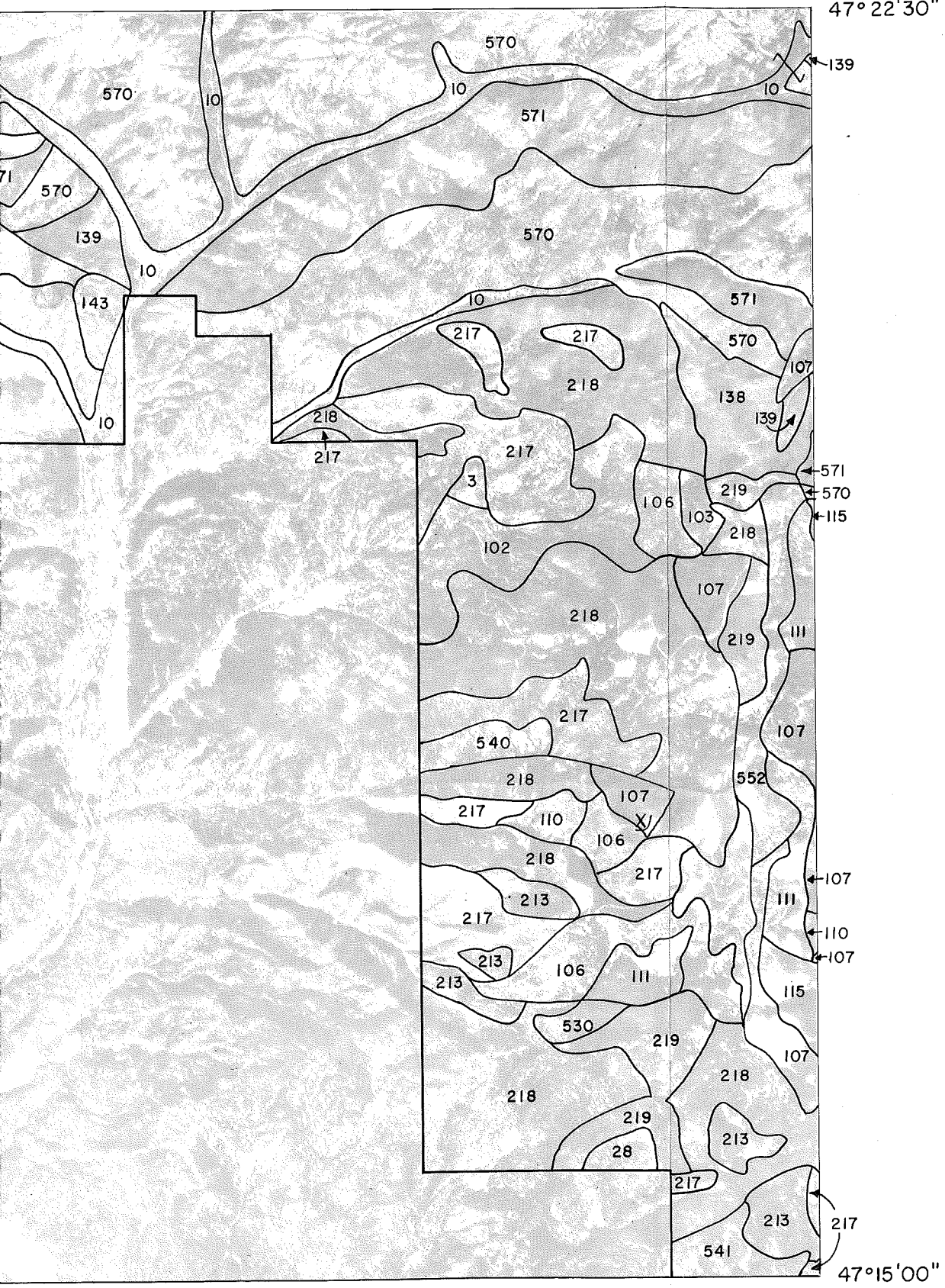
Scale in Miles

1 1/2 0 1 2

N

Sheet 32

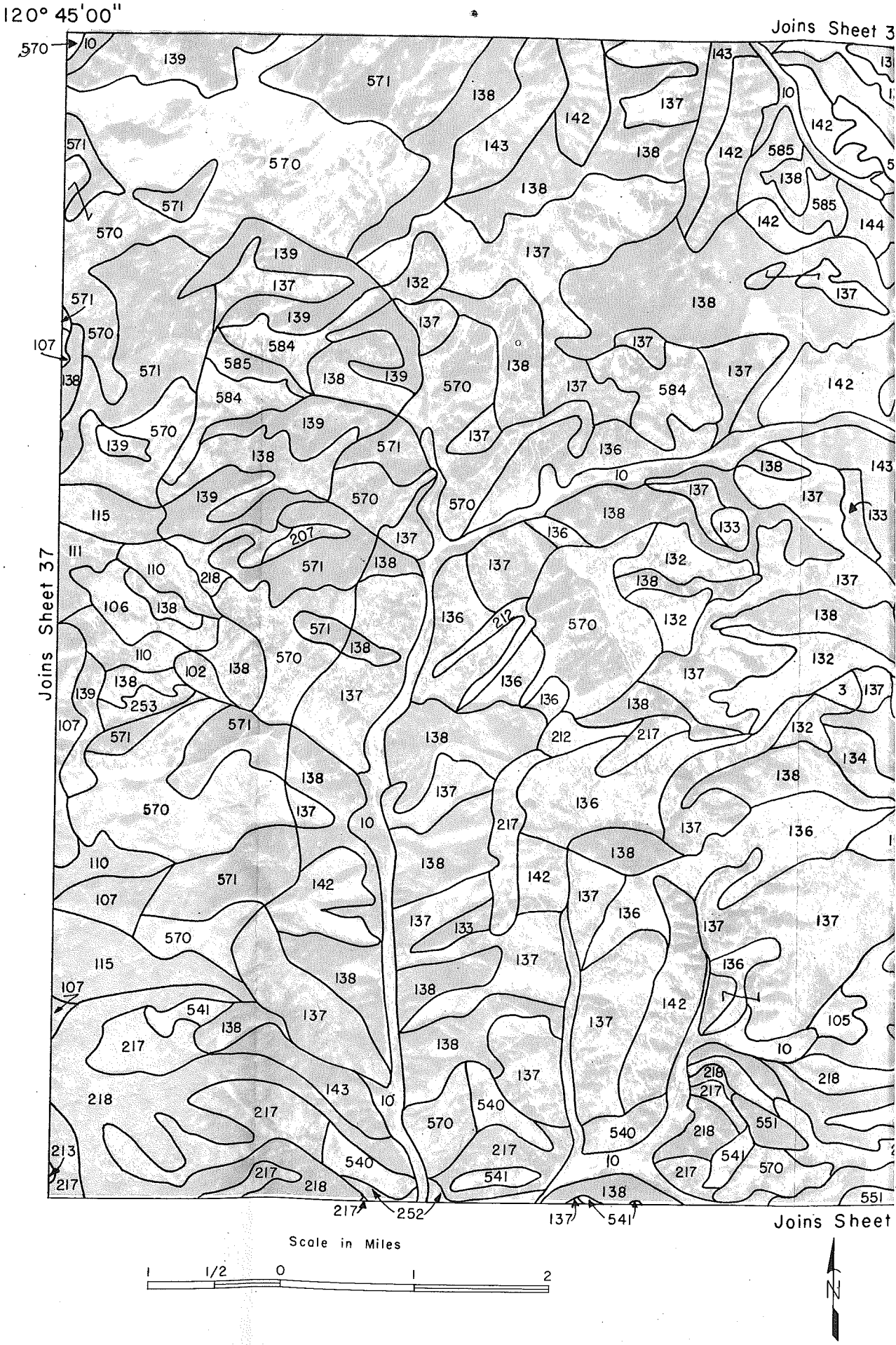
120°45'00"
47°22'30"

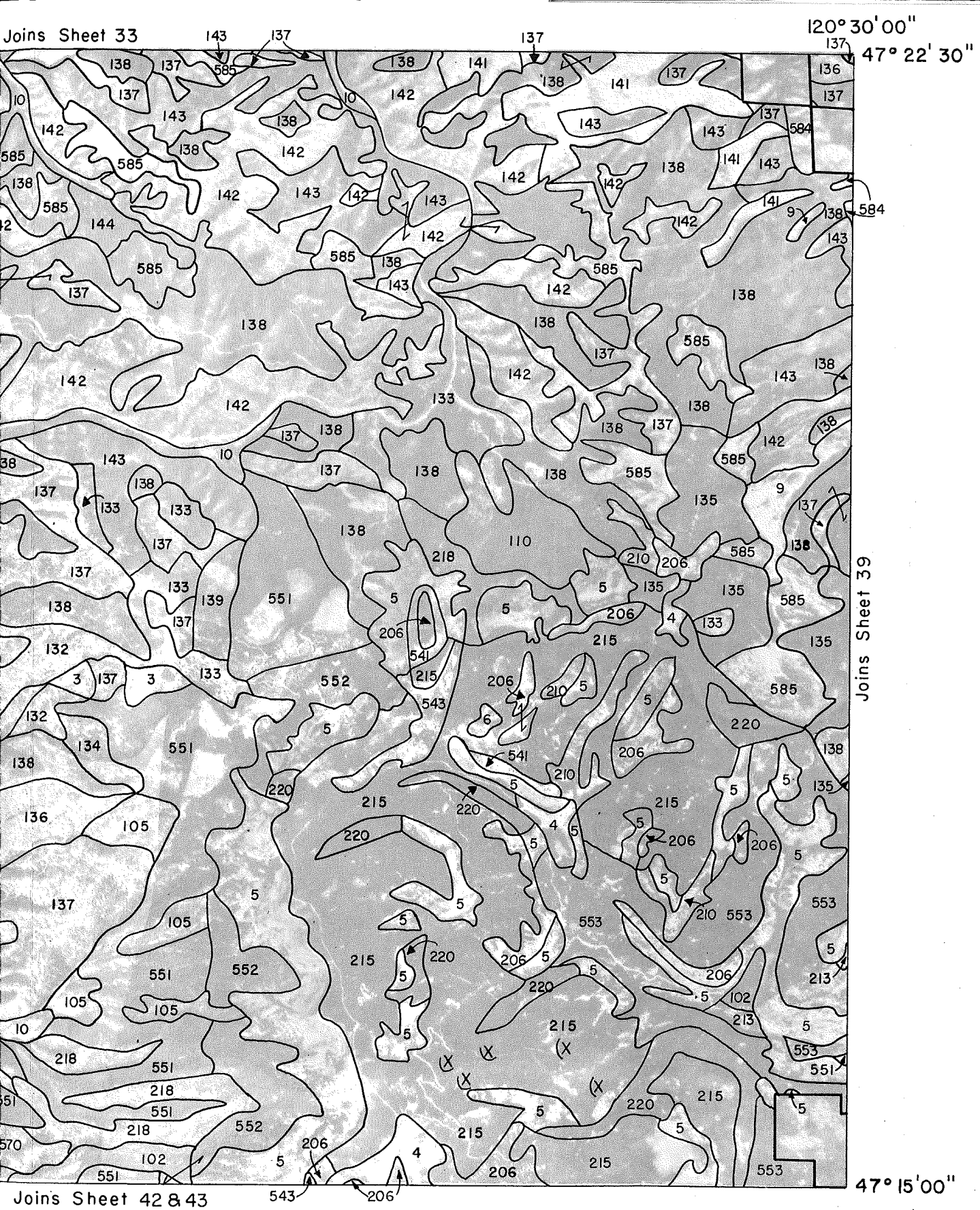


Sheets 41 & 42

WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

37


120° 45'00"
Joins Sheet 3
Joins Sheet 37
Joins Sheet
Scale in Miles
1 1/2 0 1 2
N



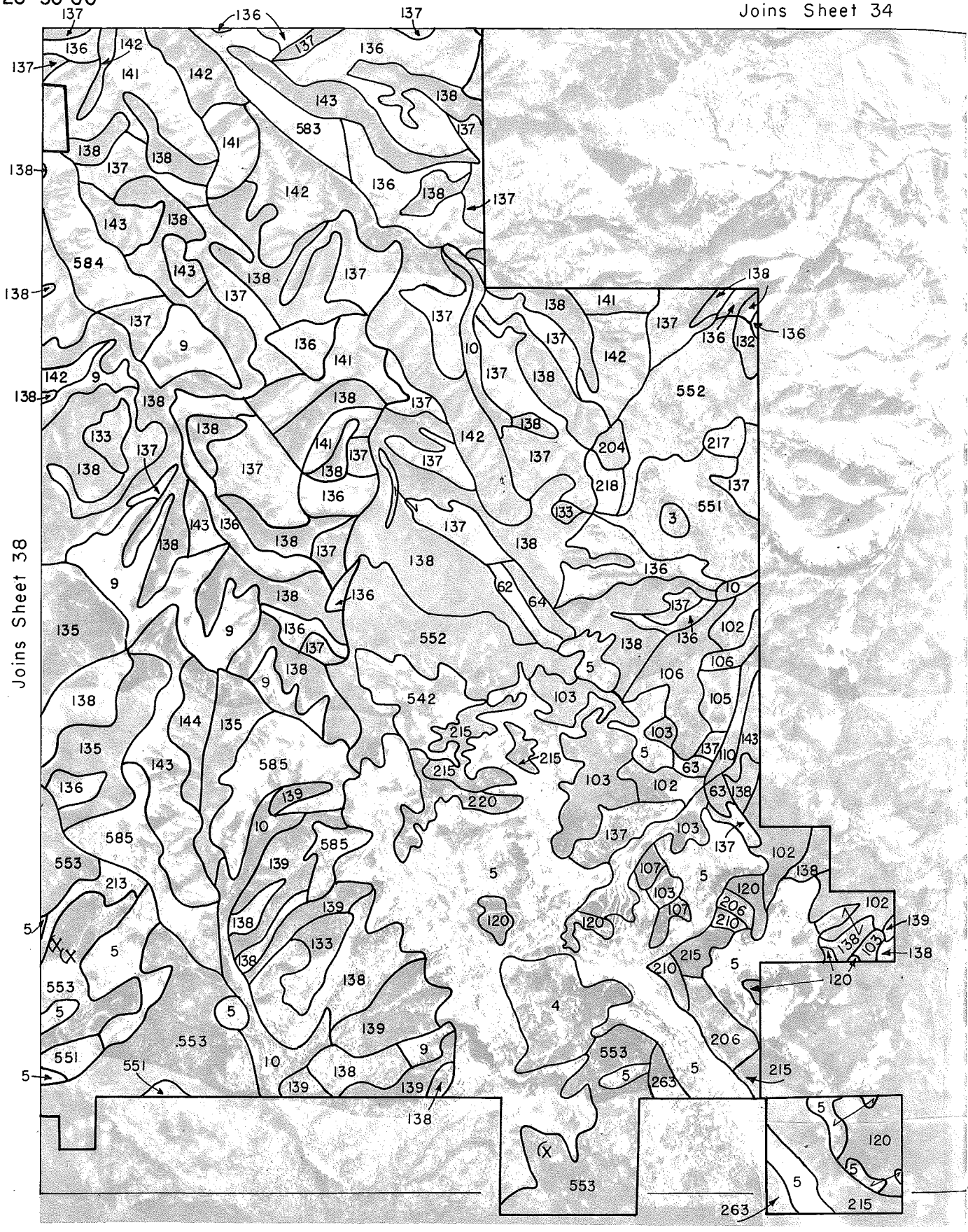
WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

38

120° 30' 00"

Joins Sheet 34

Joins Sheet 38



Scale in Miles

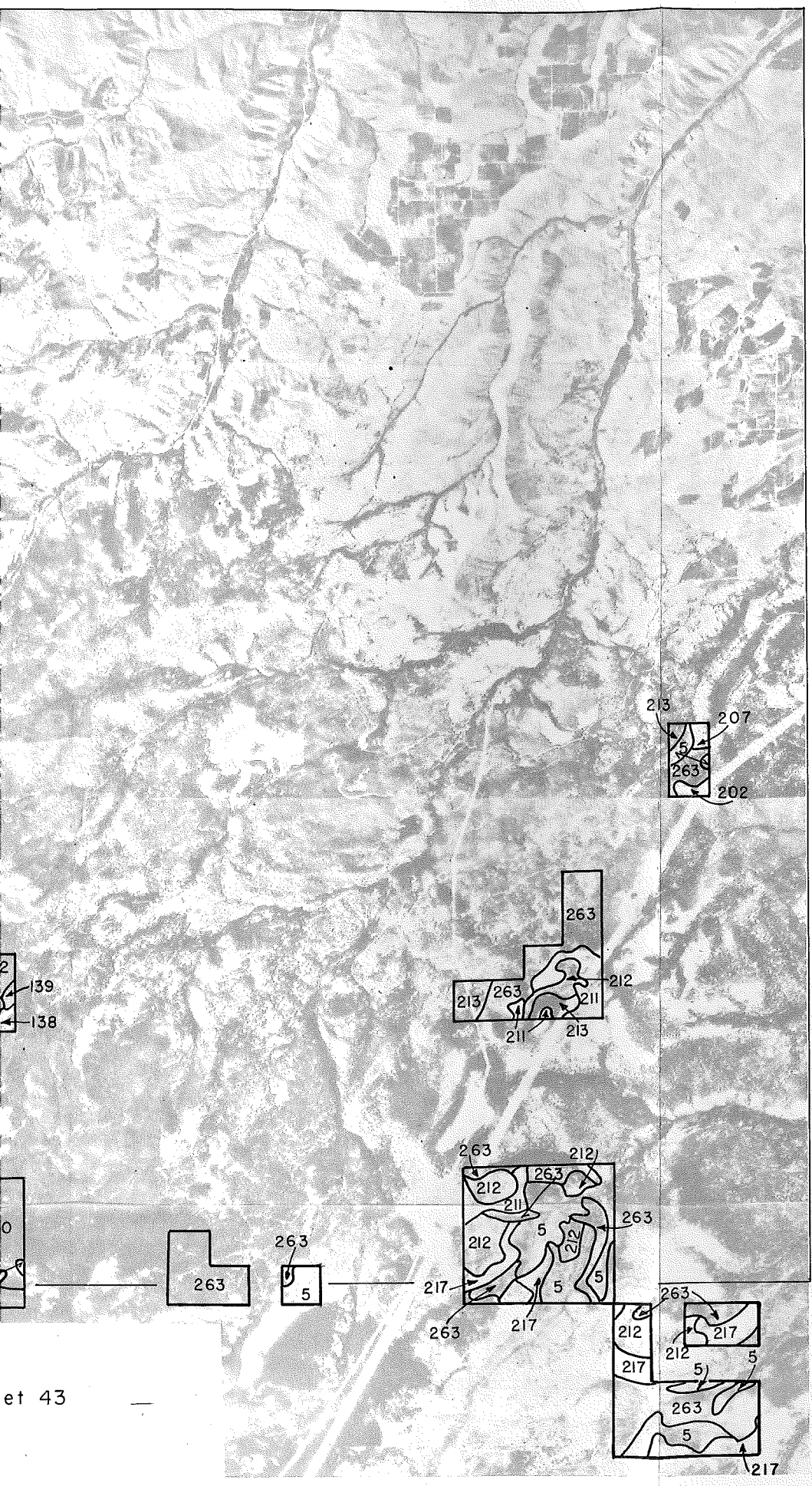
1 1/2 0 1 2

Joins Sheet 43

N

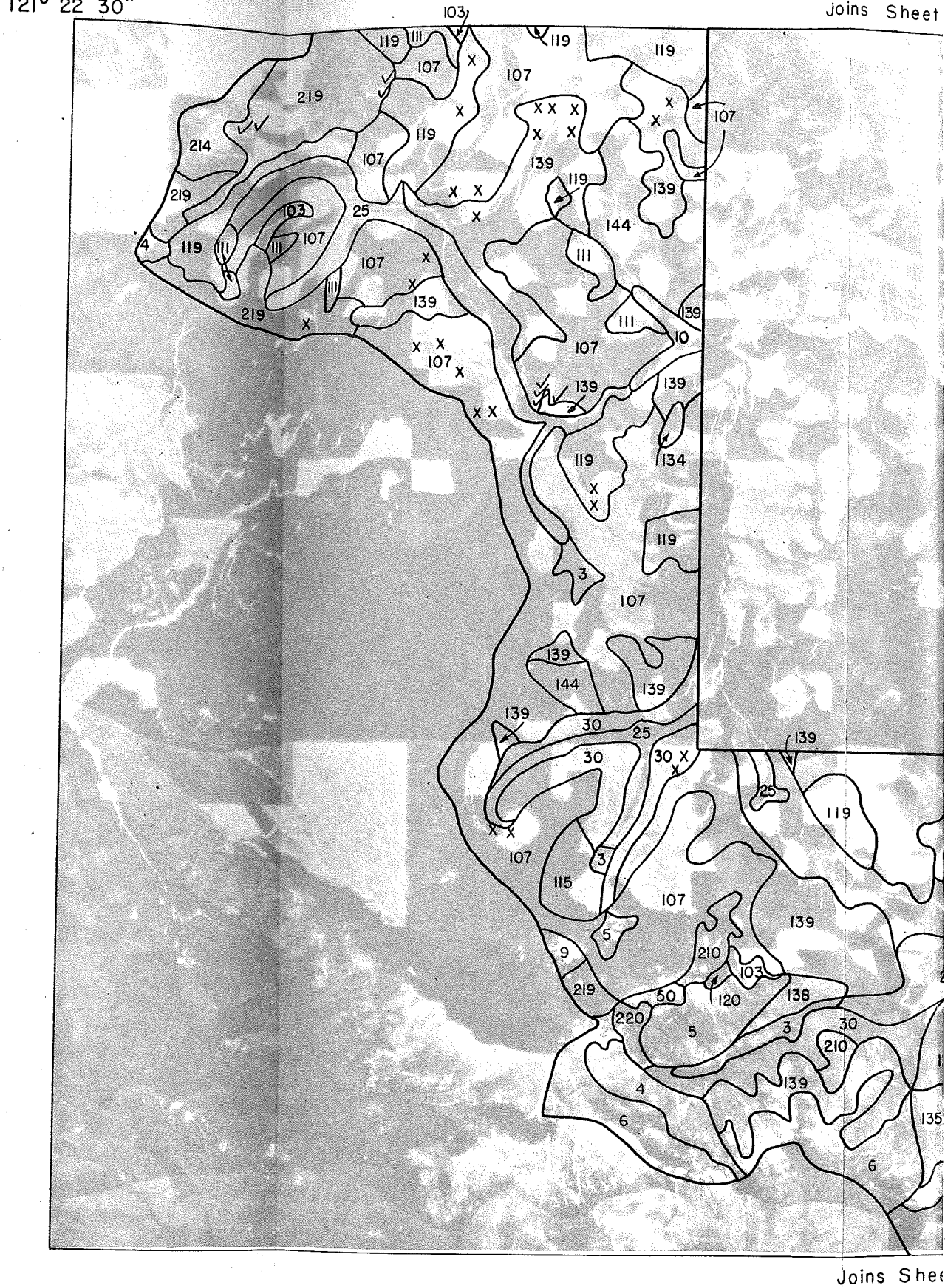
120° 15' 00"

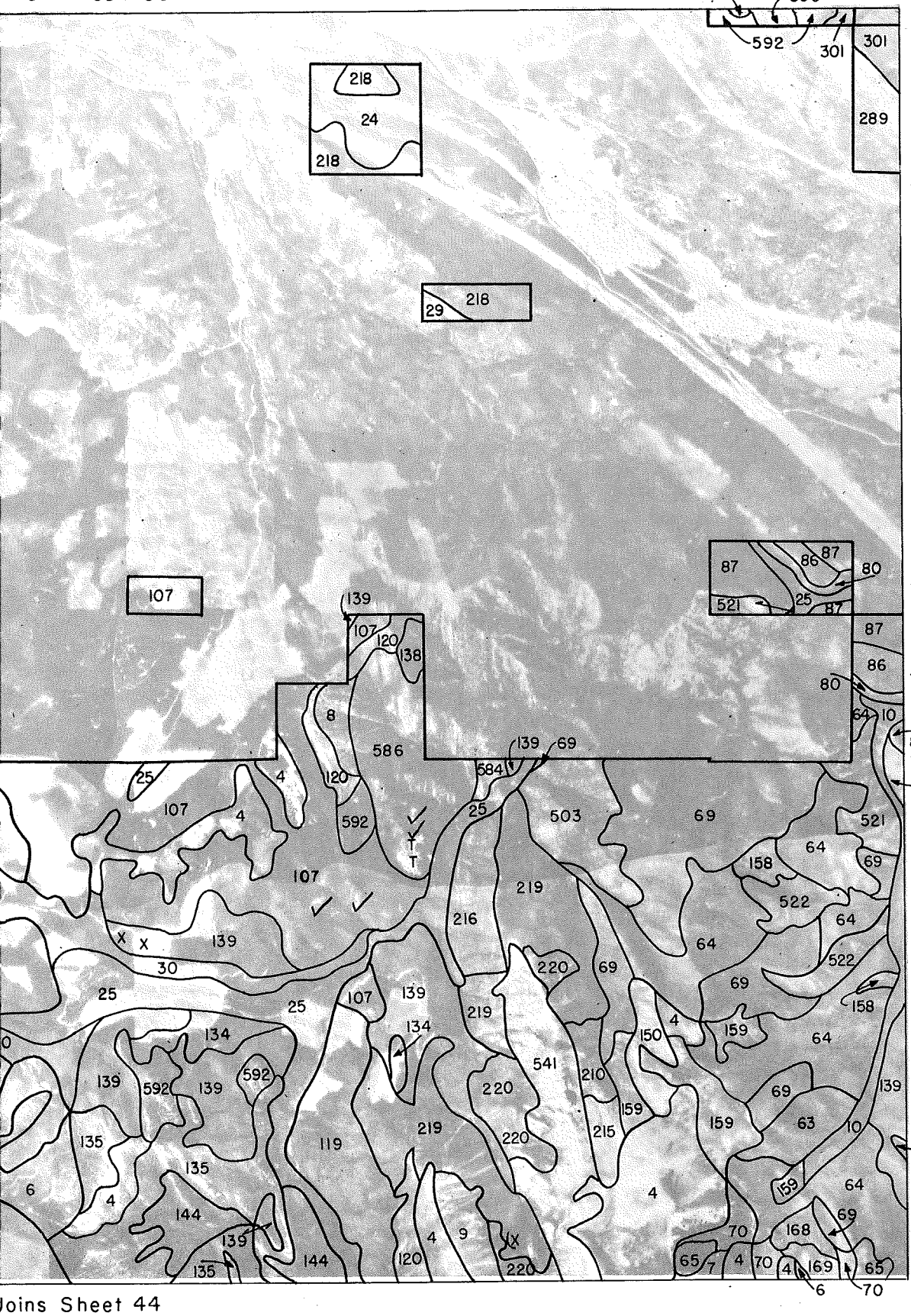
47° 22' 30"



47° 15' 00"

et 43


121° 22' 30"
Joins Sheet
Joins Shee
Scale in Miles
1 1/2 0 1 2
N

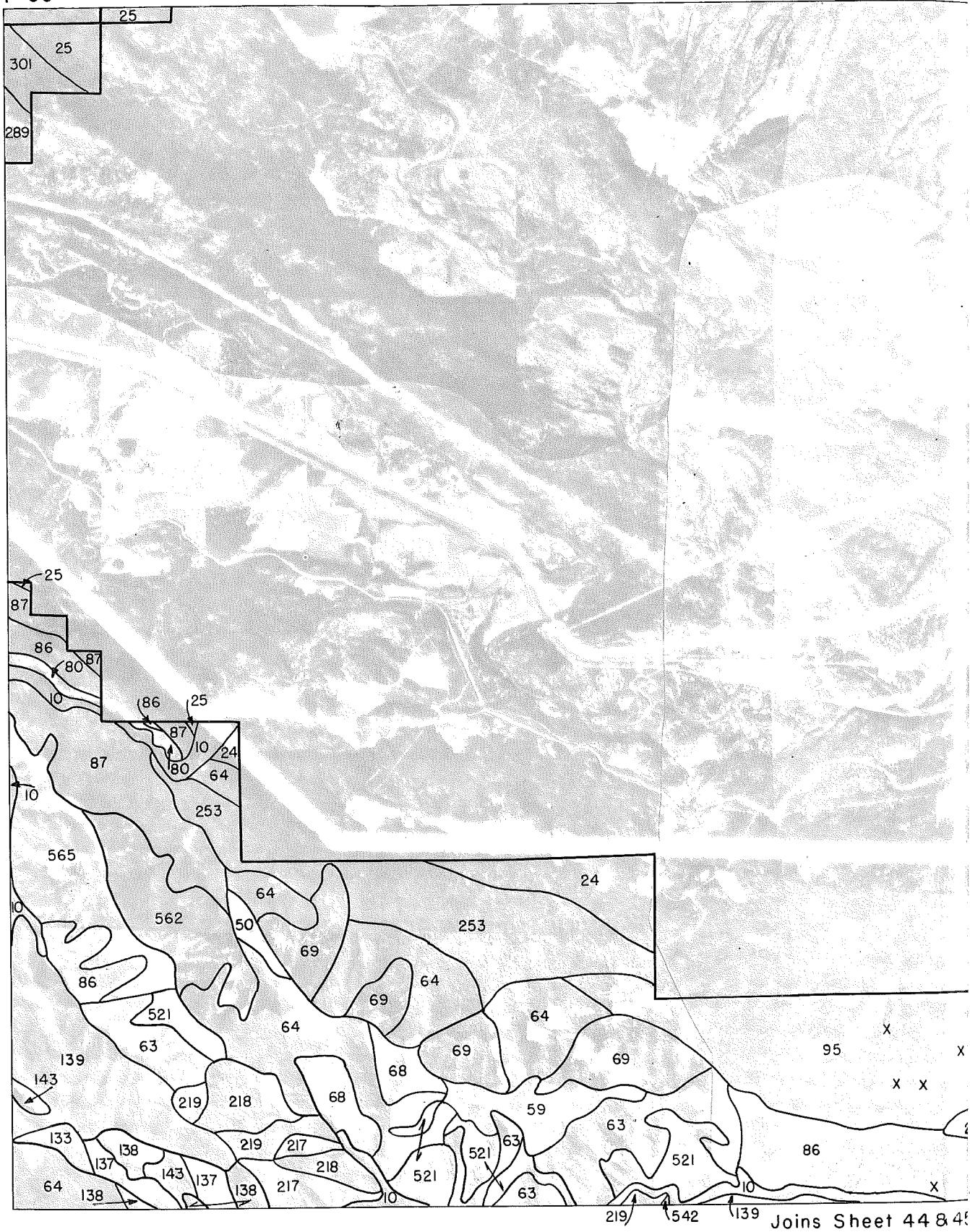


WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

40

121° 07' 30"

Joins Sheet 36 & 37

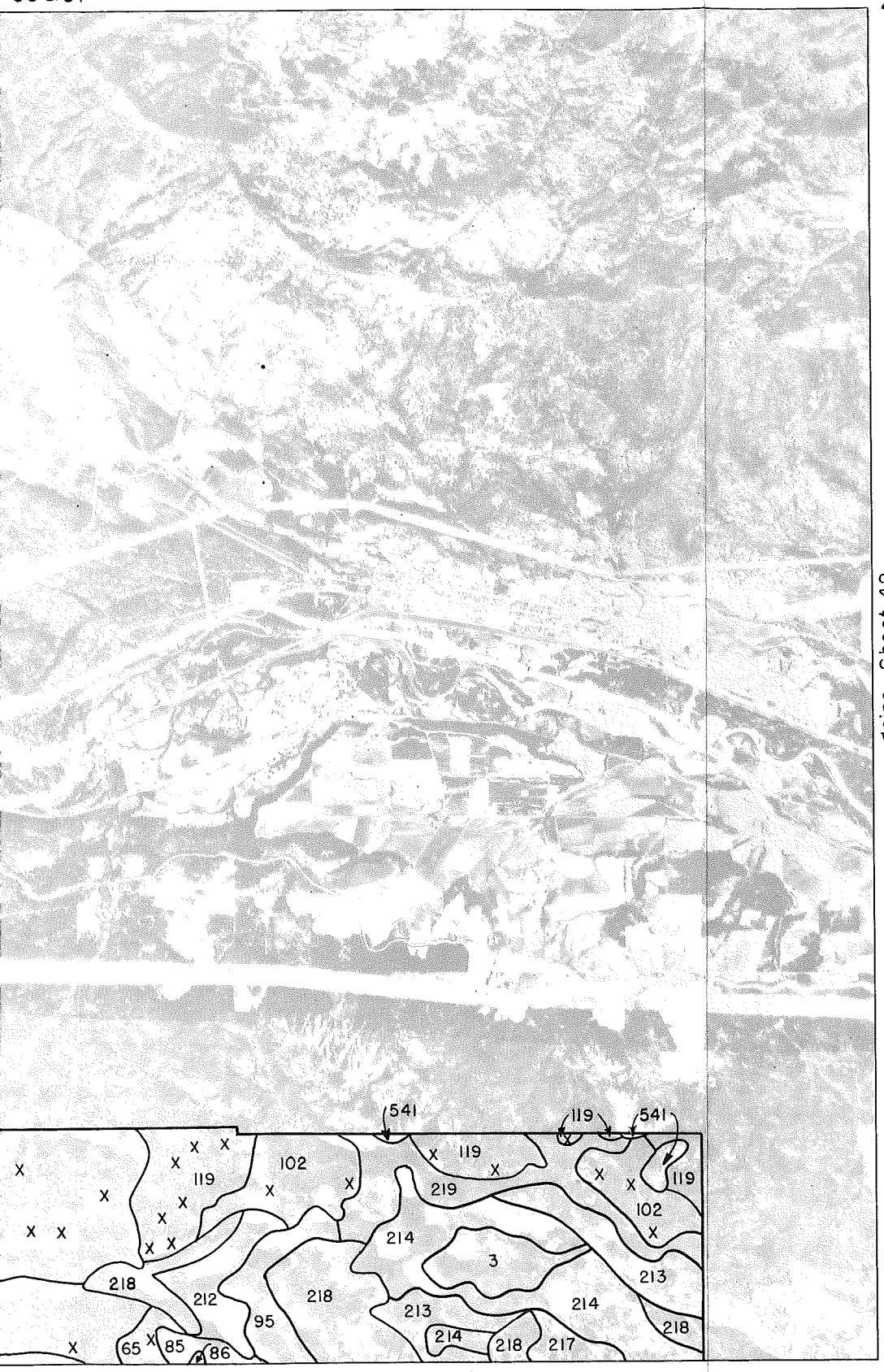


Scale in Miles

1 1/2 0 1 2

N

120° 52' 30"
47° 15' 00"



Joins Sheet 42

47° 07' 30"

eet 44 & 45

WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

120° 52' 30"

Joins She

541

217

Joins Sheet 41

Joins S

Scale in Miles

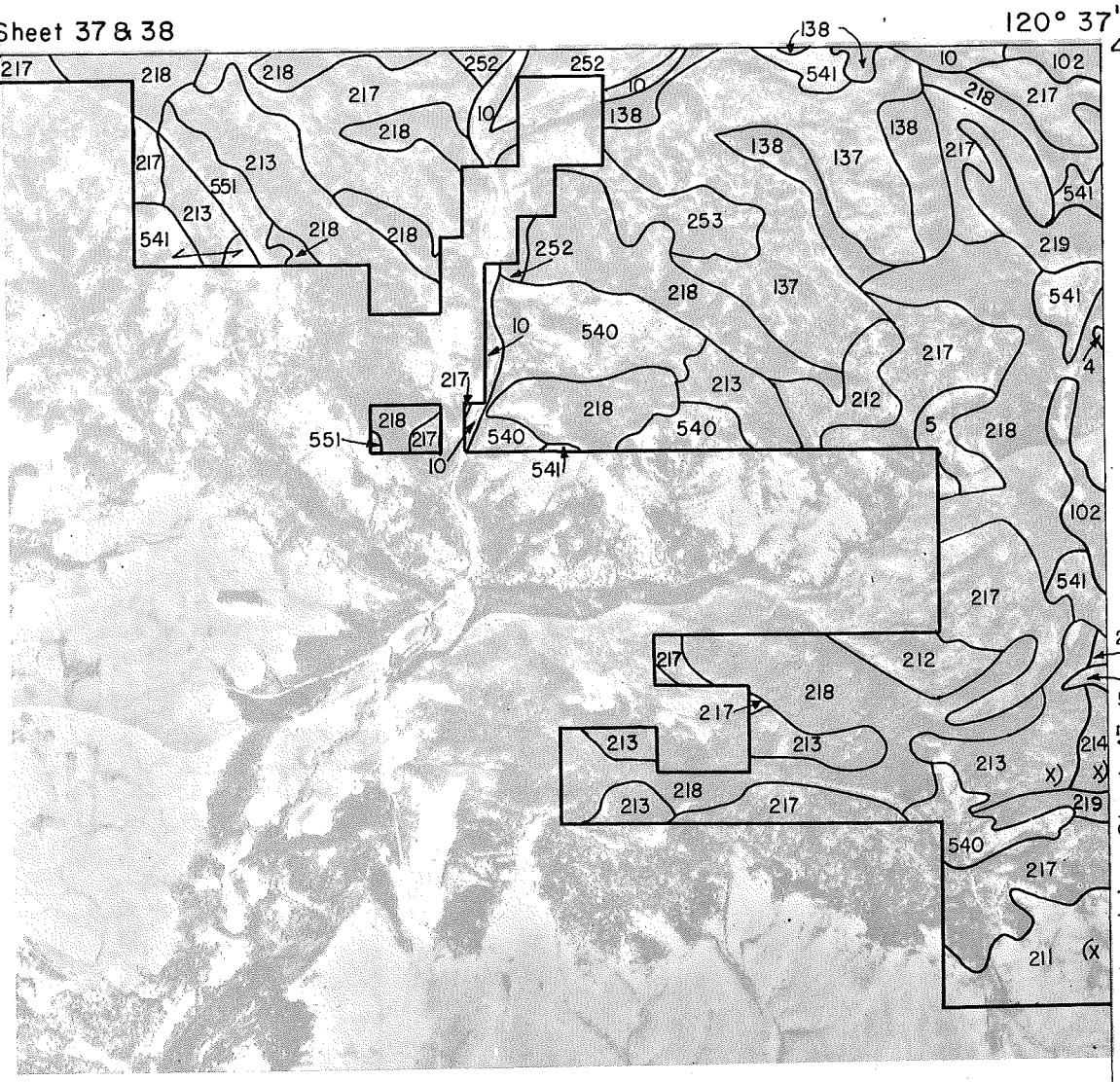
1 1/2 0 1 2

N

ins Sheet 37 & 38

120° 37' 30"

47° 15' 00"



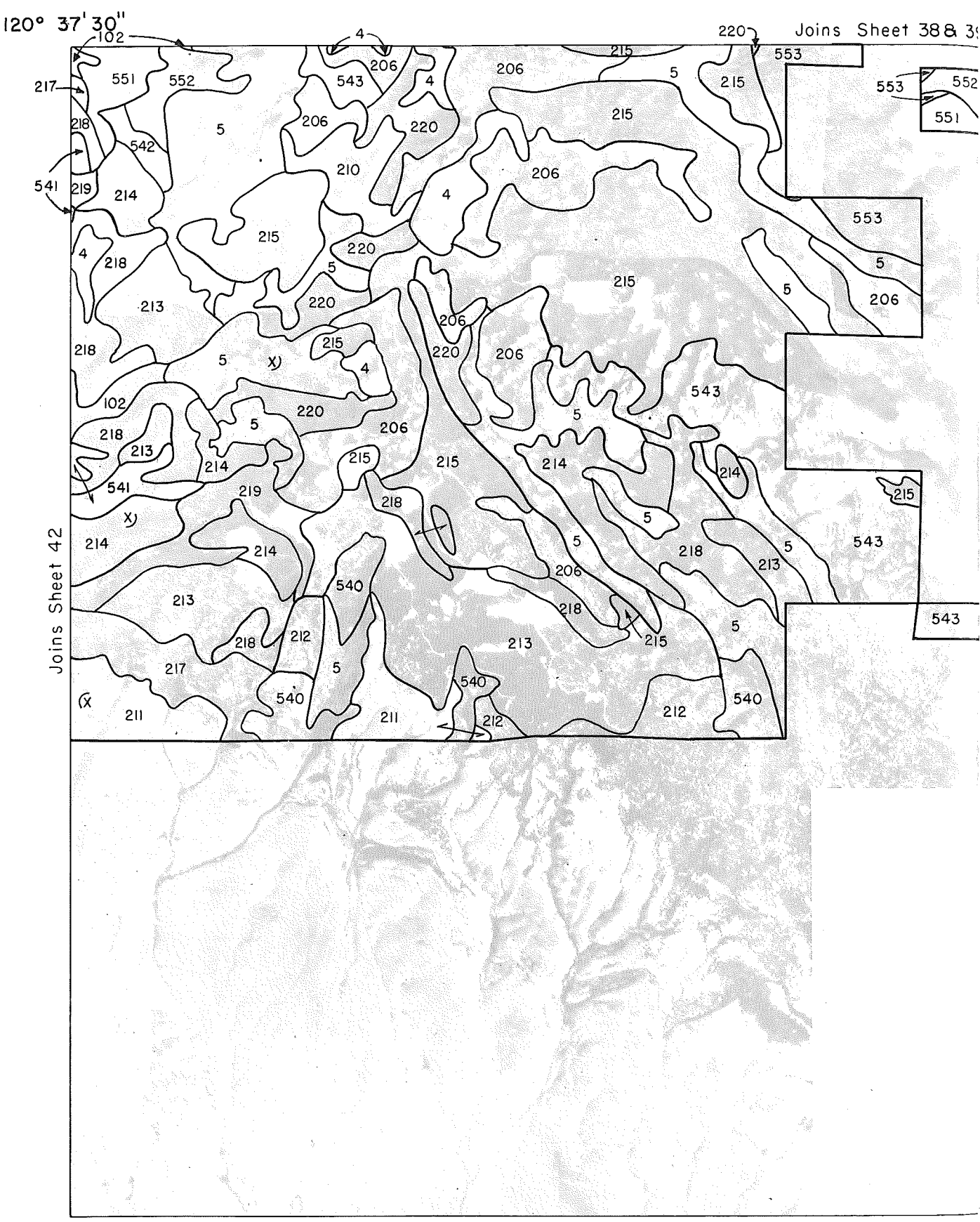
Joins Sheet 43

47° 07' 30"

Joins Sheet 45

N

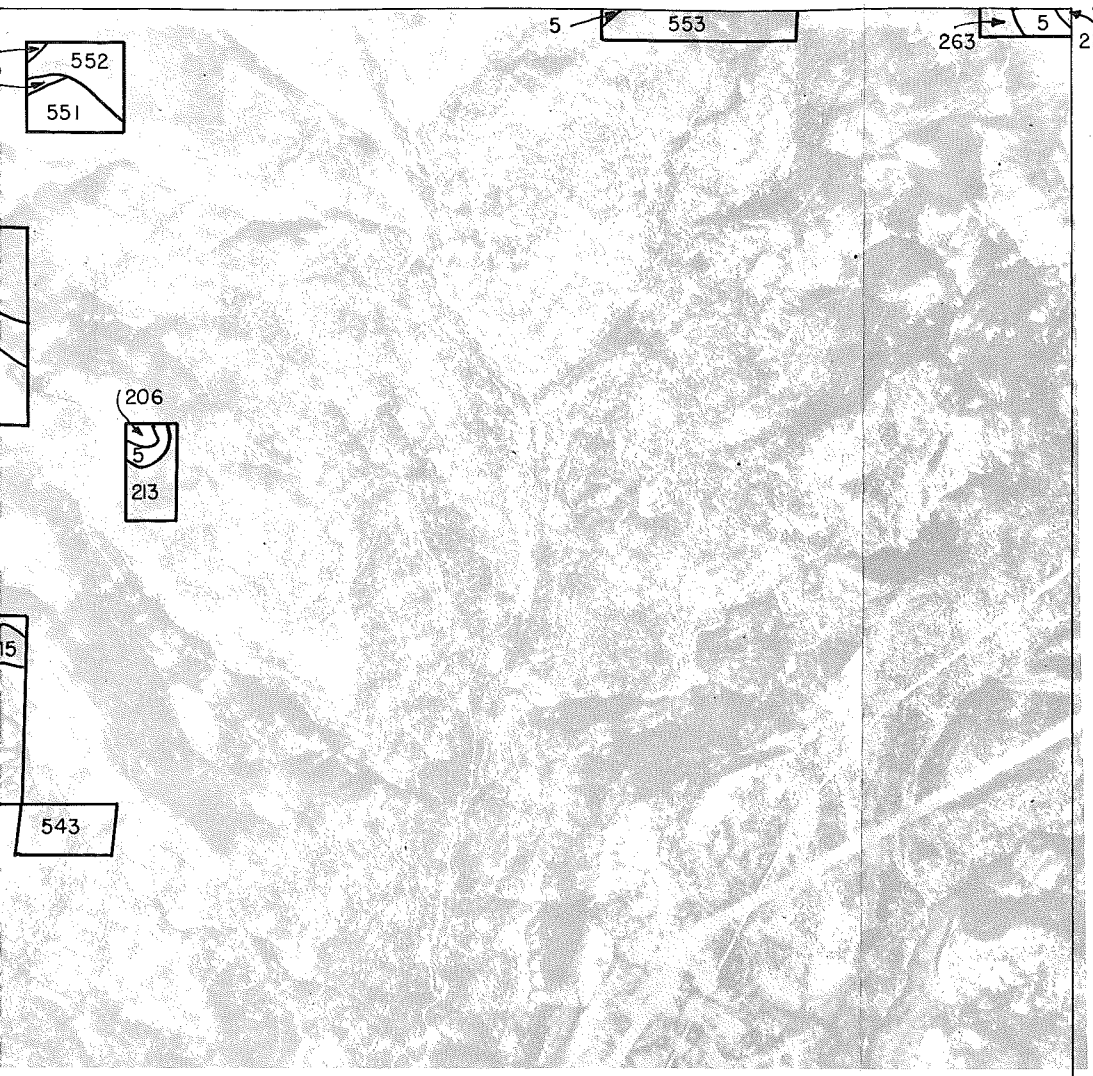
WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY


120° 37' 30"
Joins Sheet 388 39
Joins Sheet 42
Scale in Miles
1
1/2
0
1
2
N

t 38 & 39

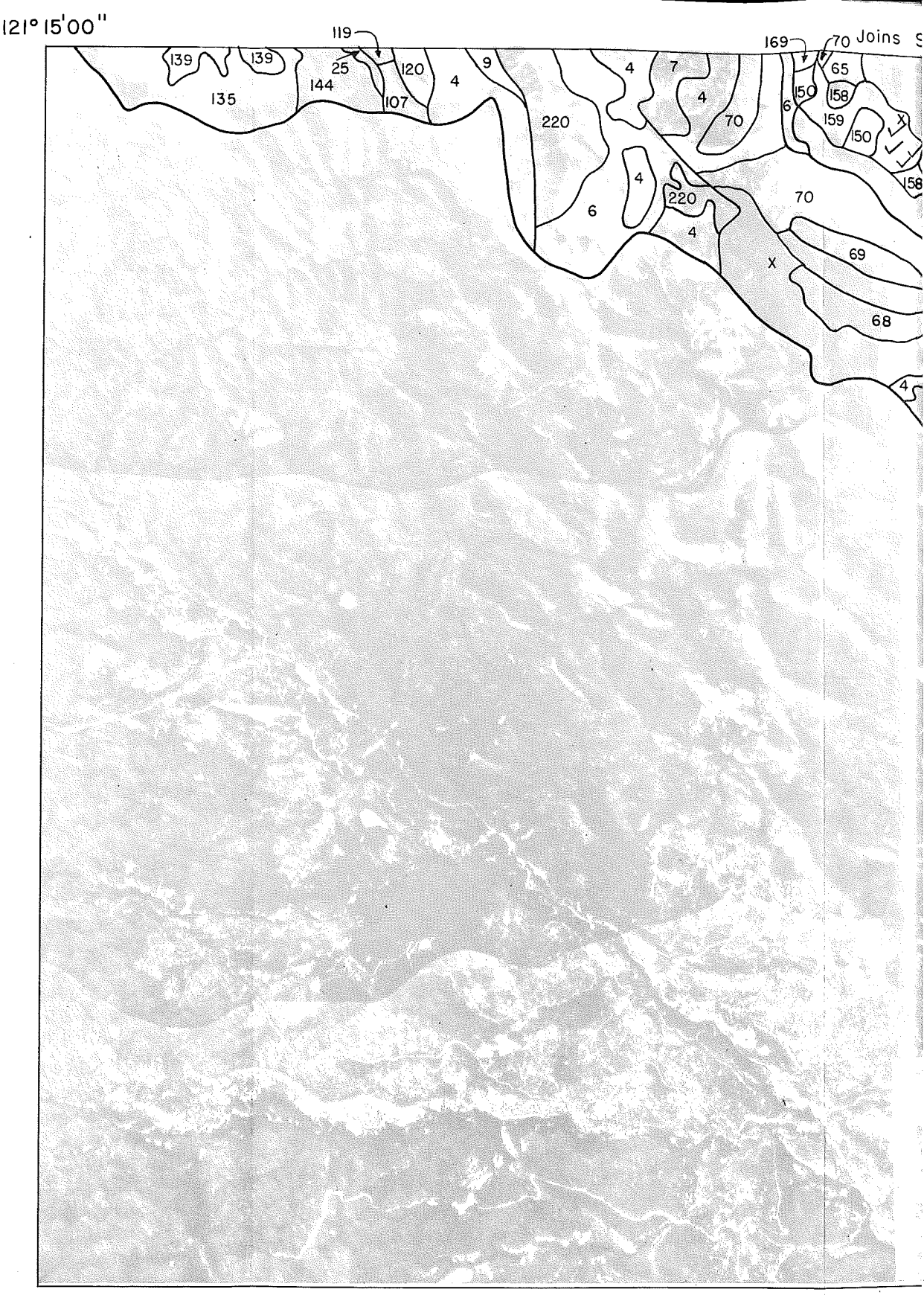
120° 22' 30"

47° 15' 00"



47° 07' 30"

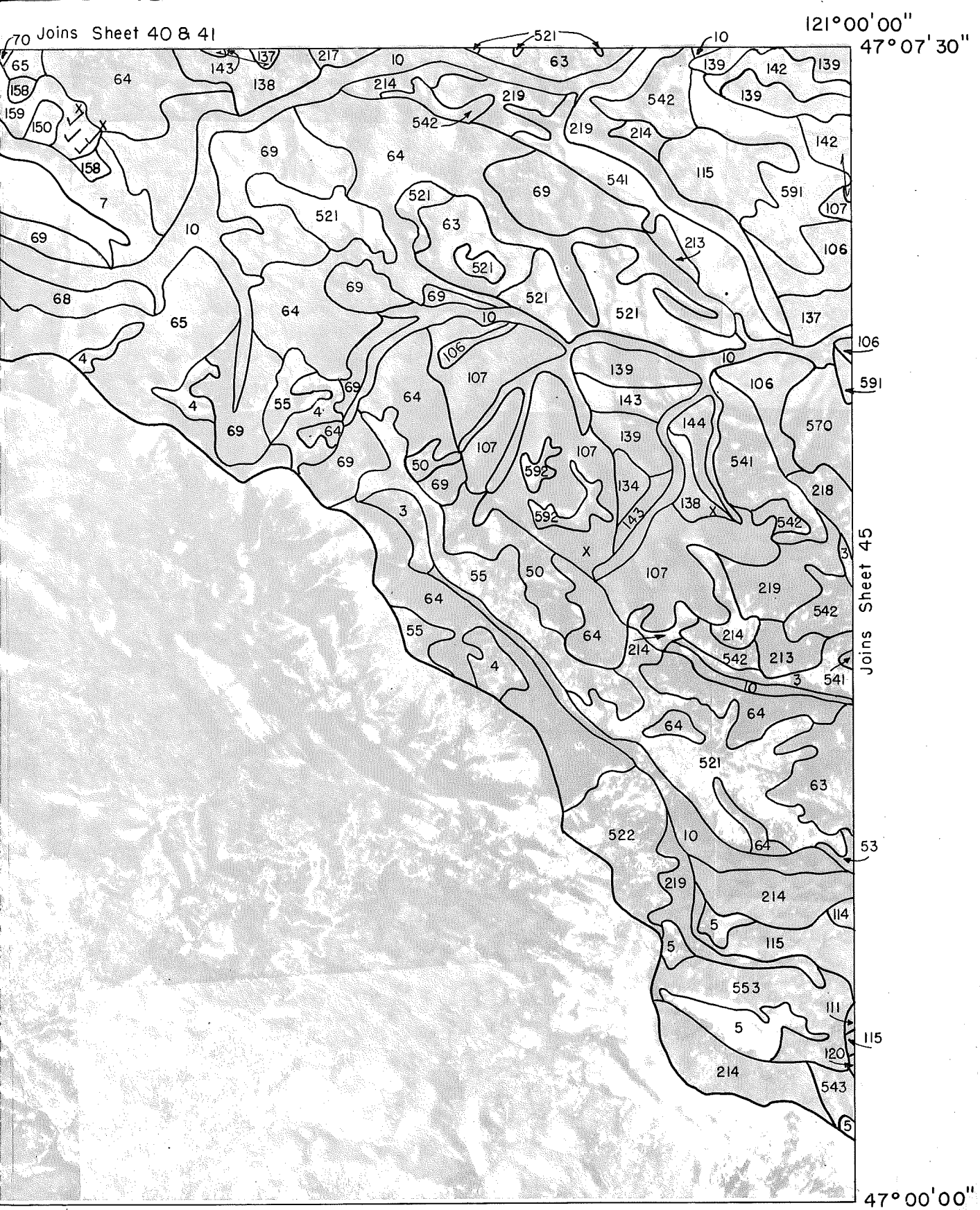
WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY



Scale in Miles

1 1/2 0 1 2

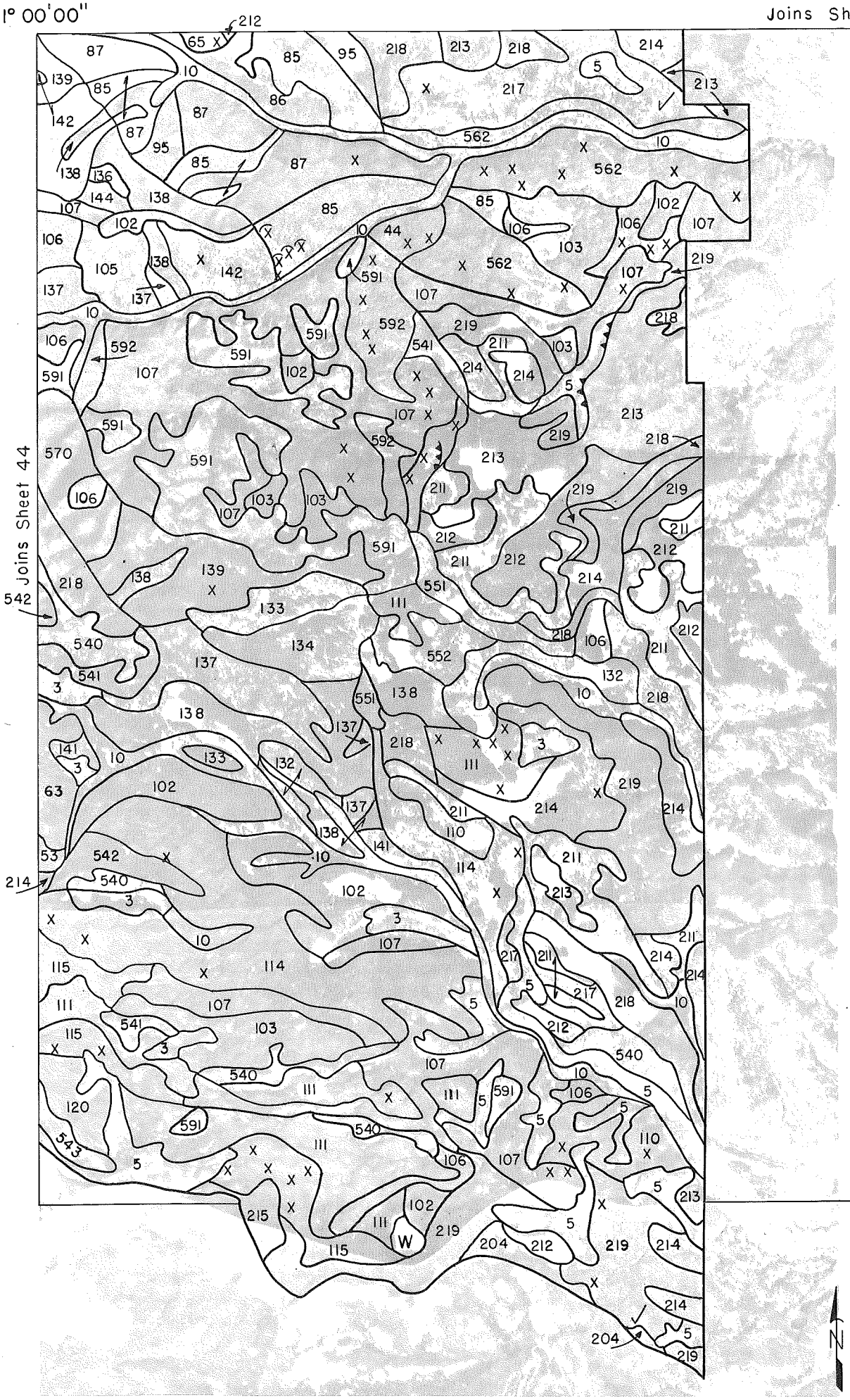
N



WENATCHEE NATIONAL FOREST
SOIL RESOURCE INVENTORY

121° 00' 00"

Joins Sheet 41

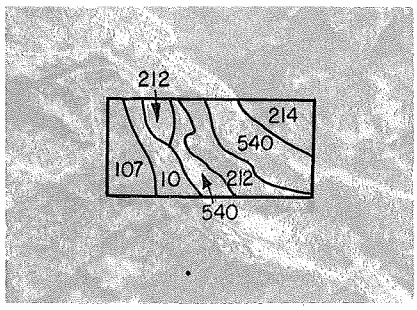


Scale in Miles

1 1/2 0 1 2

120°45'00"

47°07'30"



47°00'00"

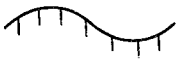
SPOT SYMBOLS

 Slump

 Slump—direction of movement indicated by open horseshoe

 Rock Outcrop

 Wet Spot

 Scarp face or terrace front

 Bedrock escarpment

 Talus slope

 Spring

 Survey area boundary

 Snow slide tracks

COMPLEXES

Mapping Unit	Land Type (L.T.)	Percentage Composition
500	—	20 to 50 percent L.T. 76 or 77; 10 to 40 percent L.T. 50; and 10 to 40 percent L.T.'s 71 or 72.
501	—	20 to 50 percent L.T. 78 or 79; 10 to 40 percent L.T. 50; and 10 to 40 percent L.T. 73.
502	—	20 to 50 percent L.T. 61 or 62; 10 to 40 percent L.T. 50; and 10 to 40 percent L.T.'s 51 or 52.
503	—	20 to 50 percent L.T. 63 or 64; 10 to 40 percent L.T. 50; 10 to 40 percent L.T. 53.
504	—	20 to 50 percent L.T. 65; 10 to 40 percent L.T. 50; and 10 to 40 percent L.T. 55
510	—	30 to 50 percent L.T. 61; 35 to 55 percent L.T. 71; and 5 to 15 percent L.T. 50
514	—	30 to 50 percent L.T. 61; 35 to 55 percent L.T. 76; and 5 to 15 percent L.T. 50
515	—	30 to 50 percent L.T. 62; 35 to 55 percent L.T. 77; and 5 to 15 percent L.T. 50
516	—	30 to 50 percent L.T. 63; 35 to 55 percent L.T. 78; and 5 to 15 percent L.T. 50
517	—	30 to 50 percent L.T. 64; 35 to 55 percent L.T. 79; and 5 to 15 percent L.T. 50
518	—	30 to 50 percent L.T. 68; 35 to 55 percent L.T. 78; and 5 to 15 percent L.T. 50
521	—	55 to 65 percent L.T. 253; 15 to 30 percent L.T. 63; 5 to 20 percent L.T. 10; and 5 to 15 percent Rock Outcrop
522	—	55 to 65 percent L.T. 263; 15 to 30 percent L.T. 64; 5 to 20 percent L.T. 10; and 5 to 15 percent Rock Outcrop
530	—	50 to 70 percent L.T. 27 or 28; 30 to 50 percent stratified fine sand, silts, and clays (glacio-lacustrine materials).
531	—	50 to 70 percent L.T. 29 or 30; 30 to 50 percent stratified fine sand, silts, and clays (glacio-lacustrine materials).
540	—	40 to 75 percent L.T. 217; 25 to 45 percent L.T. 212; and 5 to 25 percent rock outcrop (basalt, andesite, or rhyolite).
541	—	40 to 75 percent L.T. 218; 25 to 45 percent L.T. 213; and 5 to 25 percent rock outcrop (basalt, andesite, or rhyolite).
542	—	40 to 75 percent L.T. 219; 20 to 35 percent L.T. 214; and 5 to 25 percent rock outcrop (basalt, andesite, or rhyolite).
543	—	40 to 75 percent L.T. 220; 20 to 35 percent L.T. 215; and 5 to 25 percent rock outcrop (basalt, andesite, or rhyolite).
551	—	40 to 60 percent L.T. 218; and 40 to 60 percent L.T. 106
552	—	40 to 60 percent L.T. 219; and 40 to 60 percent L.T. 107
553	—	40 to 60 percent L.T. 220; and 40 to 60 percent L.T. 120
562	—	40 to 60 percent L.T. 87; and 40 to 60 percent L.T. 95
570	—	50 to 70 percent L.T. 138; and 30 to 50 percent L.T. 106
571	—	50 to 70 percent L.T. 139; and 30 to 50 percent L.T. 107
583	—	35 to 70 percent L.T. 136; 10 to 35 percent soil less than 15 inches deep; and 5 to 35 percent Rock Outcrop (Swauk Sandstone).
584	—	35 to 70 percent L.T. 137; 10 to 35 percent soil less than 15 inches deep; and 5 to 35 percent Rock Outcrop (Swauk Sandstone).
585	—	35 to 70 percent L.T. 138; 10 to 35 percent soil less than 15 inches deep; and 5 to 35 percent Rock Outcrop (Swauk Sandstone).
591	—	40 to 60 percent L.T. 106; 35 to 45 percent L.T. 110; and 5 to 30 percent Rock Outcrop (pyro-clastic rock).
592	—	40 to 60 percent L.T. 107; 35 to 45 percent L.T. 111; and 5 to 30 percent Rock Outcrop (pyro-clastic rock).
596	—	40 to 70 percent L.T. 298; 10 to 40 percent L.T. 30; and 5 to 25 percent Rock Outcrop (Hard Sedimentary Rock).
597	—	40 to 70 percent L.T. 298; 10 to 40 percent L.T. 31; and 5 to 25 percent Rock Outcrop (Hard Sedimentary Rock).

APPROXIMATE PERCENTAGE COMPOSITION BY MAPPING UNIT NUMBER

Mapping Unit Number	Percent	Mapping Unit Number	Percent	Mapping Unit Number	Percent
1	0.2	67	0.6	211	0.2
3	0.3	68	0.4	212	0.1
4	0.9	69	0.9	213	0.3
5	1.5	70	0.4	214	0.2
6	12.3	71	0.2	215	0.5
7	5.8	72	0.2	216	0.1
8	3.6	73	0.1	217	0.4
9	0.1	75	0.5	218	0.6
10	1.6	76	0.1	219	0.6
11	0.1	77	1.4	220	0.2
12	0.6	78	0.9	252	0.2
13	0.2	79	1.9	253	0.2
14	0.1	85	0.1	263	0.2
15	0.4	86	0.2	271	0.1
24	0.6	87	0.7	298	0.9
25	2.1	88	0.4	301	0.1
27	0.3	95	0.1	500	0.5
28	0.5	102	0.2	501	0.5
29	1.2	103	0.2	502	1.0
30	3.6	105	0.1	503	0.9
31	1.5	106	0.3	504	0.6
32	0.4	107	1.0	510	0.1
33	0.3	110	0.3	514	0.6
34	1.8	111	0.1	515	0.3
35	0.1	114	0.1	516	0.2
36	0.2	115	0.2	517	0.1
37	0.4	119	0.3	518	0.3
38	1.1	120	0.1	521	0.2
40	0.9	132	0.1	522	0.2
41	0.6	133	0.5	530	0.1
42	2.9	135	0.2	531	0.2
48	0.5	136g	0.1	540	0.1
49	0.3	136	1.1	541	0.2
50	0.3	137	2.0	542	0.1
51	1.8	138	1.9	543	0.2
52	0.4	139	0.6	551	0.5
53	0.8	141g	0.1	552	0.1
55	0.6	141	0.5	553	0.4
57	0.1	142	1.4	562	0.2
59	0.1	143	0.6	570	1.6
61g	0.3	144	0.1	571	0.8
61	0.5	150	0.6	583	0.8
62	0.9	156	0.3	584	0.7
63	1.9	157	0.2	585	0.3
64	2.2	158	0.1	591	0.1
65	1.6	159	0.2	592	0.2
66g	0.3	206	0.2	596	0.4
66	0.3	210	0.1	597	0.5
				TOTAL	99.9

SECTION II

MAPPING UNIT 2

Mapping Unit 2 consists dominantly of landtype 2 and minor amounts of landtypes 5 and 6.

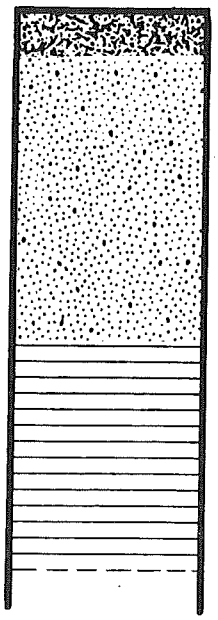
Typically, landtype 2 occurs on very steep slopes along the outer or stream side edge of nearly level to moderately steep terrace benches. Slopes commonly range from 60 to 80 percent.

This landtype ranges in elevation from 1000 to 3500 feet and supports a wide variety of vegetation that ranges from ponderosa pine—Douglas fir to mixed conifers.

SOIL PROFILE

Surface Soil

0 to 1½ inches thick; dark brown; friable; sandy loam or loamy sand; 15 to 30 percent gravel.



Subsoil

10 to 36 inches thick; olive brown; loose; loamy sand, sandy loam, loam or silt loam; 0 to 35 percent gravel.

Substratum

10 to 60 inches thick; grayish brown; loose; loamy sand, sandy loam, loam, or silt loam; 40 to 80 percent gravel and cobbles.

Soil characteristics

Parent material—glacio lacustrine and glacial outwash deposits. Slopes range from 45 to 90 percent.
Drainage class—excessively drained
Typical landform—very steep sloping areas along the outer edge of nearly level terrace benches
Depth to bedrock—greater than twelve feet
Natural stability—II
Erosion hazard—high to very high
Compaction hazard—low
Available water holding capacity—0.07 to 0.16 inches per inch

Some Important Landtype Limitations and Hazards

Watershed

Hydrologic group—C

Very low water storage area. Area generally droughty and poorly vegetated. Precipitation ranges from 12 to 75 inches per year.

Engineering

These soils are non-plastic and have a low angle of repose. When unconfined they have poor bearing strength. They are subject to piping when wet and dry ravel when dry.

MAPPING UNIT 3

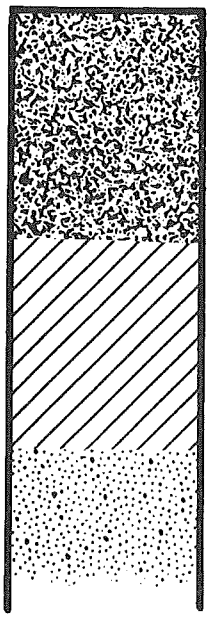
Mapping Unit 3 consists dominantly of landtype 3 and minor amounts of landtypes 11 or 13 and open water.

Landtype 3 is a wet, cold soil developed in medium to moderately coarse textured alluvium. It has a high organic matter content, often two to four times as much as the adjacent upland soils. The soil material is generally stratified.

Typically, landtype 3 occurs on nearly level to gently sloping valley bottoms adjacent to local drainages. Slopes range from 0 to 8 percent, but most often are less than 3 percent. Many occur in abandoned oxbows in wide river bottoms.

This landtype ranges in elevation from 1000 to 3500 feet and supports sedges, reeds, grass, red osier dogwood, willow, and cottonwood.

SOIL PROFILE



Surface soil — 6 to 18 inches thick; very dark brown or black; very friable; loam, silt loam, or peaty muck; 0 to 5 percent gravel.

Subsoil — 18 to 30 inches thick; dark brown or very dark brown, mottled with yellowish red and/or light gray; very friable; loam, or silt loam; 0 to 20 percent gravel.

Substratum — 10 to 48 inches thick; dark brown, mottled with yellowish red and/or light gray; very friable; sandy loam, loam, or silt loam; 15 to 30 percent gravel.

Soil Characteristics

Parent material—alluvial sediments from adjacent uplands
Drainage class—poorly to very poorly drained
Typical landform—concave basins. Slopes range from 0 to 7 percent.
Depth to bedrock—4 to 12+feet
Natural stability—I
Erosion hazard—low
Compaction hazard—high
Available water holding capacity—0.17 to 0.20 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—D

These areas are important for filtering and storing water. Precipitation ranges from 15 to 90 inches per year.

Engineering

Poor bearing strength, remains wet throughout most of the year, high frost heave hazard and high organic matter content.

MAPPING UNIT 4

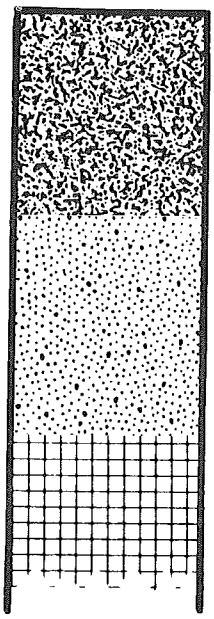
Mapping Unit 4 consists dominantly of landtype 4 and minor amounts of landtypes 50 and 150.

Landtype 4 is a very deep, wet, cold soil that has formed in medium to moderately coarse textured colluvium. It has a moderate to high organic matter content. This unit is seasonally saturated and on the flatter slopes it often has a high water table.

Typically, landtype 4 occurs on nearly level to very steep topography. The poorly drained members generally occur on the flatter slopes. This landtype occurs intermixed with alpine fir and silver fir, or at elevations slightly above timber line.

This landtype ranges in elevation from 5000 to 7000 feet and supports elk sedge, pine grass, bluebunch wheatgrass, Idaho fescue, lupine, yarrow, some big sage and subalpine fir.

SOIL PROFILE



Surface soil — 0 to 12 inches thick; very dark brown or black; very friable; sandy loam, loam, silt loam, or peaty muck; 5 to 15 percent gravel.

Subsoil — 6 to 48 inches thick; dark brown or very dark grayish brown; friable; sandy loam, loam, or silt loam; 5 to 25 percent gravel.

Bedrock — Impermeable layer; root and water movement restricted.

Soil characteristics

Parent material—residuum and also alluviam from associated rock types and/or soils. Slopes range from 0 to 85 percent, but are most commonly between 50 and 85 percent.
Drainage class—moderately well to poorly drained
Typical landform—concave slopes
Depth to bedrock or impermeable layer—24 to 60+inches
Natural stability—I
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.15 to 0.19 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—D

These areas are important water filter and water storage areas. Precipitation ranges from 80 to 120 inches per year.

Engineering

Poor bearing strength, remains wet for long periods, high frost heave hazard, high organic matter content and steep slopes.

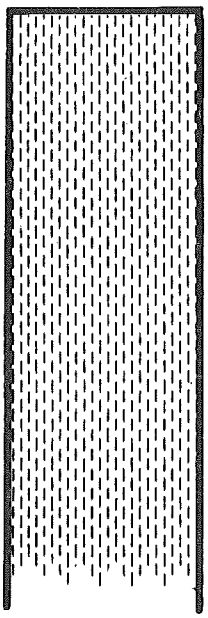
MAPPING UNIT 5

Mapping Unit 5 consists dominantly of landtype 5 and minor amounts of landtypes 50 and 150. Rock outcrops make up less than 15 percent of the area.

Landtype 5 has formed in rocky talus deposits that occur at the base of bedrock outcrops. The rock fragments are generally angular and range in size from 4 to 24 inches in diameter.

Typically, landtype 5 occurs on steep and very steep (55 to 95 percent) slopes. The down slope axis often occurs as fingers (long and narrow).

This landtype ranges in elevation from 2000 to 5000 feet and supports very little if any vegetation.



SOIL PROFILE

Heterogeneous mixture of angular rock fragments ranging in size from 4 to 40 inches in diameter. Depth to underlying bedrock or soil material ranges from 3 to more than 20 feet; 90 to 100 percent angular cobbles and stones.

Soil characteristics

Parent material—all rock types
Drainage class—excessively drained
Landform—adjacent to but always occurring below outcroppings of bedrock. In most places, the bedrock above has slopes steeper than 130 percent. Slopes range from 55 to 95 percent, but are most often between 55 and 85 percent.
Depth to bedrock—3 to more than 20 feet
Natural stability—II
Erosion hazard—low
Compaction hazard—low
Available water holding capacity— < 0.06 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—N/A
Very low water storage capacity. Precipitation ranges from 9 to 120 inches per year.

Engineering

Good bearing strength. Disturbed slopes ravel back to natural angle of repose. Possible source of road rock, depending on rock hardness characteristics.

MAPPING UNIT 6

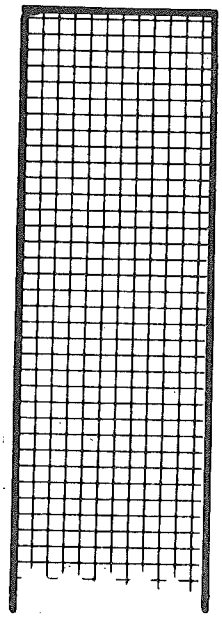
Mapping Unit 6 consists dominantly of landtype 6 and minor amounts of landtypes 7, 8 and 9 and small areas of deeper residual soils.

Landtype 6 is a miscellaneous landtype composed of 50 to 90 percent rock outcrop and very shallow soils; 5 to 40 percent talus slopes, and 1 to 10 percent alpine meadows. Most years there are areas that are continuously covered with snow and ice.

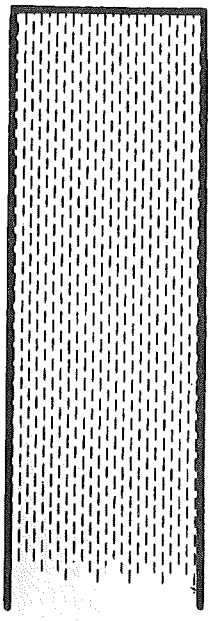
Typically, landtype 6 occurs on steep and very steep topography mostly above timberline.

This landtype ranges in elevation from 6,000 to 10,000 feet and supports very little vegetation.

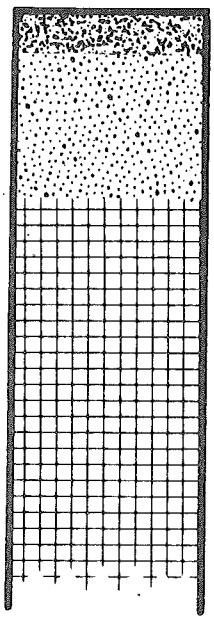
SOIL PROFILES



Bedrock



Heterogeneous mixture of angular rock fragments ranging in size from 4 to 40 inches in diameter. Depth to bedrock ranges from 3 to more than 20 feet. 50 to 100 percent cobbles and stones.



Surface Soil

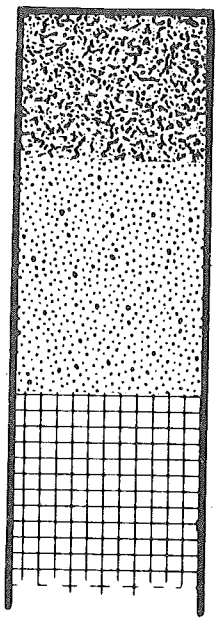
0 to 2 inches thick; dark brown; friable; sandy loam, or loam; 10 to 30 percent gravel.

Subsoil

5 to 20 inches thick; brown; friable; sandy loam; 25 to 50 percent gravel.

Bedrock

10 feet + thick



Surface Soil

0 to 12 inches thick; very dark brown; very friable; sandy loam; 10 to 25 percent gravel.

Subsoil

6 to 48 inches thick; dark brown; friable; sandy loam, or loam; 10 to 40 percent gravel.

Bedrock

Impermeable layer; root and water movement restricted.

Soil characteristics (overall general features of this land type)

Parent material—all rock types occurring on the forest, plus residuum of alluvial materials derived therefrom. Slopes range from 5 to 95 percent, but are most often between 50 and 80 percent.

Drainage class—excessively to poorly drained

Typical land form—complex rugged broken, convex and concave slopes. Most often occur on upper slope positions along ridgelines.

Depth to bedrock—0 to 20 feet, depending on the particular component.

Natural stability—I and II

Erosion hazard—high

Compaction hazard—low

Available water holding capacity—0.01 to 0.20 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—variable

Very low water storage area. Precipitation ranges from 60 to 120 inches per year.

Engineering

Most materials have good bearing strength. High elevations dictate a very short season for any construction.

MAPPING UNIT 7

Mapping Unit 7 consists of landtype 7 and minor amounts of landtypes 6, 8 and 9.

Landtype 7 is a miscellaneous landtype composed of from 50 to 80 percent very shallow and shallow residual soils, 10 to 50 percent rock outcrops and talus deposits, and 10 to 20 percent moderately deep and deep soils.

Typically, landtype 7 occurs on sloping to very steep topography.

This landtype ranges in elevation from 5500 to 7000 feet and supports a wide range of plant communities; from bunchgrass—ponderosa pine to subalpine firs.

SOIL PROFILES

Surface Soil

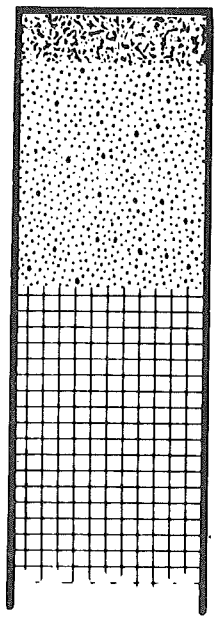
1 to 2 inches thick; dark brown; friable; sandy loam, or loamy sand; 10 to 40 percent gravel.

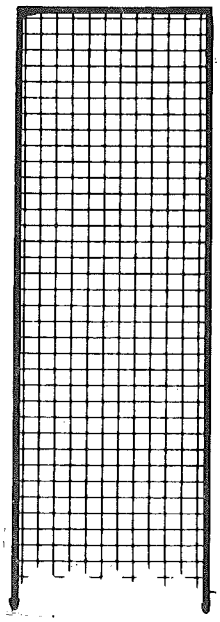
Subsoil

5 to 20 inches thick; brown; friable; sandy loam, or loam; 10 to 60 percent gravel.

Bedrock

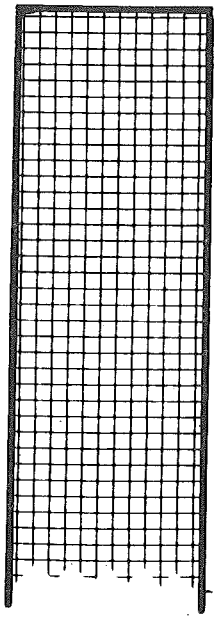
10 feet + thick





Bedrock

10 feet + thick



Heterogeneous mixture of angular rock fragments ranging in size from 4 to 40 inches in diameter. Depth to bedrock ranges from 3 to more than 20 feet, 50 to 100 percent cobbles and stones.

Surface Soil

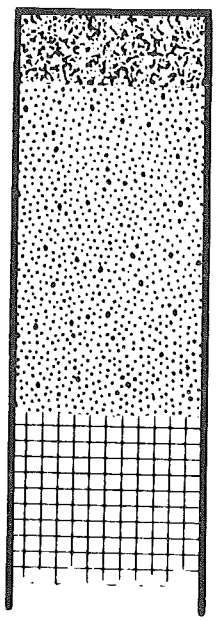
1 to 4 inches thick; dark brown; friable; sandy loam, or loam; 10 to 40 percent gravel.

Subsoil

20 to 50 inches thick; brown; friable; sandy loam, or loam; 10 to 40 percent gravel.

Bedrock

10 feet + thick



Soil Characteristics—(general features of this land type)

Parent material—all rock types occurring on the forest

Drainage class—excessively to well drained

Typical landform—complex rugged convex and concave slopes. Occurs on upper slopes, near ridge-
Slopes range from 40 to 90 percent, but most are between 50 and 80 percent.

Depth to bedrock—0 to 20 feet (depends on the component.)

Natural stability—II

Erosion hazard—high

Compaction hazard—low to moderate

Available water holding capacity—0.01 to 0.12 inches per inch

Some Important Landtype Limitations and Interpretations

Hydrologic group—variable

Important upper watershed snow storage area because the trees provide shade and wind protection which slows down the rate of snow melt. Precipitation ranges from 60 to 120 inches per year.

Engineering

Physical properties vary widely. High elevations dictate a short construction season.

MAPPING UNIT 8

Mapping Unit 8 consists dominantly of landtype 8 and minor amounts of landtypes 5, 7, 9 and adjacent landtypes in the zone of occurrence.

Landtype 8 is a miscellaneous landtype composed of highly dissected (more than 9 drains per mile) shallow to deep soils occurring on steep to very steep topography. In many places the upper part of the dissections start in residual materials and the lower part is in glacial till materials.

Typically, landtype 8 occurs on steep to very steep complex slopes.

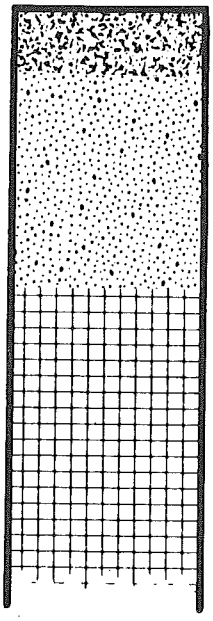
This landtype ranges in elevation from 2500 to 6000 feet and occurs under many different plant communities.

SOIL PROFILES

Surface Soil

Subsoil

Bedrock

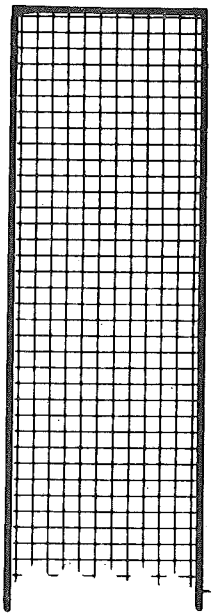


1 to 2 inches thick; dark brown; friable; sandy loam or loam; 10 to 25 percent gravel.

5 to 20 inches thick; brown; friable; sandy loam, or loam; 20 to 40 percent gravel.

10 feet + thick

Bedrock

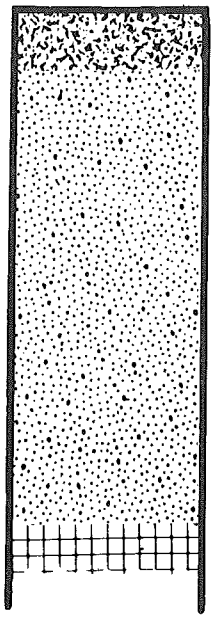


10 feet + thick

Surface Soil

Subsoil

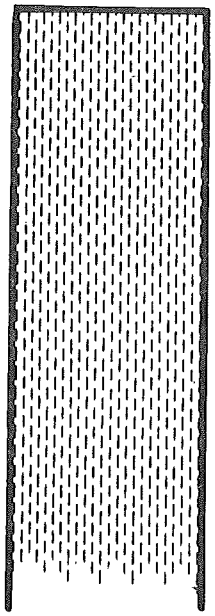
Bedrock



1 to 2 inches thick; dark brown; sandy loam, or loam; 10 to 15 percent gravel.

20 to 56 inches thick; brown; friable; sandy loam; 15 to 35 percent gravel.

10 feet + thick



3 inches to 20 feet thick, heterogeneous mixture angular rocky fragments ranging in size from 4 to 40 inches; 40 to 100 percent cobbles and stones

Soil Characteristics

Parent material—all rock types occurring on the forest

Drainage class—well to moderately well drained

Typical landform—multiple drainage dissections, often occurring in the mid to upper slope positions. Slopes range from 40 to 95 percent, but are most often between 60 to 75 percent.

Depth to bedrock—0 to 20 feet

Natural stability—II

Erosion hazard—very high

Compaction hazard—low to moderate

Available water holding capacity—0.01 to 0.15 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—variable

Low water storage area, high density of drainages accelerate rate of runoff. Precipitation ranges from 30 to 120 inches per year.

Engineering

High density of drainage pattern affects road alignment and raises the cost of construction significantly. Also, the steep slopes and rapid runoff, coupled with the closely spaced drainage pattern, greatly increase the risk of sediment getting into class I and II streams.

MAPPING UNIT 9

Mapping Unit 9 consists dominantly of landtype 9 with small pockets of deeper soils that support trees and grass.

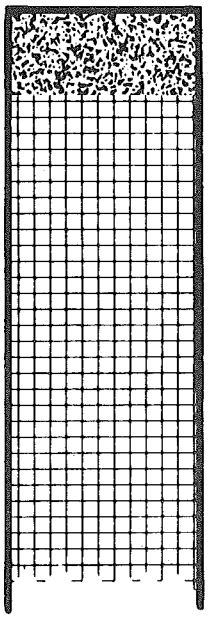
Landtype 9 is a miscellaneous land type composed of moderately hard and soft bedrock types that have been faulted and tipped. Slopes are generally very steep.

Bedrock is most often sandstone, but in some places it consists of other moderately hard to soft rock types. The important feature is that the dip is downslope, which causes accelerated soil creep and also increases the mass failure hazard. Depth to bedrock is less than six inches.

Typically, landtype 9 occurs on steep and very steep mountain sideslopes above the glaciated valleys.

This landtype ranges in elevation from 2500 to 6000 feet and supports very little vegetation—many sites are nearly barren.

SOIL PROFILE



Surface soil — 0 to 6 inches thick; light brown or brown; loose; sandy loam, loamy sand; or sand; 0 to 30 percent gravel.

Bedrock — 10 feet + thick

Soil characteristics

Parent material—sandstone, serpentines, and schist
Drainage class—excessively drained
Typical landform—tilted blocks with sharp angles and very steep slopes. Slopes range from 85 to 150 percent, but most often are between 90 and 120 percent.
Depth to bedrock—0 to 6 inches
Natural stability—V
Erosion hazard—very high
Compaction hazard—very low
Available water holding capacity—< 0.06 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—D

Very low water storage capacity and very rapid runoff. Precipitation ranges 12 to 100 inches per year.

Engineering

The dip of the bedrock and the very steep slopes result in very high risk for mass failures and weak structural qualities.

MAPPING UNIT 10

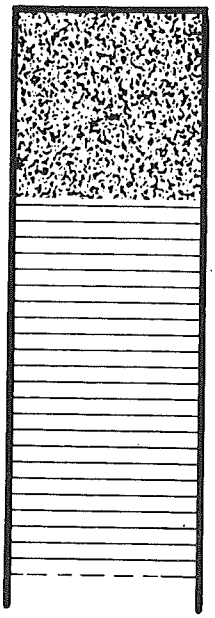
Mapping Unit 10 consists dominantly of landtype 10 and minor amounts of landtype 11, and some toe slopes of adjacent upland soils.

Typically, landtype 10 occurs on nearly level to gently sloping valley bottoms.

This landtype ranges in elevation from 1200 to 3500 feet and occurs under all of the different plant communities recognized on the forest.

SOIL PROFILE

Surface soil



4 to 20 inches thick; very dark grayish brown; friable; sandy loam, or loam; 0 to 20 percent gravel.

Subsoil

40 to 200+ inches thick; brown; loose; sand, loamy sand, sandy loam and silt loam; 15 to 40 percent gravel and cobbles.

Soil characteristics

Parent material—alluvium from adjacent materials and rock types
Drainage class—well to moderately well drained
Typical landform—canyon bottoms on gentle concave slopes. Slopes range from 0 to 20 percent; most are less than 12 percent.
Depth to bedrock—greater than twelve feet
Natural stability—I
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.13 to 0.17 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—A

Moderate to high water storage area. These areas are subject to flooding and stream channel erosion. Removal of streamside vegetation greatly increases the erosion hazard.

Engineering

These soils have a seasonal high water table, are subject to flooding and are very erosive. The structural characteristics of these materials can change rapidly over short distances and become highly contrasting.

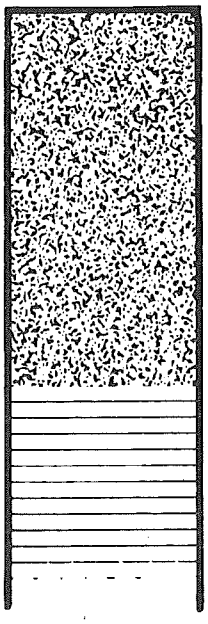
MAPPING UNIT 11

Mapping Unit 11 consists dominantly of landtype 11 and minor amounts of landtype 10 and some toe slopes of adjacent upland soils.

Typically, landtype 11 occurs on nearly level to gently sloping stream bottoms.

This landtype ranges in elevation from 1200 to 3500 feet and supports sedges, reeds, willow, red osier dogwood, alder and cottonwood.

SOIL PROFILE



Surface Soil — 12 to 36 inches thick; very dark brown or black; very friable; loam or sandy loam; 0 to 15 percent gravel.

Subsoil — 24 to 120+ inches; dark brown or brown; loose; sand, loamy sand or sandy loam; 15 to 40 percent gravel and cobbles.

Soil characteristics

Parent material—alluvium from adjacent materials and rock types
Drainage class—somewhat poorly to very poorly
Typical landform—canyon bottoms on gentle concave slopes. They most often occur as old filled oxbows and stream meanders. Slopes range from 0 to 10 percent, but most are less than 3 percent.
Depth to bedrock—greater than twelve feet
Natural stability—I
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.13 to 0.18 inches per inch

Some Important Landtype Limitations and Hazards

Watershed

Hydrologic group—A

High water storage area, these areas remain wet for long periods. These areas are subject to seasonal flooding.

Engineering

Seasonal high water table, and subject to flooding. Surface materials have poor bearing strength and are very erosive.

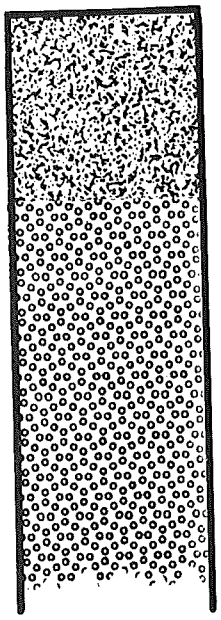
MAPPING UNIT 12

Mapping Unit 12 consists dominantly of landtype 12 and minor amounts of landtype 13 and some toe slopes of adjacent upland soils.

Typically, landtype 12 occurs on nearly level to gently sloping stream bottoms.

This landtype ranges in elevation from 2000 to 3100 feet and occurs under all of the plant communities recognized on the forest.

SOIL PROFILE



Surface Soil — 2 to 15 inches thick; very dark grayish brown; friable; ashy sandy loam, or ashy loamy sand; 20 to 50 percent ash and pumice (.5 to 22 mm. dia.).

Subsoil — 40 to 200+ inches thick; brown; loose; ashy loamy sand, or ashy sand; 50 to 90 percent ash and pumice (.5 to 25 mm dia.).

Soil characteristics

Parent material—alluvium from adjacent uplands
Drainage class—well to somewhat excessively drained
Typical landform—canyon bottoms on gentle concave slopes. Slopes range from 0 to 20 percent; most are less than 12 percent.
Depth to bedrock—greater than twelve feet
Natural stability—I
Erosion hazard—very high
Compaction hazard—moderate to low
Available water holding capacity—0.16 to 0.20 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—A

These soils have a high water storage capacity. They are subject to seasonal flooding and are very erosive.

Engineering

These soils may have a seasonal high water table. They have good bearing strength when confined, but poor bearing strength when unconfined. They have a very low angle of repose, and are subject to piping.

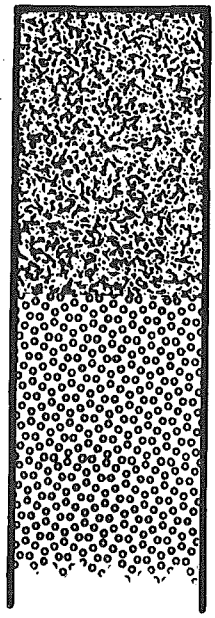
MAPPING UNIT 13

Mapping Unit 13 consists dominantly of landtype 13 and minor amounts of landtype 12 and some toe slopes of adjacent upland soils.

Typically, landtype 13 occurs on nearly level slightly concave slopes. It occurs in valley bottoms and drainageways.

This landtype ranges in elevation from 2000 to 4000 feet and supports sedges, reeds, red osier dogwood, willow, cottonwood and alder.

SOIL PROFILE



Surface Soil

12 to 36 inches thick; very dark brown or black; very friable; ashy loam, or ashy sandy loam; 20 to 50 percent ash and pumice (.5 to 25 mm. dia.).

Subsoil

24 to 120+ inches thick; dark brown ot brown; loose; ashy sandy loam, or ashy loamy sand; 50 to 90 percent ash and pumice (.5 to 22 mm. dia.).

Soil characteristics

Parent material—alluvium from adjacent uplands
Drainage class—somewhat poorly to very poorly drained
Typical landform—canyon bottoms on gentle concave slopes. Slopes range from 0 to 10 percent; most are less than 3 percent.
Depth to bedrock—greater than 12 feet
Natural stability—I
Erosion hazard—very high
Compaction hazard—moderate to low
Available water holding capacity—0.16 to 0.20 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—A

These soils are subject to seasonal flooding and remain wet for extended periods. They are highly erosive and very sensitive to stream channel cutting.

Engineering

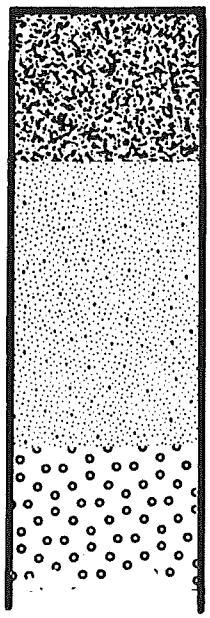
These soils have a high water table and remain wet for long periods. The pumicy material has poor bearing strength when disturbed and unconfined. There is an ever present danger of piping with these materials when used in fills and other earthen structures.

MAPPING UNIT 14

Mapping Unit 14 consists dominantly of landtype 14 and minor amounts of landtypes 10, 11 and till soils 27 and 28.

This landtype ranges in elevation from 1500 to 2500 feet and supports a bunchgrass, bunchgrass-ponderosa pine, or ponderosa pine-Douglas fir plant community. (See Appendix for definition.)

SOIL PROFILE



Surface Soil — 2 to 12 inches thick; very dark grayish brown or dark brown; friable; sandy loam, or loam; 5 to 35 percent gravel.

Subsoil — 10 to 36 inches thick; friable; sandy loam, or loam; 15 to 45 percent gravel.

Substratum — 30 to 120+ inches; multicolored sand and gravel; 55 to 90 percent gravel and cobbles.

Soil characteristics

Parent material—glacial outwash
Drainage class—well to excessively drained
Typical landform—nearly level to gently sloping benches. Most often they occur in wide valleys below glacial moraines. Slopes range from 0 to 30 percent, but most are less than 12 percent.
Depth to bedrock—greater than 12 feet
Natural stability—I
Erosion hazard—low
Compaction hazard—moderate
Available water holding capacity—0.15 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—A

These soils have a limited water storage capacity, but because of the highly contrasting textures in the substratum there is frequently a tendency for water to perch for short periods, thus affecting total soil capacity somewhat.

These soils tend to droughty.

Engineering

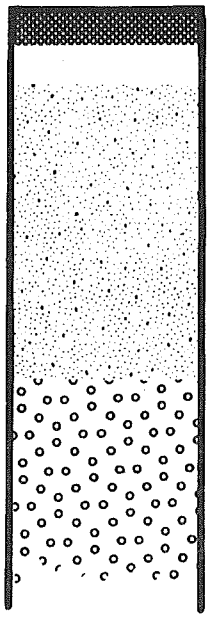
These soils are poorly graded, but do have good bearing strength. They have a low angle of repose which is related to the fact that the coarse fragments (larger than 2 mm) all have rounded corners. Frost heave is not a problem. Piping is rarely a problem; however, it can be important, because these materials are stratified.

MAPPING UNIT 15

Mapping Unit 15 consists dominantly of landtype 15 and minor amounts of landtypes 10, 11, 24 and 25.

This landtype ranges in elevation from 1500 to 2500 feet and supports either an associated species or a mixed conifer plant community. (See Appendix for definition)

SOIL PROFILE

Duff		1 to 3 inches thick; needles, leaves, and twigs.
Surface Soil		0 to 2½ inches thick; grayish brown; very friable; loamy sand or sand.
Subsoil		10 to 40 inches thick; brown; friable; sandy loam, or loam; 5 to 35 percent gravel.
Substratum		30 to 120+ inches thick; multicolored sand and gravel (40 to 98 percent gravel and cobbles).

Soil characteristics

Parent material—glacial outwash
Drainage class—well to excessively drained
Typical landform—nearly level to gently sloping benches. Most often they occur in wide valleys below glacial moraines. Slopes range from 0 to 30 percent, but most are less than 15 percent.
Depth to bedrock—deeper than 12 feet
Natural Stability—I
Erosion hazard—low
Compaction hazard—moderate
Available water holding capacity—0.15 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—A

These soils have a limited water storage capacity, but because of the highly contrasting textures in the substratum there is frequently a tendency for water to perch for short periods, thus affecting the total soil capacity somewhat. These soils tend to be droughty.

Engineering

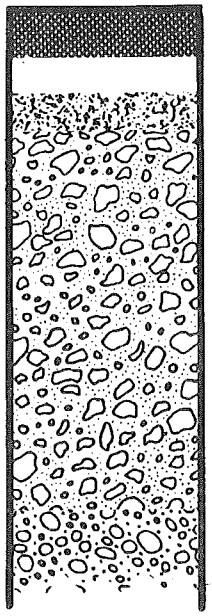
These soils are poorly graded but do have good bearing strength. They have a low angle of repose which is related to the fact that the coarse fragments (larger than 2 mm) all have rounded corners. Frost heave is not a problem. Piping is rarely a problem; however, it can be important because these materials are stratified.

MAPPING UNIT 24

Mapping Unit 24 consists dominantly of landtype 24 and minor amounts of landtype 29, and rock outcrops.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff — 1 to 3 inches thick; needles, leaves and twigs.

Surface Soil — 0 to 1½ inches thick; grayish brown; very friable; loamy sand or sand.

0 to 1½ inches thick; very dark grayish brown; very friable; sandy loam or loamy sand; 5 to 25 percent gravel.

Subsoil — 10 to 70 inches thick; brown; friable; sandy loam, or loamy sand; 10 to 50 percent gravel and cobbles.

Substratum — 30 to 120+ inches thick; gray; very firm (compacted); sandy loam, or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent material—glacial till
Drainage class—well to moderately well drained
Typical landform—valley bottom and sideslopes. Valleys generally have a characteristic U shape. Slopes range from 3 to 40 percent; however, most are between 5 and 25 percent.
Depth to bedrock—greater than 12 feet
Natural stability—II
Erosion hazard—low
Compaction hazard—moderate to high
Available water holding capacity—0.09 to 0.16 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage capacity of this soil is in the uncompacted material. The change from the un-

compacted to the compacted till is abrupt. This contact, in most cases, stops root and water penetration, often causing a perched water table and lateral water movement.

Engineering

This material has good bearing strength.

Lateral water movement most often occurs immediately above the compacted till. This water movement can result in piping and mass failures.

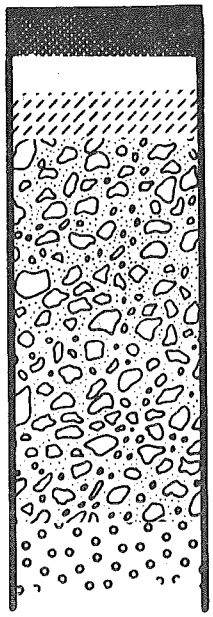
The substratum material is non-plastic.

MAPPING UNIT 25

Mapping Unit 25 consists dominantly of landtype 25 and minor amounts of landtype 30, and rock outcrops.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (see appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; loose; sand, or loamy sand.
	0 to 10 inches thick; strong brown; firm; sandy loam, or loamy sand; 15 to 35 percent gravel.
Subsoil	10 to 70 inches thick; brown; friable; sandy loam, or loamy sand; 10 to 50 percent gravel.
Substratum	30 to 120+ inches thick; gray; very firm (compacted); sandy loam or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent material—glacial till
Drainage class—well to moderately well drained
Typical landform—valley bottom and sideslopes. Valleys generally have a characteristic U shape. Slopes range from 3 to 40 percent; however, most are between 5 and 25 percent.
Depth to bedrock—greater than 12 feet
Natural stability—II
Erosion hazard—low
Compaction hazard—moderate to high
Available water holding capacity—0.09 to 0.16 inches per inch. The substratum is nearly impermeable.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage of this soil is in the uncompacted material. The change from uncompacted to the compacted till is abrupt. This contact, in most cases, stops root and water penetration, often causing a perched water table and lateral water movement.

Engineering

This material has good bearing strength.

Lateral water movement most often occurs immediately above the compacted till. This water movement can result in piping and mass failures.

The substratum material is non-plastic, and is seldom sticky.

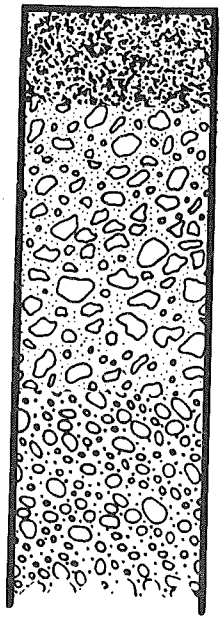
MAPPING UNIT 27

Mapping Unit 27 consists dominantly of landtype 27 and minor amounts of landtype 61 and outcrops.

This landtype ranges in elevation from 1000 to 3500 feet and supports a bunchgrass-ponderosa pine plant community. (See appendix for definition)

SOIL PROFILE

Surface Soil



1 to 6 inches thick; brown or very dark grayish brown; friable; sandy loam or loamy sand; 10 to 30 percent gravel.

Subsoil

18 to 36 inches thick; brown; friable; sandy loam or loamy sand; 10 to 50 percent gravel and cobbles.

Substratum

30 to 120+ inches thick; gray; very firm (compacted); sandy loam or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent material—glacial till
Drainage class—well to moderately well drained
Typical landform—valley bottom and sideslopes. Valleys generally have a characteristic U shape. Slopes range from 5 to 85 percent; however most are between 40 and 65 percent.
Depth to bedrock—greater than 12 feet
Natural stability—III
Erosion hazard—moderate to high
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch. The substratum is nearly impermeable.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage capacity of this soil is in the uncompacted material. The change from the uncompacted to the compacted till is abrupt. This contact, in most cases, stops root and water penetration, often causing a perched water table and lateral water movement.

Engineering

This material has good bearing strength.

Lateral water movement most often occurs immediately above the compacted till. This lateral water movement can result in piping and mass failures.

The substratum material is non-plastic.

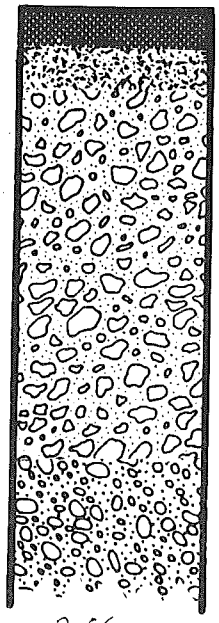
MAPPING UNIT 28

Mapping Unit 28 consists dominantly of landtype 28 and minor amounts of landtype 62, and rock outcrops.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pine-Douglas-fir plant community. (See appendix for definition)

SOIL PROFILE

Duff
Surface Soil



0 to 1 inch thick; needles, leaves and twigs.
½ to 6 inches thick; dark brown or very dark grayish brown; friable; sandy loam or loamy sand; 10 to 25 percent gravel.

Subsoil

15 to 50 inches thick; brown; friable; sandy loam or loamy sand; 10 to 50 percent gravel and cobbles.

Substratum

30 to 120+ inches; gray; very firm (compacted); sandy loam, or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent material—glacial till
Drainage class—well to moderately well drained
Typical landform—valley sideslopes. Valleys usually have a characteristic U shape. Slopes range from 5 to 85 percent; however, most are between 40 and 65 percent.
Depth to befrock—5 to 12+ feet
Natural stability—III
Erosion hazard—moderate to high
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch. The substratum is nearly impermeable.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage capacity of this soil is in the uncompacted material. The change from the uncompacted to the compacted till is abrupt. This contact, in most cases, stops root and water penetration, often causing a perched water table and lateral water movement.

Engineering

This material has good bearing strength.

Lateral water movement most often occurs immediately above the compacted till. This lateral water movement can result in piping and mass failures.

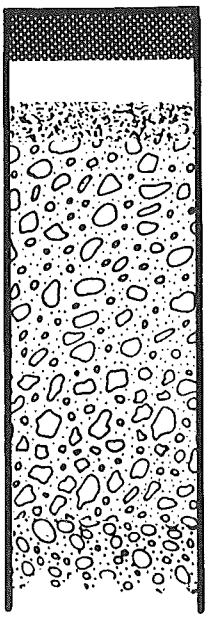
The substratum material is non-plastic.

MAPPING UNIT 29

Mapping Unit 29 consists dominantly of landtype 29 and minor amounts of landtypes 24, 63, and rock outcrops.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 3 inches thick; needles, leaves and twigs.
Surface Soil	0 to 1½ inches thick; grayish brown; very friable; loamy sand or sand. 0 to 1½ inches thick; very dark grayish brown; very friable; sandy loam, or loamy sand, 5 to 25 percent gravel.
Subsoil	10 to 40 inches thick; brown; friable; sandy loam, or loamy sand; 10 to 50 percent gravel and cobbles.
Substratum	30 to 120+ inches thick; gray; very firm (compacted); sandy loam, or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent Material—glacial till
Drainage class—well and moderately well drained
Typical landform—valley sideslopes. Valleys generally have a characteristic U shape. Slopes range from 40 to 90 percent; however, most are between 40 and 65 percent.
Depth to bedrock—12+ feet
Natural stability—III
Erosion hazard—moderate to high
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch. The substratum is nearly impermeable.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage capacity of this soil is in the uncompacted material. The change from the uncompacted to the compacted till is abrupt. This contact, in most cases, stops roots and water penetration, often causing a perched water table and lateral water movement.

Engineering

This material has good bearing strength.

Lateral water movement most often occurs immediately above the compacted till. This lateral water movement can result in piping and mass failures.

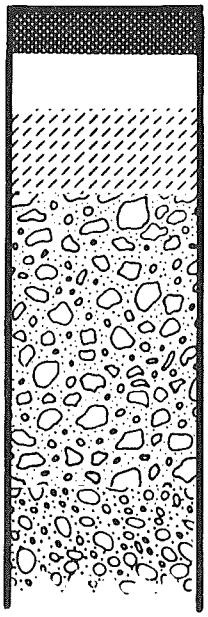
The substratum material is non-plastic.

MAPPING UNIT 30

Mapping Unit 30 consists dominantly of landtype 30 and minor amounts of landtypes 25, 34, 64 and rock outcrops.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (see appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick, needles, leaves and twigs.
Surface Soil	2 mm to 3 in. thick; light gray; loose; sand or loamy sand.
	0 to 8 in. thick; strong brown; firm; sandy loam, or loamy sand; 15 to 35 percent gravel and cobbles.
Subsoil	10 to 40 inches thick; brown; friable; sandy loam, or loamy sand; 10 to 50 percent gravel and cobbles.
Substratum	30 to 120+ inches thick; gray; very firm (compacted); sandy loam, or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent material—glacial till
Drainage class—well to moderately well drained
Typical landform—valley sideslopes. Valleys generally have a characteristic U shape. Slopes range from 40 to 85 percent; however, most are between 40 and 65 percent.
Depth to bedrock—12+ feet
Natural stability—III
Erosion hazard—moderate to high
Compaction hazard—moderate
Available water holsing capacity—0.09 to 0.16 inches per inch. The substratum is nearly impermeable.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B
Most of the water storage capacity of this soil is in the uncompacted material. The change from the un-

compacted to the compacted till is abrupt. This contact, in most cases, stops root and water penetration, often causing a perched water table and lateral water movement.

Engineering

This material has good bearing strength.

Lateral water movement most often occurs immediately above the compacted till. This lateral water movement can result in piping and mass failures.

The substratum is non-plastic.

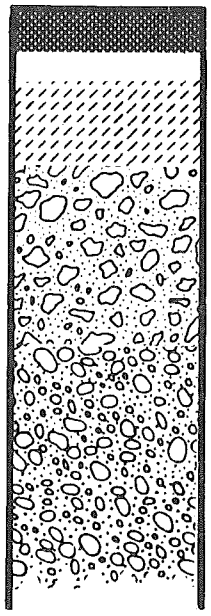
MAPPING UNIT 31

Mapping Unit 31 consists dominantly of landtype 31 and minor amounts of landtypes 30, 55, 65 and rock outcrops.

This landtype ranges in elevation from 5000 to 5600 feet and supports a subalpine plant community. (See appendix for definitions)

SOIL PROFILES

Timbered Soil



Duff — 1 to 4 inches thick; needles, leaves and twigs.

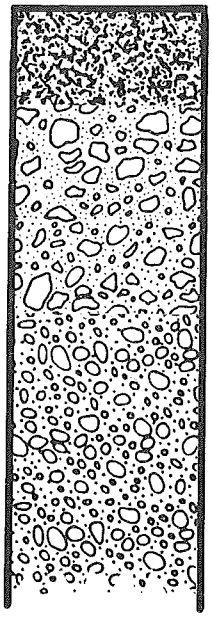
Surface Soil — 2 mm to 3 inches thick; light gray; loose; sand or loamy sand.

0 to 8 inches thick; strong brown; firm; sandy loam, or loamy sand; 10 to 30 percent gravel and cobbles.

Subsoil — 10 to 40 inches thick; brown; friable; sandy loam, or loamy sands 10 to 50 percent gravel and cobbles.

Substratum — 30 to 60+ inches thick; gray; very firm (compacted); sandy loam, or loamy sand; 15 to 65 percent gravel and cobbles.

Meadow Soil



Surface Soil — 2 to 15 inches thick; very dark grayish brown; friable; sandy loam, or loam; 0 to 15 percent gravel.

Subsoil — 15 to 40 inches thick; brown; friable; sandy loam or loamy sand; 10 to 50 percent gravel and cobbles.

Substratum — 10 to 50+ inches thick; gray; very firm (compacted); sandy loam, or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent material—glacial till
Drainage class—well to moderately well drained
Typical landform—valley sideslopes. Slopes range from 10 to 90 percent; however, most are between 40 and 65 percent.
Depth to bedrock—12+ feet
Natural stability—III
Erosion hazard—moderate to high
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch. The substratum is nearly impermeable.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage capacity of the soil is in the uncompacted material. The change from the uncompacted to the compacted till is abrupt. This contact, in most cases, stops root and water penetration, often causing a perched water table and lateral water movement.

Engineering

This material has good bearing strength

Lateral water movement most often occurs immediately above the compacted till. This lateral water movement can result in piping and in mass soil failures.

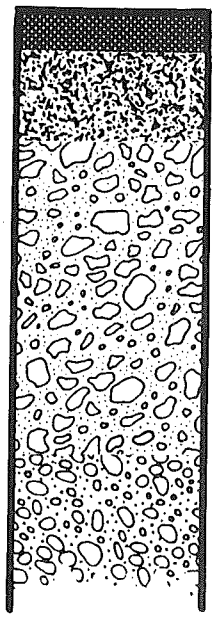
The substratum material is non-plastic.

MAPPING UNIT 32

Mapping Unit 32 consists dominantly of landtype 32 and minor amounts of landtypes 28, 62, ane rock outcrops.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pine-Douglas fir plant community. (See appendix for definitions)

SOIL PROFILE



Duff — 0 to 1 inch thick; needles, leaves and twigs.

Surface Soil — ½ to 6 inches thick; dark brown or very dark grayish brown; friable; sandy loam or loam; 5 to 25 percent gravel.

Subsoil — 15 to 50 inches thick; brown; friable; sandy loam or loamy sand; 10 to 50 percent gravel and cobbles.

Substratum — 30 to 120+ inches thick; gray; very firm (compacted); sandy loam or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent material—glacial till
Drainage class—well to somewhat excessively drained
Typical landform—highly dissected valley sideslopes (4 to 9 drainage dissections per mile). Slopes range from 40 to 90 percent; however, most are between 50 and 80 percent.
Depth to bedrock—12+ feet
Natural Stability—III
Erosion hazard—high
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch. The substratum is nearly impermeable.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage capacity of this soil is in the uncompacted material. The change from the uncompacted to the compacted till is abrupt. This contact, in most cases, stops root and water penetration, often causing a perched water table and lateral water movement.

This landtype is subject to rapid runoff.

Engineering

This material has good bearing strength.

Lateral water movement most often occurs immediately above the compacted till. This lateral water movement can result in piping and in mass soil failures.

The substratum material is non-plastic.

The highly dissected landform, 4 to 9 drainages per mile, adversely affects road alignments, substantially adds to road construction costs, and greatly increases the risk of soil from construction sites being eroded into streams and rivers.

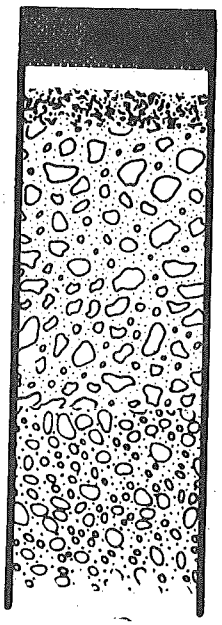
This landtype is subject to avalanches.

MAPPING UNIT 33

Mapping Unit 33 consists dominantly of landtype 33 and minor amounts of landtypes 29, 63 and rock outcrops.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definitions)

SOIL PROFILE



Duff — 1 to 3 inches thick; needles, leaves and twigs.

Surface Soil — 0 to 1½ inches thick; grayish brown; very friable; loamy sand. 0 to 1½ inches thick; very dark grayish brown; very friable; sandy loam, or loam.

Subsoil — 10 to 40 inches thick; brown; friable; sandy loam or loamy sand; 10 to 50 percent gravel and cobbles.

Substratum — 30 to 120+ inches thick; gray; very firm (compacted); sandy loam or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent material—glacial till
Drainage class—well to somewhat excessively drained
Typical landform—highly dissected valley sideslopes (4 to 9 drainage dissections per mile). Slopes range from 45 to 85 percent; however most are between 50 and 80 percent.
Depth to bedrock—12+ feet
Natural stability—III
Erosion hazard—high
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch. The substratum is nearly impermeable.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage capacity of this soil is in the uncompacted material. The change from the uncompacted to the compacted till is abrupt. This contact, in most cases, stops root and water penetration, often causing a perched water table and lateral water movement.

This landtype is subject to rapid runoff.

Engineering

This material has good bearing strength.

Lateral water movement most often occurs immediately above the compacted till. This lateral water movement can result in piping and soil failures.

The substratum material is non-plastic.

The highly dissected landform, 4 to 9 drainages per mile, adversely affects road alignment, substantially adds to road construction costs and greatly increases the risk of soil from construction sites being eroded into streams and rivers.

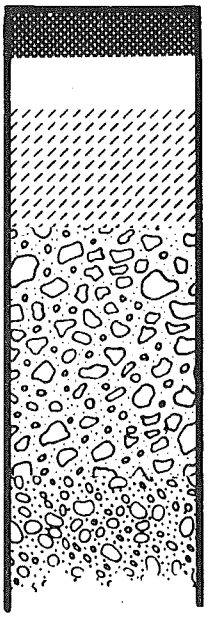
This landtype is subject to avalanches.

MAPPING UNIT 34

Mapping Unit 34 consists dominantly of landtype 34 and minor amounts of landtypes 30, 64 and rock outcrops.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; loose; medium sand.
	0 to 8 inches thick; strong brown; firm sandy loam.
Subsoil	10 to 40 inches thick; brown; friable; sandy loam, or loamy sand; 10 to 50 percent gravel and cobbles.
Substratum	30 to 120+ inches thick; gray; very firm (compacted); sandy loam, or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent material—glacial till
Drainage class—well to somewhat excessively drained
Typical landform—highly dissected valley sideslopes (4 to 9 drainage dissections per mile). Slopes range from 45 to 85 percent.
Depth to bedrock—12+ feet
Natural Stability—III
Erosion hazard—high
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch. The substratum is nearly impermeable.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage capacity of this soil is in the uncompacted material. The change from the uncompacted to the compacted till is abrupt. This contact, in most cases, stops root and water penetration, often causing a perched water table and lateral water movement.

This landtype is subject to rapid runoff.

Engineering

This material has good bearing strength.

Lateral water movement often occurs immediately above the compacted till. This lateral water movement can result in piping and mass soil failures.

The substratum material is non-plastic.

The highly dissected landform (4 to 9 drainages per mile) adversely affects road alignment, substantially adds to road construction costs, and greatly increases the risk of soil from construction sites being eroded into streams and rivers.

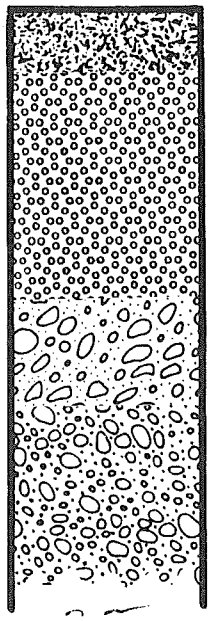
This landtype is subject to avalanches.

MAPPING UNIT 35

Mapping Unit 35 consists dominantly of landtype 35 and minor amounts of landtypes 71, 79 and rock outcrops.

This landtype ranges in elevation from 1000 to 3500 feet and supports a bunchgrass-ponderosa pine plant community. (See Appendix for definition)

SOIL PROFILE



Surface Soil — 1 to 4 inches thick; dark brown; very friable; ashy sandy loam.

Subsoil — 10 to 60 inches thick; white to brown; loose; ashy loamy sand or ashy sandy loam; 25 to 95 percent ash and pumice (.5 to 50 mm dia.).

Substratum — 15 to 30 inches thick; brown; friable; sandy loam or loamy sand; 10 to 50 percent gravel and cobbles.

30 to 120+ inches thick; gray; very firm (compacted); sandy loam, or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent material—Volcanic ash and pumice overlying glacial till
Drainage class—well to somewhat excessively drained
Typical landform—nearly level to very steep glaciated valley sideslopes. Slopes range from 3 to 80 percent; however, most are between 10 and 30 percent.
Depth to bedrock—12+ feet
Natural stability—III
Erosion hazard—moderate
Compaction hazard—low to moderate
Available water holding capacity—0.09 to 0.18 inches per inch. The compacted substratum is nearly impermeable.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage capacity of this landtype is in the surface and subsoil. The change from the uncompacted to the compacted till is abrupt. This contact, in most cases, stops root and water penetration, often causing a perched water table and lateral water movement.

In many places this landtype has a thin very fine ash layer on the surface that causes a hydrophobic effect on initial wetting of the soil. Once the soil has been thoroughly moistened this is no longer a problem.

Unprotected pumice material is subject to both wind and water erosion.

Engineering

Ash and pumice materials have fair bearing strength when confined. The till materiat has good bearing strength.

Lateral water movement most often occurs immediately above the glacial till. Lateral water movement can result in piping and mass soil failures.

The substratum material is non-plastic.

Volcanic ash and pumice have a low angle of repose. Once disturbed they are difficult to stabilize.

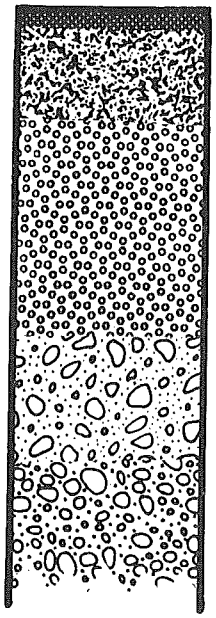
Unsurfaced roads in ash and pumice materials are very dusty when dry. They are not sticky or slippery when wet.

MAPPING UNIT 36

Mapping Unit 36 consists dominantly of landtype 36 and minor amounts of landtypes 40, 72, and rock outcrops.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pine-Douglas fir lant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to 1 inch thick; needles, leaves and twigs.
Surface Soil	½ to 6 inches thick; dark brown or very dark grayish brown; friable; ashy sandy loam or ashy loamy sand; 20 to 95 percent ash and pumice (0.5 to 50.0 mm. dia.).
Subsoil	10 to 60 inches thick; white to brown; loose; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50.0 mm. dia.).
	15 to 30 inches thick; brown; friable; sandy loam, or loamy sand; 10 to 50 percent gravel and cobbles.
Substratum	30 to 120+ inches thick; gray; very firm (compacted); sandy loam, or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent material—volcanic ash and pumice overlying glacial till
Drainage class—well to somewhat excessively drained
Typical landform—nearly level to steep glaciated valley sideslopes. Slopes range from 3 to 40 percent; however, most are between 10 and 30 percent.
Depth to bedrock—8 to 12+ feet
Natural stability—III
Erosion hazard—moderate
Compaction hazard—low to moderate
Available water holding capacity—0.09 to 0.18 inches per inch. The compacted substratum is nearly impermeable.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage capacity of this landtype is in the surface and subsoil. The change from the uncompacted to the compacted till is abrupt. This contact, in most cases, stops root and water penetration, often causing a perched water table and lateral water movement.

In many places this landtype has a thin very fine ash layer on the surface that causes a hydrophobic effect on initial wetting of the soil. Once the soil has been thoroughly moistened this is no longer a problem.

Unprotected pumice material is subject to both wind and water erosion.

Engineering

Ash and pumice materials have fair bearing strength when confined. The till material has good bearing strength.

Lateral water movement most often occurs immediately above the glacial till. Lateral water movement can result in piping and mass soil failures.

The substratum material is non-plastic.

Volcanic ash and pumice have a low angle of repose. Once disturbed, they are difficult to stabilize.

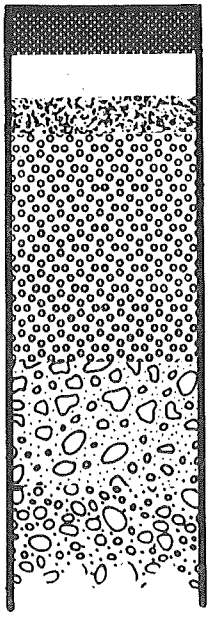
Unsurfaced roads in ash and pumice materials are very dusty when dry. They are not sticky or slippery when wet.

MAPPING UNIT 37

Mapping Unit 37 consists dominantly of landtype 37 and minor amounts of landtypes 41, 73 and rock outcrops.

This landtype ranges in elevation from 2500 to 3800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 3 inches thick; needles, leaves, and twigs.
Surface Soil	0 to 1½ inches thick; grayish brown; very friable; loamy sand.
	0 to 1½ inches thick; very dark grayish brown; very friable; ashy sandy loam or ashy loamy sand; 20 to 95 percent ash and pumice (0.5 to 50.0 mm dia.).
Subsoil	10 to 60 inches thick; white to brown; loose; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50.0 mm dia.).
	15 to 30 inches thick; brown; friable; sandy loam, or loamy sand; 10 to 50 percent gravel and cobbles.
Substratum	30 to 120+ inches thick; gray; very firm (compacted); sandy loam, or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent material—volcanic ash and pumice overlying glacial till
Drainage class—well to somewhat excessively drained
Typical landform—nearly level to steep glaciated valley sideslopes. Slopes range from 3 to 40 percent; however, most are between 10 and 30 percent.
Depth to bedrock—12+ feet
Natural stability—III
Erosion hazard—moderate
Compaction hazard—low to moderate
Available water holding capacity—0.09 to 0.18 inches per inch. The compacted substratum is nearly impermeable.
Note: Included with this landtype are some small areas of glacio-lacustrine deposits.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage capacity of this landtype is in the surface and subsoil. The change from the uncompacted to the compacted till is abrupt. This contact, in most cases, stops root and water penetration, often causing a perched water table and lateral water movement.

In many places this landtype has a thin very fine ash layer on the surface that causes a hydrophobic effect on initial wetting of the soil. Once the soil has been thoroughly moistened this is no longer a problem.

Unprotected pumice material is subject to both wind and water erosion.

Engineering

Ash and pumice materials have fair bearing strength when confined. The till material has good bearing strength.

Lateral water movement most often occurs immediately above the glacial till. Lateral water movement can result in piping and mass soil failures.

The substratum material is non-plastic.

Volcanic ash and pumice have a low angle of repose. Once disturbed this material is difficult to stabilize.

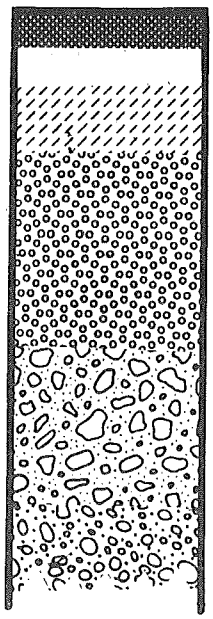
Unsurfaced roads in ash and pumice materials are very dusty when dry. They are not sticky or slippery when wet.

MAPPING UNIT 38

Mapping Unit 38 consists dominantly of landtype 38 and minor amounts of landtype 42 and rock outcrops.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; loose; medium sand, or loamy sand.
	0 to 10 inches thick; strong brown; firm; ashy sandy loam, or ashy loamy sand; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).
Subsoil	10 to 60 inches thick; white to brown; loose; ashy loam, or loamy sand; 10 to 50 percent gravel and cobbles.
	15 to 30 inches thick; brown; friable; sandy loam, or loamy sand; 10 to 50 percent gravel and cobbles.
Substratum	30 to 120+ inches thick; gray; very firm (compacted); sandy loam, or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent material—volcanic ash and pumice overlying glacial till
Drainage class—well to somewhat excessively drained
Typical landform—nearly level to steep glaciated valley sideslopes. Slopes range from 3 to 40 percent; however, most are between 10 and 30 percent.
Depth of bedrock—12+ feet
Natural stability—III
Erosion hazard—moderate to high
Available water holding capacity—0.09 to 0.18 inches per inch. The compacted substratum is nearly impermeable.
Compaction hazard—low to moderate

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage capacity is in the surface and subsoil. The change from the uncompacted to the compacted till is abrupt. This contact in most cases stops root and water penetration, often causing a perched water table and lateral water movement.

In many places this landtype has a thin very fine ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. Once the soil has been thoroughly moistened this is no longer a problem.

Unprotected pumice material is subject to both wind and water erosion. Because of its low bulk density it is extremely erosive.

Engineering

Ash and pumice material has fair bearing strength when confined. The till material has good bearing strength.

Lateral water movement most often occurs immediately above the glacial till. Lateral water movement can result in piping and mass soil failures.

The substratum is non-plastic.

Volcanic ash and pumice have a very low angle of repose. Once disturbed they are difficult to stabilize.

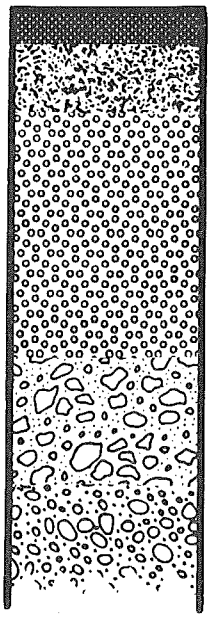
Unsurfaced roads in ash and pumice materials are very dusty when dry. They are not sticky or slippery when wet.

MAPPING UNIT 40

Mapping Unit 40 consists dominantly of landtype 40 and minor amounts of landtypes 36, 77 and rock outcrops.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pine-Douglas-fir plant community. (See Appendix for definition)

SOIL PROFILE



Duff	0 to 1 inch thick; needles, leaves and twigs.
Surface Soil	½ to 6 inches thick; dark brown or very dark grayish brown; friable; ashy sandy loam or ashy loamy sand; 20 to 95 percent ash and pumice (0.5 to 55 mm. dia.).
Subsoil	10 to 60 inches thick; white to brown; loose; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).
	15 to 30 inches thick; brown; friable; sandy loam, or loamy sand; 10 to 50 percent gravel and cobbles.
Substratum	30 to 120+ inches thick; gray; very firm (compacted); sandy loam, or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent material—Volcanic ash and pumice overlying glacial till
Drainage class—well to somewhat excessively drained
Typical landform—steep and very steep glaciated valley sideslopes. Slopes range from 40 to 80 percent; however, most are between 45 and 65 percent.
Depth to bedrock—12+ feet
Natural stability—IV
Erosion hazard—high to very high
Compaction hazard—low
Available water holding capacity—0.09 to 0.18 inches per inch. The compacted substratum is nearly impermeable.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage capacity of this landtype is in the surface and subsoil. The change from the uncompacted to the compacted till is abrupt. This contact, in most cases, stops root and water penetration, often causing a perched water table and lateral water movement.

In many places this landtype has a thin very fine ash layer on the surface that causes a hydrophobic effect on initial wetting of the soil. Once the soil has been thoroughly moistened this is no longer a problem.

Unprotected pumice material is subject to both wind and water erosion.

This landtype is especially sensitive to debris avalanches.

Engineering

Ash and pumice material has fair bearing strength when confined. The till material has good bearing strength.

Lateral water movement most often occurs immediately above the glacial till. Lateral water movement can result in piping and mass soil failures.

Volcanic ash and pumice have a very low angle of repose. Once disturbed they are difficult to stabilize.

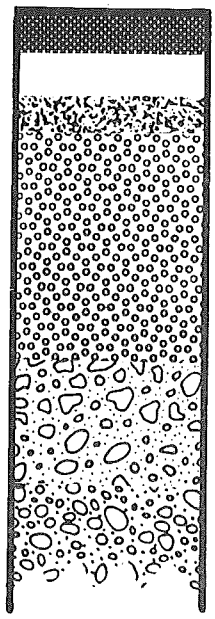
Unsurfaced roads in ash and pumice materials are very dusty when dry. They are not sticky or slippery when wet.

MAPPING UNIT 41

Mapping Unit 41 consists dominantly of landtype 41 and minor amounts of landtypes 37, 78 and rock outcrops.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff — 1 to 4 inches thick; very dark grayish brown; needles, leaves and twigs.

Surface Soil — 0 to 1½ inches thick; grayish brown; loose; loamy sand.
0 to 1½ inches thick; very dark grayish brown; very friable; ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).

Subsoil — 10 to 60 inches thick; white to brown; loose; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).

15 to 30 inches thick; brown; friable; sandy loam or loamy sand; 10 to 50 percent gravel and cobbles.

Substratum — 30 to 120+ inches thick; gray; very firm (compacted); sandy loam, or loamy sand; 15 to 65 percent gravel or cobbles.

Soil characteristics

Parent material—Volcanic ash and pumice overlying glacial till
Drainage class—well to somewhat excessively drained
Typical landform—steep and very steep glaciated valley sideslopes. Slopes range from 40 to 80 percent; however, most are between 45 and 65 percent. A few areas may have as many as 9 dissections per mile, but most areas have less than 4 per mile.
Depth to bedrock—12+ feet
Natural stability—IV
Erosion hazard—high to very high
Compaction hazard—low
Available water holding capacity—0.09 to 0.18 inches per inch. The compacted substratum is nearly impermeable.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage capacity of this landtype is in the surface and subsoil. The change from the uncompacted to the compacted till is abrupt. This contact, in most cases, stops root and water penetration, often causing a perched water table and lateral water movement.

In many places the landtype has a thin, very fine ash layer on the surface that causes a hydrophobic effect on initial wetting of the soil. Once the soil has been thoroughly moistened this is no longer a problem.

Unprotected pumice material is subject to both wind and water erosion.

Engineering

Ash and pumice material has fair bearing strength when confined. The till material has good bearing strength.

Lateral water movement most often occurs immediately above the glacial till. Lateral water movement can result in a piping and mass soil failures.

The substratum material is non-plastic.

Volcanic ash and pumice have a very low angle of repose. Once disturbed they are difficult to stabilize.

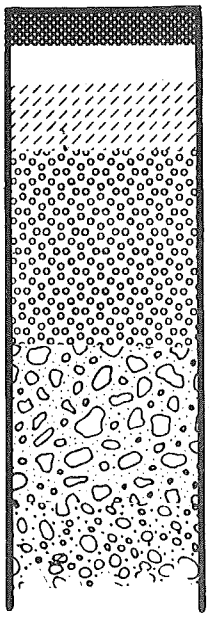
Unsurfaced roads in ash and pumice materials are very dusty when dry. They are not sticky or slippery when wet.

MAPPING UNIT 42

Mapping Unit 42 consists dominantly of landtype 42 and minor amounts of landtypes 39, 79 and rock outcrops.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See Appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; medium sand.
	0 to 8 inches thick; strong brown; friable; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).
Subsoil	10 to 60 inches thick; white to brown; loose; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).
	15 to 30 inches thick; brown; friable; sandy loam, or loamy sand; 10 to 50 percent gravel and cobbles.
Substratum	30 to 120+ inches thick; gray; very firm (compacted); sandy loam, or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent material—volcanic ash and pumice overlying glacial till
Drainage class—well to somewhat excessively drained
Typical landform—steep and very steep valley sideslopes. Slopes range from 40 to 80 percent; however, most are between 45 and 65 percent.
Depth to bedrock—12+ feet
Natural stability—IV
Erosion hazard—high to very high
Compaction hazard—low
Available water holding capacity—0.09 to 0.18 inches per inch. The compacted substratum is nearly impermeable.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage capacity of this landtype is in the surface and subsoil. The change from the uncompacted to the compacted till is abrupt. This contact, in most cases, stops root and water penetration, often causing a perched water table and lateral water movement.

In many places this landtype has a thin very fine ash layer on the surface that causes a hydrophobic effect on initial wetting of the soil. Once the soil has been thoroughly moistened this is no longer a problem.

Unprotected pumice material is subject to both wind and water erosion.

Engineering

Ash and pumice material has fair bearing strength when confined. The till material has good bearing strength.

Lateral water movement most often occurs immediately above the glacial till. Lateral water movement can result in piping and mass soil failures.

The substratum material is non-plastic.

Volcanic ash and pumice have a very low angle of repose. Once disturbed they are difficult to stabilize.

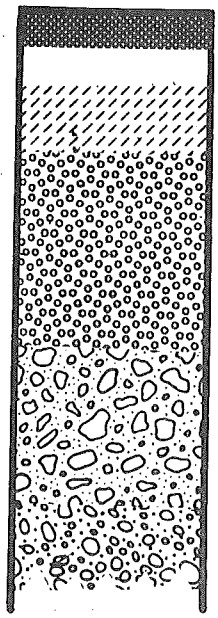
Unsurfaced roads in ash and pumice materials are very dusty when dry. They are not sticky or slippery when wet.

MAPPING UNIT 48

Mapping Unit 48 consists dominantly of landtype 48 and minor amounts of landtypes 42, 79 and rock outcrops.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community (See appendix for definition)

SOIL PROFILE



Duff — 1 to 4 inches thick; needles, leaves and twigs.

Surface Soil — 2 mm to 3 inches thick; light gray; medium sand.

0 to 8 inches thick; strong brown; friable; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).

Subsoil — 10 to 60 inches thick; white to brown; loose; ashy loamy sand, or ashy sandy loam; 20 to 95 percent gravel and cobbles (0.5 to 50 mm. dia.).

15 to 30 inches thick; friable; sandy loam, or loamy sand; 10 to 50 percent gravel and cobbles.

Substratum — 30 to 120+ inches thick; gray; very firm (compacted); sandy loam, or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent material—volcanic ash and pumice over glacial till
Drainage class—well to somewhat excessively drained
Typical landform—steep and very steep highly dissected valley sideslopes (4 to 9 drainages per mile). Slopes range from 40 to 85 percent; however, most are between 45 and 65 percent.
Depth of bedrock—12+ feet
Natural stability—IV
Erosion hazard—very high
Compaction hazard—low
Available water holding capacity—0.09 to 0.18 inches per inch. The compacted substratum is nearly impermeable.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage capacity of this landtype is in the surface and subsoil. The change from the uncompacted to the compacted till is abrupt. This contact, in most cases, stops root and water penetration, often causing a perched water table and lateral water movement.

In many places this landtype has a thin very fine ash layer on the surface that causes a hydrophobic effect on initial wetting of the soil. Once the soil has been thoroughly moistened this is no longer a problem.

Unprotected pumice material is subject to both wind and water erosion.

Engineering

Ash and pumice materials have fair bearing strength when confined. The till material has good bearing strength.

Lateral water movement most often occurs immediately above the glacial till. Lateral water movement can result in piping and mass soil failures.

The substratum material is non-plastic.

Volcanic ash and pumice have a very low angle of repose. Once disturbed they are difficult to stabilize.

Unsurfaced roads in ash and pumice materials are very dusty when dry. They are not sticky or slippery when wet.

The highly dissected landform (4 to 9 drainage dissections per mile) adversely affects road alignment, substantially adds to road construction costs, and greatly increases the risk of soil from construction sites being eroded into streams and rivers.

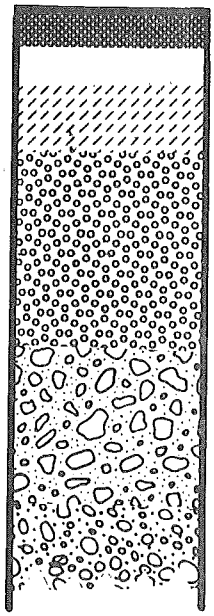
MAPPING UNIT 49

Mapping Unit 49 consists dominantly of landtype 49 and minor amounts of landtypes 70 and rock outcrops.

This landtype ranges in elevation from 5000 to 6000 feet and supports a subalpine plant community. (See appendix for definition)

SOIL PROFILES

Timbered Soil



Duff — 1 to 4 inches thick; needles, leaves and twigs.

Surface Soil — 2 mm to 3 inches thick; light gray; loose; medium sand.

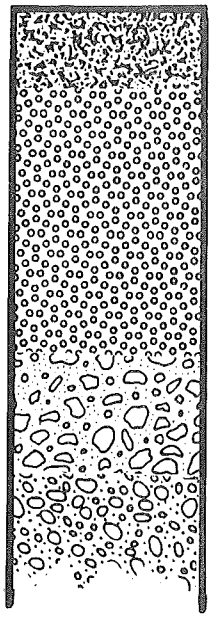
0 to 6 inches thick; strong brown; friable; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm dia.).

Subsoil — 10 to 60 inches thick; white to brown; loose; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).

15 to 30 inches thick; grayish brown; friable; sandy loam or loamy sand; 10 to 50 percent gravel and cobbles.

Substratum — 30 to 120+ inches thick; gray; very firm (compacted); sandy loam, or loamy sand; 15 to 65 percent gravel and cobbles.

Meadow Soil



Surface Soil — 2 to 15 inches thick; very dark grayish brown; friable; ashy sandy loam, or ashy loamy sand; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).

10 to 60 inches thick; white to brown; loose; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).

Subsoil — 15 to 30 inches thick; grayish brown; friable; sandy loam, or loamy sand; 15 to 50 percent gravel and cobbles.

Substratum — 30 to 120+ inches thick; gray; very firm (compacted); sandy loam, or loamy sand; 15 to 65 percent gravel and cobbles.

Soil characteristics

Parent material—Volcanic ash and pumice over glacial till
Drainage class—moderately well to somewhat excessively drained
Typical landform—steep and very highly dissected valley sideslopes (4 to 9 drainages per mile). Slopes range from 3 to 85 percent; however, most are between 20 and 65 percent.
Depth to bedrock—12+ feet
Natural stability—IV
Erosion hazard—very high
Compaction hazard—low
Available water holding capacity—0.09 to 0.18 inches per inch. The compacted substratum is nearly impermeable.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

Most of the water storage capacity of this landtype is in the surface and subsoil. The change from the uncompacted to the compacted till is abrupt. This contact, in most cases, stops root and water penetration, often causing a perched water table and lateral water movement.

In many places this landtype has a thin very fine ash layer on the surface that causes a hydrophobic effect on initial wetting of the soil. Once the soil has been thoroughly moistened this is no longer a problem.

Unprotected pumice material is subject to both wind and water erosion.

Engineering

Ash and pumice material has fair bearing strength when confined. The till material has good bearing strength.

Lateral water movement most often occurs immediately above the glacial till. Lateral water movement can result in piping and mass soil failures.

The substratum material is non-plastic.

Volcanic ash and pumice have a very low angle of repose. Once disturbed they are difficult to stabilize.

Unsurfaced roads in ash and pumice materials are very dusty when dry. They are not sticky or slippery when wet.

The highly dissected landform (4 to 9 drainages per mile) adversely affects road alignment, substantially adds to road construction costs, and greatly increases the risk of soil from construction sites being eroded into streams and rivers.

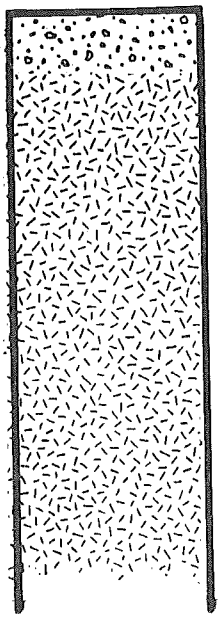
MAPPING UNIT 50

Mapping Unit 50 consists dominantly of landtype 50 and minor amounts of landtypes ranging from very shallow to moderately deep residual soils.

This landtype may occur at any elevation. It supports very little vegetation—mainly moss, lichens, grasses and forbs.

SOIL PROFILE

Soil



0 to 6 inches thick; pale brown; loose; loamy sand, or sandy loam; (5 to 85 percent gravel).

Bedrock

Many feet thick

Soil characteristics

Parent material—granitic and gneissic rock types
Drainage class—excessively drained
Typical landform—all slopes and all aspects
Depth to bedrock—0 to 6 inches
Natural stability—I
Erosion hazard—low
Compaction hazard—none
Available water holding capacity—< 0.06 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—not applicable

Runoff from this landtype is rapid and nearly total, as there is very little water storage capacity except for entrapments (ponds).

This landtype may occur in any of the six plant community type areas recognized on the forest.

Engineering

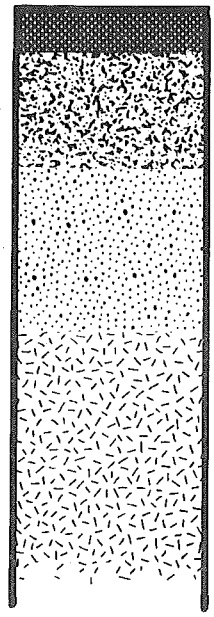
These rock types have a wide range in hardness characteristics, so on-site investigations are needed to evaluate site characteristics and qualities. Many rock types are non-rippable, yet have poor wearing qualities for road rock.

MAPPING UNIT 51

Mapping Unit 51 consists dominantly of landtype 51 and minor amounts of landtype 50 and 61.

This landtype ranges in elevation from 1000 to 3500 feet and supports a bunchgrass-ponderosa pine plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to ½ inch thick; needles, leaves and twigs.
Surface	2 to 8 inches thick; dark brown or very dark grayish brown; friable; sandy loam, or loamy sand; (0 to 25 percent gravel).
Subsoil	6 to 20 inches thick; brown; friable; loamy sand, sandy loam or loam; (0 to 45 percent gravel).
Bedrock	Many feet thick

Soil characteristics

Parent material—granitic and gneissic rock types
Drainage class—somewhat excessively drained
Typical landform—nearly level to very steep unglaciated uplands. Slopes range from 3 to 90 percent, but most are between 15 and 50 percent.
Depth to bedrock—less than 20 inches
Natural stability—II
Erosion hazard—high
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—D
These landtypes have low water holding capacity and rapid runoff.

Engineering

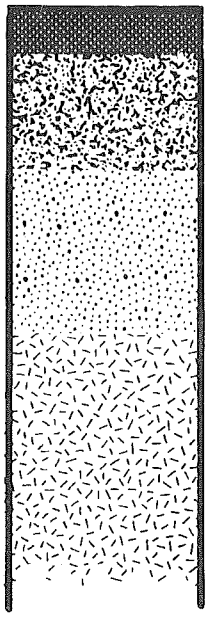
These rock types are highly variable, some are rippable, others are not. Generally they provide a stable road base.

MAPPING UNIT 52

Mapping Unit 52 consists dominantly of landtype 52 and minor amounts of landtypes 50, 57 and 62.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pine-Douglas fir plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to 1 inch thick; needles, leaves and twigs.
Surface Soil	½ to 6 inches thick; very dark grayish brown; friable; sandy loam, or loamy sand.
Subsoil	6 to 20 inches thick; brown; friable; loamy sand, sandy loam or loam; (0 to 45 percent gravel).
Bedrock	Many feet thick

Soil characteristics

Parent material—granitic and gneissic rock types
Drainage class—somewhat excessively drained
Typical landform—nearly level to very steep unglaciated uplands. Slopes range from 3 to 90 percent, but most are between 15 and 50 percent.
Depth to bedrock—less than 20 inches
Natural stability—II
Erosion hazard—high
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—D

These landtypes have low water holding capacity and rapid runoff.

Engineering

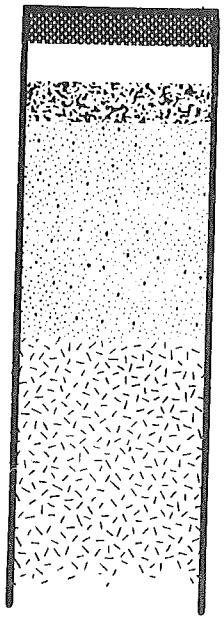
These rock types are highly variable, some are rippable, others are not. Generally, they provide a stable road base.

MAPPING UNIT 53

Mapping Unit 53 consists dominantly of landtype 53 and minor amounts of landtypes 50 and 63.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff	½ to 2½ in. thick; needles, leaves and twigs.
Surface Soil	0 to 1½ in. thick; grayish brown; loose; loamy sand.
	0 to 1½ in. thick; very dark grayish brown; very friable; sandy loam, or loamy sand.
Subsoil	6 to 20 inches thick; dark brown; friable; loamy sand, sandy loam or loam; (0 to 45 percent gravel).
Bedrock	Many feet thick

Soil characteristics

Parent material—granitic and gneissic rock types
Drainage class—somewhat excessively drained
Typical landform—nearly level to very steep unglaciated uplands. Slopes range from 3 to 90 percent, but most are between 15 and 50 percent.
Depth to bedrock—less than 20 inches
Natural stability—II
Erosion hazard—high
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—G
These landtypes have low water holding capacity and rapid runoff.

Engineering

These rock types are highly variable, some are rippable, others are not. Generally, they provide a stable road base.

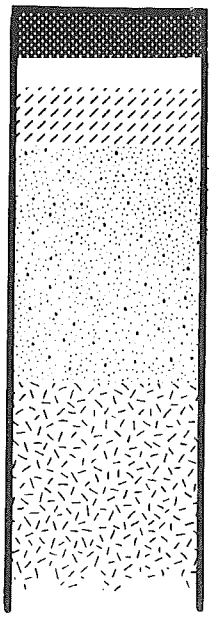
MAPPING UNIT 55

Mapping Unit 55 consists dominantly of landtype 55 and minor amounts of landtypes 50 and 65.

This landtype ranges in elevation from 5000 to 6000 feet and supports a subalpine plant community. (See appendix for definition)

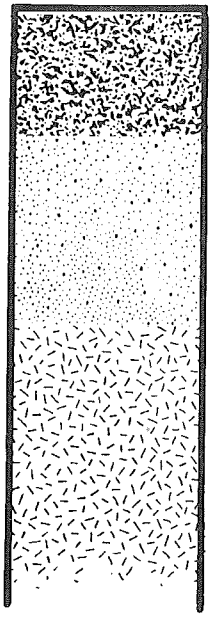
SOIL PROFILES

Timbered Soil



Duff	1 to 4 in. thick; needles, leaves and twigs.
Surface Soil	2 mm to 3 in. thick; light gray; loose; medium sand.
	0 to 6 in. thick; strong brown; firm; loamy sand or sandy loam; (0 to 15 percent gravel).
Subsoil	6 to 20 in. thick; brown; friable; loamy sand, sandy loam, or loam; (0 to 45 percent gravel).
Bedrock	Many feet thick

Meadow Soil



Surface Soil	2 to 10 in. thick; very dark grayish brown; friable; sandy loam, or loam; (0 to 15 percent gravel).
Subsoil	6 to 18 in. thick; brown; friable; sandy loam, loam, or sandy clay loam; (0 to 45 percent gravel).
Bedrock	Many feet thick.

Soil Characteristics

Parent material—granitic and gneissic rock types
Drainage class—moderately well to somewhat excessively drained
Typical landform—nearly level to very steep uplands. Slopes range from 3 to 90 percent, but most are between 15 and 50 percent.
Depth to bedrock—less than 20 inches
Natural stability—II
Erosion hazard—high
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—D

These landtypes have low water holding capacity and rapid runoff.

Engineering

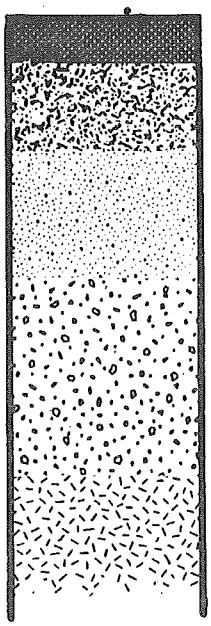
These rock types are highly variable, some are rippable, others are not. Generally, they provide a stable road base.

MAPPING UNIT 57

Mapping Unit 57 consists dominantly of landtype 57 and minor amounts of landtypes 50, 52 and 62.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pine-Douglas fir plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to 2 inches thick; needles, leaves and twigs.
Surface Soil	½ to 6 inches thick; dark brown; friable; sandy loam, or loamy sand; (0 to 15 percent gravel).
Subsoil	5 to 30 inches thick; brown or grayish brown; friable; sandy loam, loam or sandy clay loam; (0 to 25 percent gravel).
Substratum	8 to 50 inches thick; yellowish brown; friable; loamy sand, sandy loam, or loam; (5 to 40 percent gravel).
Bedrock	Many feet thick

Soil characteristics

Parent material—granitic and gneissic rock types
Drainage class—well to somewhat excessively drained
Typical landform—nearly level to steep upland slopes. Slopes range from 0 to 40 percent, but most are between 5 and 25 percent.
Depth to bedrock—20 to 60 inches
Natural stability—I
Erosion hazard—low
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch in the soil material

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B
These soils have a moderate water holding capacity. In many places, this landtype has a thin ash layer

on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened, this is no longer a problem.

Engineering

These rock types are highly variable, some are rippable and others are not. Generally they provide a stable road base.

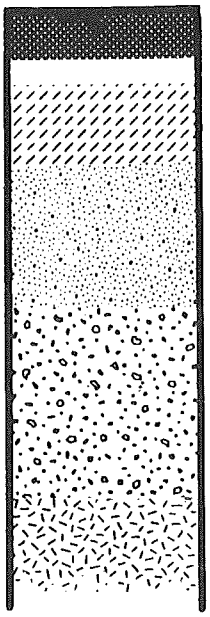
This soil material has low shrink swell, and is usually not slippery when wet.

MAPPING UNIT 59

Mapping Unit 59 consists dominantly of landtype 59 and minor amounts of landtypes 50 and 64.

This landtype ranges in elevation from 300 to 6500 feet and supports a mixed conifer plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves and twigs.
Surface Soil	2 mm to 3 inch thick; light gray; loose; fine sand.
	0 to 8 inches thick; strong brown; firm; loamy sand, or sandy loam; (0 to 15 percent gravel).
Subsoil	5 to 30 inches thick; brown or dark brown; friable; sandy loam; or loam; (0 to 25 percent gravel).
Substratum	10 to 50 inches thick; yellowish brown; friable; loamy sand, sandy loam, or loam; (5 to 40 percent gravel).
Bedrock	Many feet thick

Soil characteristics

Parent material—granitic and gneissic rock types
Drainage class—well to somewhat excessively drained
Typical landform—nearly level to steep upland slopes. Slopes range from 0 to 40 percent, but most are between 5 and 25 percent.
Depth to bedrock—20 to 60 inches
Natural stability—I
Erosion hazard—low
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch in the soil material

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

These soils have a moderate water holding capacity. In many places, this landtype has a thin ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened, this is no longer a problem.

Engineering

These rock types are highly variable, some are rippable and others are not. Generally, they provide a stable road base.

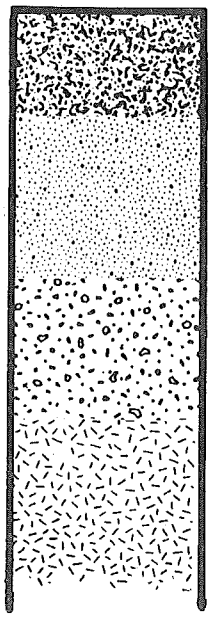
This soil material has a low shrink swell, and is usually not slippery when wet.

MAPPING UNIT 61g

Mapping Unit 61g consists dominantly of landtype 61g and minor amounts of landtype 50.

This landtype ranges in elevation from 740 to 3800 feet and supports a bunchgrass plant community. (See appendix for definition)

SOIL PROFILE



Surface Soil	2 to 12 inches thick; very dark grayish brown or dark brown; very friable; loamy sand or sandy loam; (0 to 15 percent gravel).
Subsoil	3 to 30 inches thick; brown; friable; sandy loam, loam or sandy clay loam; (0 to 25 percent gravel).
Substratum	10 to 48 inches thick; yellowish brown; friable; loamy sand, sandy loam, or loam; (10 to 40 percent gravel).
Bedrock	Many feet thick

Soil characteristics

Parent material—granitic and gneissic rock types
Drainage class—well to somewhat excessively drained
Typical landform—nearly level to very steep upland slopes, slopes range from 5 to 90 percent; however, most are between 45 and 65 percent.
Depth to bedrock—20 to 60 inches
Natural stability—II
Erosion hazard—moderate
Compaction hazard—low to moderate
Available water holding capacity—0.09 to 0.16 inches per inch in the soil material

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

These soils have a moderate water holding capacity.

In many places this landtype has a thin ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

This landtype most often occurs on west and south facing aspects.

Engineering

These rock types are highly variable, some are rippable and others are not. Generally, they provide a stable road base.

This soil material has a low shrink swell, and is usually not slippery when wet.

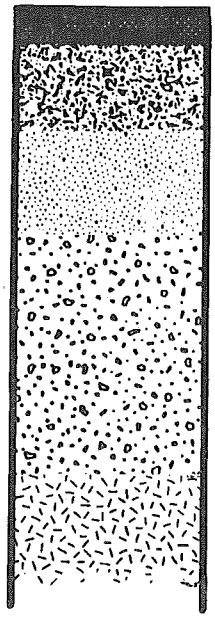
This landtype is subject to debris avalanche hazard.

MAPPING UNIT 61

Mapping Unit 61 consists dominantly of landtype 61 and minor amounts of landtypes 50 and 51.

This landtype ranges in elevation from 1000 to 3500 feet and supports a bunchgrass-ponderosa pine plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to ½ inch thick; needles, leaves and twigs.
Surface Soil	2 to 8 inches thick; dark brown or very dark grayish brown; very friable; loamy sand or sandy loam; (0 to 15 percent gravel).
Subsoil	12 to 36 inches thick; dark brown; friable; sandy loam, loam, or sandy clay loam; (0 to 25 percent gravel).
Substratum	10 to 48 inches thick; yellowish brown; friable; loamy sand, sandy loam, or loam; (10 to 40 percent gravel).
Bedrock	Many feet thick

Soil characteristics

Parent material—granitic and gneissic rock types
Drainage class—well to somewhat excessively drained
Typical landform—nearly level to very steep upland slopes. Slopes range from 5 to 90 percent; however, most are between 45 and 65 percent.
Depth to bedrock—20 to 60 inches
Natural stability—II
Erosion hazard—moderate
Compaction hazard—low to moderate
Available water holding capacity—0.09 to 0.16 inches per inch in the soil material

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B
These soils have a moderate water holding capacity.
In many places this landtype has a thin ash layer on the surface that causes a hydromorphic effect on in-

itial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

Engineering

These rock types are highly variable; some are rippable and others are not. Generally they provide a stable road base.

This soil material has a low shrink swell, and is usually not slippery when wet.

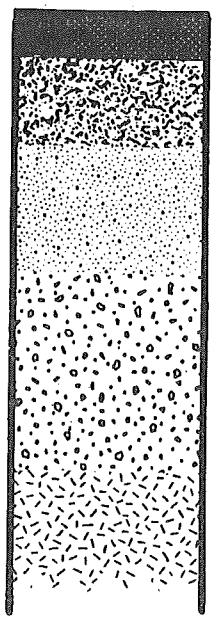
This landtype has a high incidence of debris avalanche.

MAPPING UNIT 62

Mapping Unit 62 consists dominantly of landtype 62 and minor amounts of landtypes 50 and 52.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pine, Douglas fir plant community. (See appendix for definition)

SOIL PROFILE



Duff	½ to 2½ inches thick; needles, leaves and twigs.
Surface Soil	½ to 6 inches thick; very dark grayish brown; friable; loamy sand, or sandy loam; (0 to 15 percent gravel).
Subsoil	12 to 40 inches thick; dark brown; very friable; sandy loam, loam, or sandy clay loam; (0 to 25 percent gravel).
Substratum	8 to 48 inches thick; yellowish brown; friable; loamy sand, or sandy loam; (10 to 40 percent gravel).
Bedrock	Many feet thick

Soil characteristics

Parent material—granitic and gneissic rock types
Drainage class—well to somewhat excessively drained
Typical landform—steep and very steep upland slopes. Slopes range from 45 to 90 percent; however, most are between 55 and 65 percent.
Depth to bedrock—20 to 60 inches
Natural stability—II
Erosion hazard—moderate
Compaction hazard—low to moderate
Available water holding capacity—0.09 to 0.16 inches per inch in the soil material

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B
These soils have a moderate water holding capacity.

In many places this landtype has a thin ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

Engineering

These rock types are highly variable, some are rippable and others are not. Generally they provide a stable road base.

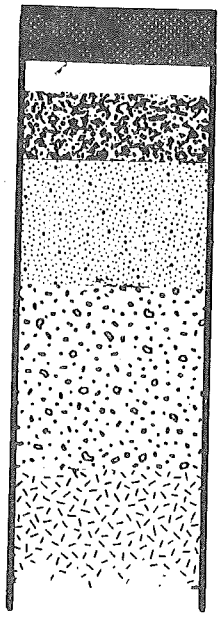
This soil material has a low shrink swell, and is usually not slippery when wet.

MAPPING UNIT 63

Mapping Unit 63 consists dominantly of landtype 63 and minor amounts of landtypes 50, 53 and 68.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff	½ to 2½ inches thick; needles, leaves and twigs.
Surface Soil	0 to 1½ inches thick; grayish brown; very friable; loamy sand, or fine sand. 0 to 1½ inches thick; very dark grayish brown; very friable; loamy sand, or sandy loam; (0 to 15 percent gravel).
Subsoil	12 to 36 inches thick; dark brown; very friable; sandy loam, loam, or sandy clay loam; (0 to 25 percent gravel).
Substratum	10 to 48 inches thick; yellowish brown; friable; loamy sand, or sandy loam; (10 to 40 percent gravel).
Bedrock	Many feet thick

Soil characteristics

Parent material—granitic and gneissic rock types
Drainage class—well to somewhat excessively drained
Typical landform—steep and very steep upland slopes; slopes range from 45 to 90 percent; however, most are between 55 and 65 percent.
Depth to bedrock—20 to 60 inches
Natural stability—II
Erosion hazard—moderate
Compaction hazard—low to moderate
Available water holding capacity—0.09 to 0.16 inches per inch in the soil material

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B
These soils have a moderate water holding capacity.

In many places this landtype has a thin ash layer on the surface that cause a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem

Engineering

These rock types are highly variable, some are rippable and others are not. Generally, they provide a stable road base.

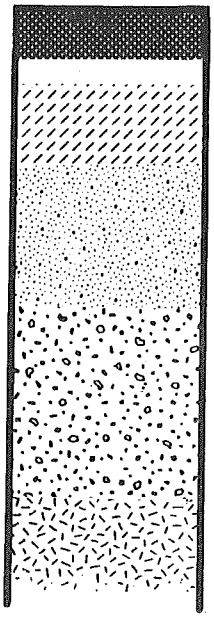
This soil material has a low shrink swell, and is usually not slippery when wet.

MAPPING UNIT 64

Mapping Unit 64 consists dominantly of landtype 64 and minor amounts of landtypes 50 and 69.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; loose; fine sand, or loamy sand.
	0 to 8 inches thick; strong brown; firm; loamy sand, sandy loam; (0 to 25 percent gravel).
Subsoil	12 to 36 inches thick; brown; friable; sandy loam, loam, or sandy clay loam; (0 to 25 percent gravel).
Substratum	12 to 36 inches thick; yellowish brown; friable; loamy sand, or sandy loam. (10 to 40 percent gravel).
Bedrock	Many feet thick

Soil characteristics

Parent material—granitic and gneissic rock types
Drainage class—well to somewhat excessively drained
Typical landform—steep to very steep upland slopes. Slopes range from 45 to 90 percent; however, most are between 55 and 65 percent.
Depth to bedrock—20 to 60 inches
Natural stability—II
Erosion hazard—moderate
Compaction hazard—low to moderate
Available water holding capacity—0.09 to 0.16 inches per inch in the soil material

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

These soils have a moderate water holding capacity.

In many places the landtype has a thin ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

Engineering

These rock types are highly variable, some are rippable and others are not. Generally they provide a stable road base.

This soil material has a low shrink swell, and is usually not slippery when wet.

This landtype has a high incidence of debris avalanches.

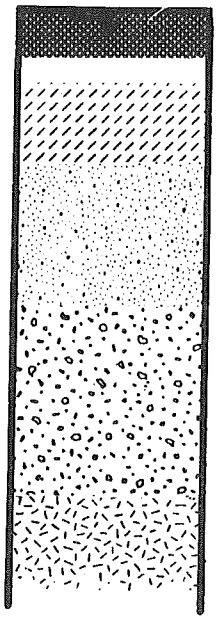
MAPPING UNIT 65

Mapping Unit 65 consists dominantly of landtype 65 and minor amounts of landtypes 50, 55 and 70.

This landtype ranges in elevation from 5000 to 6000 feet and supports a subalpine plant community. (See appendix for definition)

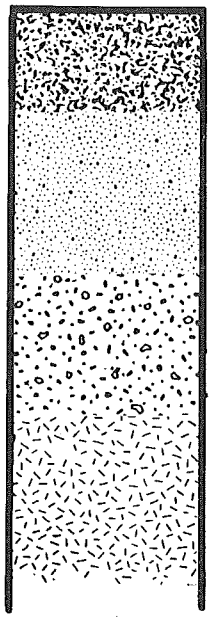
SOIL PROFILES

Timbered Soil



Duff	1 to 4 inches thick; needles, leaves, and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; loose; medium sand
	0 to 6 inches thick; strong brown; firm; sandy loam, or loamy sand (0 to 15 percent gravel).
Subsoil	6 to 20 inches thick; brown; friable; sandy loam, loam, or sandy clay loam (0 to 25 percent gravel).
Substratum	12 to 40 inches thick; yellowish-brown; friable; loamy sand, or sandy loam (10 to 40 percent gravel).
Bedrock	Many feet thick

Meadow Soil



Surface Soil	2 to 10 inches thick; very dark grayish brown; friable; sandy loam, or loamy sand (0 to 15 percent gravel).
Subsoil	6 to 24 inches thick; brown; friable; sandy loam, loam, or sandy clay loam (0 to 25 percent gravel).
Substratum	12 to 40 inches thick; yellowish brown; friable; loamy sand or sandy loam (10 to 40 percent gravel).
Bedrock	Many feet thick

Soil Characteristics

Parent material—granitic and gneissic rock types
Drainage class—moderately well to somewhat excessively drained
Typical landform—nearly level to very steep upland slopes. Slopes range from 5 to 90 percent; however, most are between 20 and 65 percent.
Depth to bedrock—20 to 60 inches
Erosion hazard—moderate
Compaction hazard—low to moderate
Available water holding capacity—0.09 to 0.16 inches per inch in the soil material

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

These soils have a moderate water holding capacity.

In many places the landtype has a thin ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

Engineering

These rock types are highly variable, some are rippable and others are not. Generally they provide a stable road base.

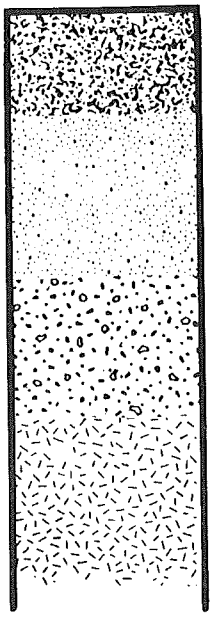
This soil material has a low shrink swell, and is usually not slippery when wet.

MAPPING UNIT 66g

Mapping Unit 66g consists dominantly of landtype 66g and minor amounts of landtypes 50 and 61g.

This landtype ranges in elevation from 740 to 3800 feet and supports a bunchgrass plant community. (See appendix for definition)

SOIL PROFILE

Surface Soil		2 to 12 inches thick; very dark grayish brown or dark brown; very friable; sandy loam, or loamy sand (0 to 15 percent gravel).
Subsoil		8 to 26 inches thick; brown; friable; sandy loam, loam, or sandy clay loam. (0 to 25 percent gravel).
Substratum		10 to 46 inches thick; yellowish brown; friable; loamy sand, or sandy loam (10 to 40 percent gravel).
Bedrock		Many feet thick

Soil Characteristics

Parent material—granitic and gneissic rock types
Drainage class—well to somewhat excessively drained
Typical landform—highly dissected valley sideslopes (4 to 9 drainages per mile). Slopes range from 45 to 90 percent; however, most are between 55 and 75 percent.
Depth to bedrock—20 to 60 inches
Natural stability—II
Erosion hazard—high
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch in the soil material

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B
The dissected character of this unit reflects the risk of avalanches and the rapid runoff to be expected

from it. As a unit it has significantly lower total water storage capacity than undissected units.

In many places the landtype has a thin ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

Engineering

The highly dissected landform (4 to 9 drainages per mile) adversely affects road alignment, substantially adds to road construction costs, and greatly increases the risk of soil from construction sites being eroded into streams and rivers.

These rock types are highly variable, some are rippable and others are not. Generally they provide a stable road base.

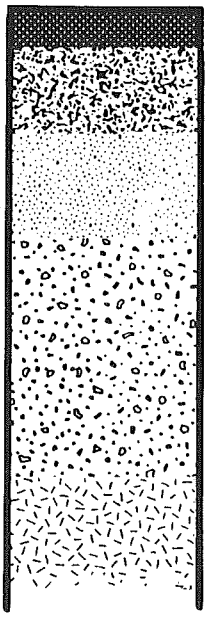
This material usually has a low shrink swell, and is seldom slippery when wet.

MAPPING UNIT 66

Mapping Unit 66 consists dominantly of landtype 66 and minor amounts of landtypes 50, 51 and 61.

This landtype ranges in elevation from 1000 to 3500 feet and supports a bunchgrass-ponderosa pine plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to ½ inch thick; needles, leaves, and twigs.
Surface Soil	2 to 8 inches thick; dark brown or very dark grayish brown; very friable; sandy loam, or loamy sand. (0 to 15 percent gravel)
Subsoil	12 to 36 inches thick; dark brown; friable; sandy loam, loam, or sandy clay loam. (0 to 25 percent gravel)
Substratum	10 to 48 inches thick; yellowish brown; friable; loamy sand or sandy loam. (10 to 40 percent gravel)
Bedrock	Many feet thick

Soil Characteristics

Parent material—granitic and gneissic rock types
Drainage class—well to somewhat excessively drained
Typical landform—highly dissected valley sideslopes (4 to 9 drainages per mile). Slopes range from 45 to 90 percent; however, most are between 55 to 75 percent.
Depth to bedrock—20 to 60 inches
Natural stability—II
Erosion hazard—high
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch in the soil material

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

The dissected character of this unit reflects the risk of avalanches and the rapid runoff to be expected from it. As a unit it has significantly lower total water storage capacity than undissected units.

In many places this landtype has a thin ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

Engineering

The highly dissected landform (4 to 9 drainages per mile) adversely affects road alignment, substantially adds to road construction costs, and greatly increases the risk of soil from construction sites being eroded into streams and rivers.

These rock types are highly variable, some are rippable and others are not. Generally they provide a stable road base.

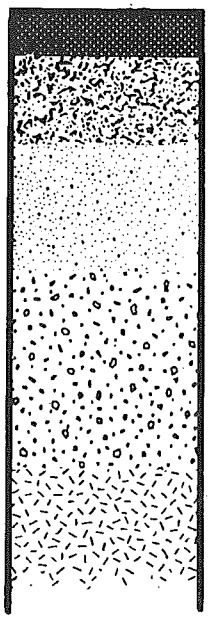
This material usually has a low shrink swell, and is seldom slippery when wet.

MAPPING UNIT 67

Mapping Unit 67 consists dominantly of landtype 67 and minor amounts of landtypes 50, 52 and 62.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pine, Douglas fir plant community. (See appendix for definition)

SOIL PROFILE

Duff		½ to 2½ inches thick; needles, leaves, and twigs.
Surface Soil		½ to 6 inches thick; very dark grayish brown; friable; sandy loam or loamy sand. (0 to 15 percent gravel)
Subsoil		12 to 40 inches thick; dark brown; very friable; sandy loam, loam or sandy clay loam (0 to 25 percent gravel).
Substratum		8 to 48 inches thick; yellowish brown; friable; loamy sand, or sandy loam (10 to 40 percent gravel).
Bedrock		Many feet thick

Soil Characteristics

Parent material—granitic and gneissic rock types
Drainage class—well to somewhat excessively drained
Typical landform—highly dissected valley sideslopes (4 to 9 drainages per mile). Slopes range from 45 to 90 percent; however, most are between 55 and 75 percent.
Depth to bedrock—20 to 60 inches
Natural stability—II
Erosion hazard—high
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch in the soil material

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

The dissected character of this unit reflects the risk of avalanches and the rapid runoff to be expected from it. As a unit it has significantly lower total water storage capacity than undissected units.

In many places this landtype has a thin ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This efect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

Engineering

The highly dissected landform (4 to 9 drainages per mile) adversely affects road alignment, substantially adds to road construction costs, and greatly increases the risk of soil from construction sites being eroded into streams and rivers.

These rock types are highly variable, some are rippable and others are not. Generally they provide a stable road base.

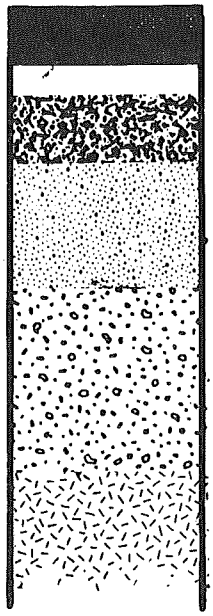
This material usually has a low shrink swell, and is seldom slippery when wet.

MAPPING UNIT 68

Mapping Unit 68 consists dominantly of landtype 68 and minor amounts of landtypes 50, 53 and 63.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff	½ to 3 inches thick; needles, leaves, and twigs.
Surface Soil	0 to 1½ inches thick; grayish brown; very friable; loamy sand or fine sand. 0 to 1½ inches thick; very dark grayish brown; very friable; sandy loam or loamy sand (0 to 15 percent gravel).
Subsoil	12 to 36 inches thick; dark brown; very friable; sandy loam, loam, or sandy clay loam(0 to 25 percent gravel).
Substratum	10 to 48 inches thick; yellowish brown; friable; loamy sand or sandy loam (10 to 40 percent gravel).
Bedrock	Many feet thick

Soil Characteristics

Parent material—granitic and gneissic rock types
Drainage class—well to somewhat excessively drained
Typical landform—highly dissected valley sideslopes (4 to 9 drainages per mile). Slopes range from 45 to 90 percent; however, most are between 55 and 75 percent.
Depth to bedrock—20 to 60 inches
Natural stability—II
Erosion hazard—high
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch in the soil material

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

The dissected character of this unit reflects the risk of avalanches and the rapid runoff to be expected from it. As a unit it has significantly lower total water storage capacity than undissected units.

In many places this landtype has a thin ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

Engineering

The highly dissected landform (4 to 9 drainages per mile) adversely affects road alignment, substantially adds to road construction costs, and greatly increases the risk of soil from construction sites being eroded into streams and rivers.

These rock types are highly variable, some are rippable and others are not. Generally they provide a stable road base.

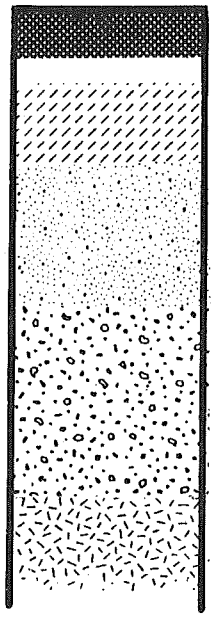
This material usually has a low shrink swell, and is seldom slippery when wet.

MAPPING UNIT 69

Mapping Unit 69 consists dominantly of landtype 69 and minor amounts of landtypes 50 and 64.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves, and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; loose; fine sand.
	0 to 8 inches thick; strong brown; firm; sandy loam or loamy sand (0 to 15 percent gravel).
Subsoil	12 to 36 inches thick; brown; friable; sandy loam, or loam (0 to 25 percent gravel).
Substratum	12 to 36 inches thick; yellowish brown; friable; loamy sand, or sandy loam (10 to 40 percent gravel).
Bedrock	Many feet thick

Soil Characteristics

Parent material—granitic and gneissic rock types
Drainage class—well and somewhat excessively drained
Typical landform—highly dissected valley sideslopes (4 to 9 drainages per mile). Slopes range from 45 to 90 percent; however, most are between 55 and 75 percent.
Depth to bedrock—20 to 60 inches
Natural stability—II
Erosion hazard—high
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch in the soil material

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

The dissected character of this unit reflects the risk of avalanches and the rapid runoff to be expected from it. As a unit it has significantly lower total water storage capacity than undissected units.

In many places this landtype has a thin ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

Engineering

The highly dissected landform (4 to 9 drainages per mile) adversely affects road alignment, substantially adds to road construction costs, and greatly increases the risk of soil from construction sites being eroded into streams and rivers.

These rock types are highly variable, some are rippable and others are not. Generally they provide a stable road base.

This material usually has a low shrink swell, and is seldom slippery when wet.

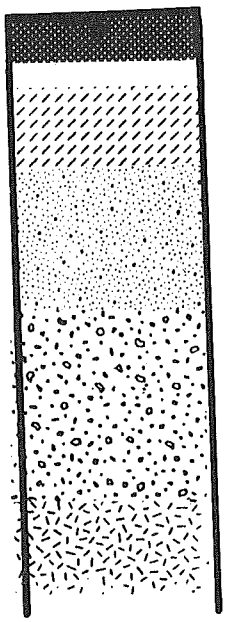
MAPPING UNIT 70

Mapping Unit 70 consists dominantly of landtype 70 and minor amounts of landtypes 50, 55 and 65.

This landtype ranges in elevation from 5000 to 6000 feet and supports a subalpine plant community. (See appendix for definition)

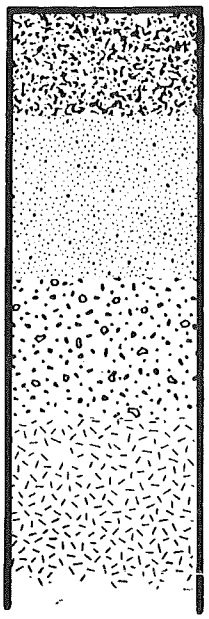
SOIL PROFILES

Timbered Soil



Duff	1 to 4 inches thick; needles, leaves, twigs.
Surface Soil	2 mm to 3 inches thick; light gray; loose; fine sand.
	0 to 6 inches thick; strong brown; firm; sandy loam or loamy sand (0 to 15 percent gravel).
Subsoil	6 to 20 inches thick; brown; friable; sandy loam or loam (0 to 25 percent gravel).
Substratum	12 to 40 inches thick; yellowish brown; friable; loamy sand, or sandy loam (10 to 40 percent gravel).
Bedrock	Many feet thick

Meadow Soil



Surface Soil	2 to 10 inches thick; very dark grayish brown; very friable; sandy loam or loam (0 to 15 percent gravel).
Subsoil	6 to 24 inches thick; brown; friable; sandy loam or loam (0 to 25 percent gravel).
Substratum	12 to 40 inches thick; yellowish brown; friable; loamy sand or sandy loam (10 to 40 percent gravel).
Bedrock	Many feet thick

Soil Characteristics

Parent material—granitic and gneissic rock types
Drainage class—well and somewhat excessively drained
Typical landform—highly dissected valley sideslopes (4 to 9 drainages per mile). Slopes range from 45 to 90 percent; however, most slopes are between 55 and 75 percent.
Depth to bedrock—20 to 60 inches
Natural stability—II
Erosion hazard—high
Compaction hazard—moderate
Available water holding capacity—0.09 to 0.16 inches per inch in the soil material

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

The dissected character of this unit reflects the risk of avalanches and the rapid runoff to be expected from it. As a unit it has significantly lower total water storage capacity than undissected units.

In many places this landtype has a thin ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

Engineering

The highly dissected landform (4 to 9 drainages per mile) adversely affects road alignment, substantially adds to road construction costs, and greatly increases the risk of soil from construction sites being eroded into streams and rivers.

These rock types are highly variable, some are rippable and others are not. Generally they provide a stable road base.

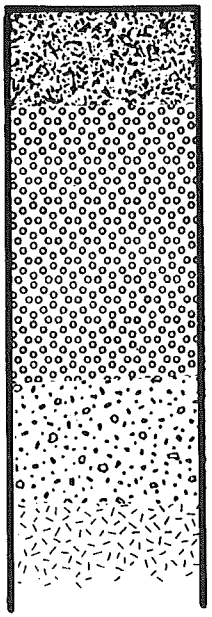
This material usually has a low shrink swell, and is seldom slippery when wet.

MAPPING UNIT 71

Mapping Unit 71 consists dominantly of landtype 71 and minor amounts of landtypes 35 and 50.

This landtype ranges in elevation from 1000 to 3500 feet and supports a bunchgrass-ponderosa pine plant community. (See appendix for definition)

SOIL PROFILE



Surface Soil	1 to 4 inches thick; dark brown; very friable; ashy sandy loam or ashy loamy sand; 20 to 80 percent ash or pumice (0.5 to 55 mm dia.).
Subsoil	9 to 60 inches thick; white to brown; loose; ashy loamy sand or ashy sandy loam; 25 to 95 percent ash or pumice (0.5 to 50 mm dia.).
Substratum	6 to 48 inches thick; yellowish brown; friable; loamy sand, or sandy loam; 10 to 45 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—ash and pumice overlying granitic or gneissic residuum
Drainage class—well to excessively drained
Typical landform—nearly level to steep non-glaciated valley sideslopes. Slopes range from 0 to 40 percent but most are between 8 and 25 percent.
Depth to bedrock—20 to 108 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—low to moderate
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

In many places this landtype has a thin very fine ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted this is no longer a problem.

Ash and pumice are highly erosive by both wind and water.

Engineering

Ash and pumice materials have fair bearing strength when confined. They have a low angle of repose and once disturbed they are difficult to stabilize.

Unsurfaced roads are very dusty when dry, but are not slippery or sticky when wet.

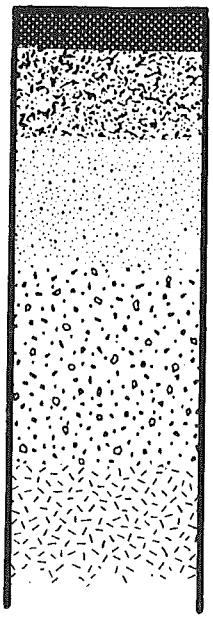
Lateral water movement in the ash and pumice material is very common, often resulting in piping in road cuts.

MAPPING UNIT 72

Mapping Unit 72 consists dominantly of landtype 72 and minor amounts of landtypes 36, 50 and 57.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pine, Douglas-fir plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to 1 inches thick; needles, leaves, and twigs.
Surface Soil	½ to 6 inches thick; dark brown or very dark grayish brown; friable; ashy sandy loam, or ashy loamy sand; 20 to 80 percent ash and pumice (0.5 to 55 mm dia.).
Subsoil	10 to 60 inches thick; white to brown; loose; ashy loamy sand, or ashy sandy loam; 25 to 95 percent ash and pumice (0.5 to 50 mm. dia.).
Substratum	4 to 48 inches thick; yellowish brown; friable; loamy sand, or sandy loam; 10 to 45 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—ash and pumcie overlying granitic or gneissic residuum
Drainage class—well to somewhat excessively drained
Typical landform—nearly level to steep non-glaciated valley sideslopes. Slopes range from 0 to 40 percent, but most are between 8 and 25 percent.
Depth to bedrock—20 to 108 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—low to moderate
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

In many places this landtype has a thin very fine ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted this is no longer a problem.

Ash and pumice are highly erosive by both wind and water.

Engineering

Ash and pumice materials have fair bearing strength when confined. They have a low angle of repose and once disturbed they are difficult to stabilize.

Unsurfaced roads are very dusty when dry, but are not slippery or sticky when wet.

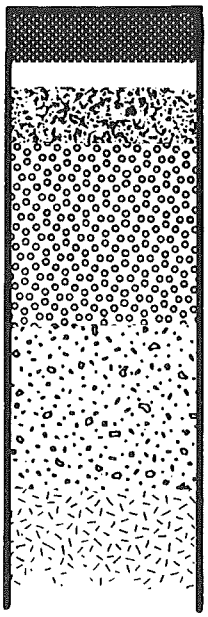
Lateral water movement in the ash and pumice material is very common, often resulting in piping in road cuts.

MAPPING UNIT 73

Mapping Unit 73 consists dominantly of landtype 73 and minor amounts of landtypes 37 and 50.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 3 inches thick; needles, leaves, and twigs.
Surface Soil	0 to 1½ inches thick; grayish brown; very friable; loamy sand.
Subsoil	0 to 1½ inches thick; very dark grayish brown; very friable; ashy loamy sand or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 55 mm. dia.). 10 to 60 inches thick; white to brown; loose; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 55 mm. dia.).
Substratum	9 to 48 inches thick; yellowish brown; friable; loamy sand or sandy loam; 10 to 45 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—pumice overlying granitic or gneissic residuum
Drainage class—well to somewhat excessively drained
Typical landform—nearly level to steep non-glaciated valley sideslopes. Slopes range from 0 to 40 percent, but most are between 8 and 25 percent.
Depth to bedrock—20 to 108 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—low to moderate
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

In many places this landtype has a thin very fine ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted this is no longer a problem.

Ash and pumice are highly erosive by both wind and water.

Engineering

Ash and pumice materials have fair bearing strength when confined. They have a low angle of repose and once disturbed they are difficult to stabilize.

Unsurfaced roads are very dusty when dry, but are not slippery when wet.

Lateral water movement in the ash and pumice material is very common, often resulting in piping in road cuts.

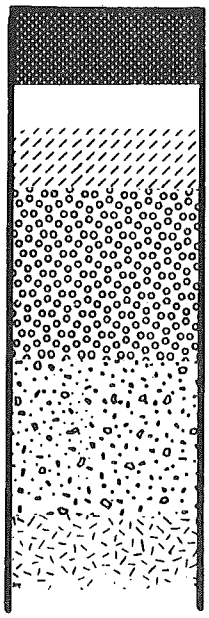
MAPPING UNIT 75

Mapping Unit 75 consists dominantly of landtype 75 and minor amounts of landtype 50.

This landtype ranges in elevation from 5000 to 6000 feet and supports a subalpine plant community. (See appendix for definition)

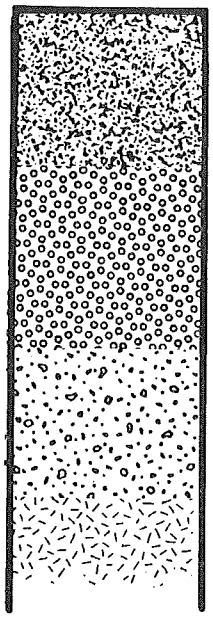
SOIL PROFILES

Timbered Soil



Duff	1 to 4 inches thick; needles, leaves, and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; loose; loamy sand. 0 to 6 inches thick; strong brown; friable; ashy loamy sand or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).
Subsoil	20 to 60 inches thick; white to brown; loose; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).
Substratum	0 to 48 inches thick; yellowish brown; friable; loamy sand, or sandy loam; 10 to 45 percent gravel.
Bedrock	Many feet thick

Meadow Soil



Surface Soil	2 to 10 inches thick; very dark grayish brown; very friable; ashy loam, or ashy loamy sand; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).
Subsoil	18 to 60 inches thick; white to brown; loose; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).
Substratum	0 to 48 inches thick; yellowish brown; friable; loamy sand or sandy loam; 10 to 45 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—ash and pumice overlying granitic and gneissic residuum
Drainage class—well to somewhat excessively drained
Typical landform—nearly level to very steep non-glaciated valley sideslopes. Slopes range from 0 to 90 percent, but most are between 20 and 50 percent.
Depth to bedrock—20 to 108 inches
Natural stability—IV
Erosion hazard—very high
Compaction hazard—low to moderate
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

In many places this landtype has a thin very fine ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted this is no longer a problem.

Ash and pumice are highly erosive by both wind and water.

Engineering

Ash and pumice materials have fair bearing strength when confined. They have a low angle of repose, and once disturbed they are difficult to stabilize.

Unsurfaced roads are very dusty when dry, but are not slippery or sticky when wet.

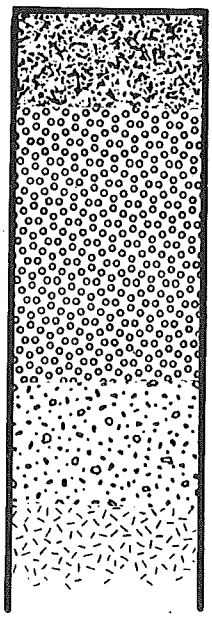
Lateral water movement in the ash and pumice material is very common, often resulting in piping in road cuts.

MAPPING UNIT 76

Mapping Unit 76 consists dominantly of landtype 76 and minor amounts of landtypes 50 and 61.

This landtype ranges in elevation from 1000 to 3500 feet and supports a bunchgrass-ponderosa pine plant community. (See appendix for definition)

SOIL PROFILE



Surface Soil	1 to 4 inches thick; dark brown; very friable; ashy sandy loam, or loamy sand; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).
Subsoil	9 to 60 inches thick; white to brown; loose; ashy loamy sand or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).
Substratum	7 to 48 inches thick; yellowish brown; friable; loamy sand, or sandy loam; 10 to 45 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—ash and pumice overlying granitic or gneissic residuum
Drainage class—well to somewhat excessively drained
Typical landform—steep to very steep non-glaciated valley sideslopes. Slopes range from 40 to 90 percent, but most are between 50 and 70 percent.
Depth to bedrock—20 to 108 inches
Natural stability—IV
Erosion hazard—very high
Compaction hazard—low to moderate
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B
In many places this landtype has a thin very fine ash layer on the surface that causes a hydromorphic

effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted this is no longer a problem.

Ash and pumice are highly erosive by both wind and water.

Engineering

Ash and pumice materials have fair bearing strength when confined. They have a low angle of repose and once disturbed they are difficult to stabilize.

Unsurfaced roads are very dusty when dry, but are not slippery or sticky when wet.

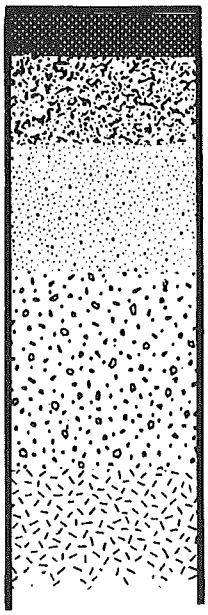
Lateral water movement in the ash and pumice material is very common, often resulting in piping in road cuts.

MAPPING UNIT 77

Mapping Unit 77 consists dominantly of landtype 77 and minor amounts of landtypes 40, 50 and 62.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pine-Douglas fir plant community. (See appendix for definition)

SOIL PROFILE



Duff	½ to 2½ inches thick; needles, leaves, twigs.
Surface Soil	½ to 6 inches thick; very dark grayish brown; very friable; ashy sandy loam, or ashy loamy sand; 20 to 95 percent ash and pumice (0.5 to 55 mm. dia.).
Subsoil	4 to 60 inches thick; white to brown; loose; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm dia.).
Substratum	10 to 48 inches thick; yellowish brown; friable; loamy sand, or sandy loam; 10 to 45 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—ash and pumice overlying granitic and gneissic residuum
Drainage class—well to somewhat excessively drained
Typical landform—steep to very steep non-glaciated valley sideslopes. Slopes range from 40 to 90 percent, but most are between 50 and 70 percent.
Depth to bedrock—20 to 108 inches
Natural stability—IV
Erosion hazard—very high
Compaction hazard—low to moderate
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

In many places this landtype has a thin very fine ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted this is no longer a problem.

Ash and pumice are highly erosive by both wind and water.

Engineering

Ash and pumice materials have fair bearing strength when confined. They have a low angle of repose, and once disturbed they are difficult to stabilize.

Unsurfaced roads are very dusty when dry, but are not slippery or sticky when wet.

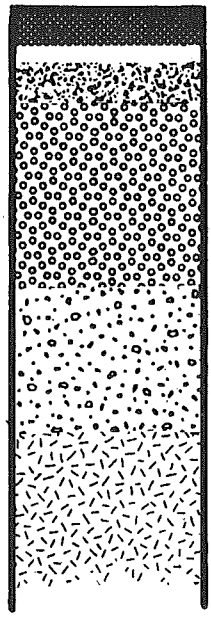
Lateral water movement in the ash and pumice material is very common, often resulting in piping in road cuts.

MAPPING UNIT 78

Mapping Unit 78 consists dominantly of landtype 78 and minor amounts of landtypes 41, 50 and 63.

This landtype ranges in elevation from 2500 to 4800 feet, and supports an associated species plant community. (See Appendix for definition)

SOIL PROFILE

Duff		1 to 3 inches thick; needles, leaves and twigs.
Surface Soil		0 to 1½ inches thick; grayish brown; very friable; loamy sand.
		0 to 1½ inches thick; very dark grayish brown; very friable; ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm dia.).
Subsoil		10 to 60 inches thick; white to brown; loose; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).
Substratum		9 to 48 inches thick; yellowish brown; friable; loamy sand,or sandy loam; 10 to 45 percent gravel.
Bedrock		Many feet thick

Soil Characteristics

Parent material—ash and pumice overlying granitic or gneissic residuum
Drainage class—well to somewhat excessively drained
Typical landform—steep to very steep non-glaciated valley sideslopes. Slopes range from 40 to 90 percent, but most are between 50 and 70 percent.
Depth to bedrock—20 to 108 inches
Natural stability—IV
Erosion hazard—very high
Compaction hazard—low to moderate
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

In many places this landtype has a thin very fine ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted this is no longer a problem.

Ash and pumice are highly erosive by both wind and water.

Engineering

Ash and pumice materials have fair bearing strength when confined. They have a low angle of repose and once disturbed they are difficult to stabilize.

Unsurfaced roads in pumice materials are very dusty when dry, but are not slippery or sticky when wet.

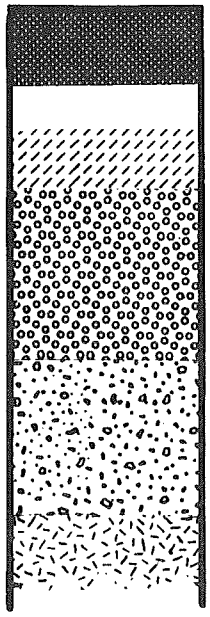
Lateral water movement in the ash and pumice material is very common, often resulting in piping in road cuts.

MAPPING UNIT 79

Mapping Unit 79 consists dominantly of landtype 79 and minor amounts of landtypes 42, 50 and 64.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; medium sand.
Subsoil	0 to 8 inches thick; strong brown; firm; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).
	10 to 60 inches thick; white to brown; loose; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).
Substratum	7 to 48 inches thick; yellowish brown; friable; loamy sand or sandy loam; 10 to 45 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—ash and pumice overlying granitic or gneissic residuum
Drainage class—well to somewhat excessively drained
Typical landform—nearly level to very steep non-glaciated valley sideslopes. Slopes range from 5 to 90 percent, but most are between 40 and 70 percent.
Depth to bedrock—20 to 108 inches
Natural stability—IV
Erosion hazard—very high
Compaction hazard—low to moderate
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

In many places this landtype has a thin very fine ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted this is no longer a problem.

Ash and pumice are highly erosive by both wind and water.

Engineering

Ash and pumice materials have fair bearing strength when confined. They have a very low angle of repose and once disturbed they are difficult to stabilize.

Unsurfaced roads in pumice materials are very dusty when dry, but are not slippery or sticky when wet.

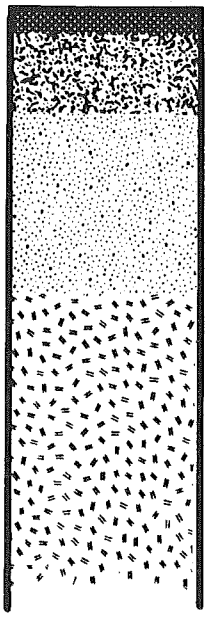
Lateral water movement in the ash and pumice material is very common, often resulting in piping in road cuts.

MAPPING UNIT 85

Mapping Unit 85 consists dominantly of landtype 85 and minor amounts of landtype 62.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pine-Douglas fir plant community. (See Appendix for definition)

SOIL PROFILE



Duff — 0 to ½ inch thick; needles, leaves and twigs.

Surface Soil — ½ to 6 inches thick; very dark grayish brown; very friable; sandy loam, or loamy sand; 0 to 20 percent gravel.

Subsoil — 4 to 40 inches thick; dark brown; very friable; sandy loam, loam, or silt loam; 10 to 35 percent gravel.

Bedrock — Many feet thick

Soil Characteristics

Parent material—schist
Drainage class—well to moderately well drained
Typical landform—non-glaciated valley sideslopes and ridge tops. Slopes range from 35 to 80 percent; most are between 45 and 65 percent.
Depth to bedrock—10 to 40 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.13 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

This soil has a low to moderate water storage capacity.

This landtype is subject to mass failures.

In some places this landtype has a thin very fine ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

Engineering

The physical properties can change drastically over short distances, but as a general rule the bedrock is weak.

This material has moderate to high shrink swell properties, and unsurfaced roads are slippery when wet.

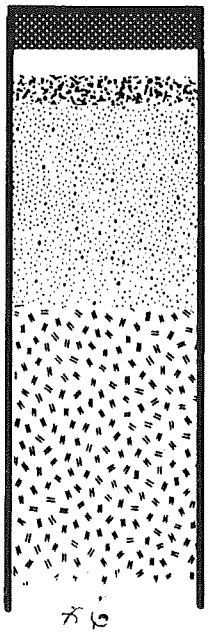
In most places this rock type is rippable.

MAPPING UNIT 86

Mapping Unit 86 consists dominantly of landtype 86 and minor amounts of landtype 63.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See Appendix for definition)

SOIL PROFILE



Duff	½ to 3 inches thick; needles, leaves and twigs.
Surface Soil	0 to 1½ inches thick; grayish brown; very friable; loamy sand.
	0 to 1½ inches thick; very dark grayish brown; very friable; sandy loam, or loamy sand; 0 to 20 percent gravel.
Subsoil	10 to 40 inches thick; dark brown; very friable; sandy loam, loam or silt loam; 10 to 35 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—schist
Drainage class—well to moderately well
Typical landform—non-glaciated valley sideslopes and ridgetops. Slopes range from 35 to 80 percent; most are between 45 and 65 percent.
Depth to bedrock—10 to 40 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.13 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

This soil has a low to moderate water storage capacity.

This landtype is subject to mass failures.

In some places this landtype has a thin very fine ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

Engineering

The physical properties can change drastically over short distances, but as a general rule the bedrock is weak.

This material has moderate to high shrink swell properties, and unsurfaced roads are slippery when wet.

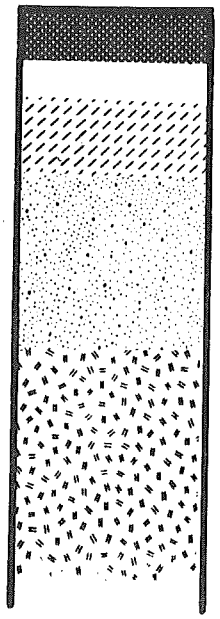
In most places this rock type is rippable.

MAPPING UNIT 87

Mapping Unit 87 consists dominantly of landtype 87 and minor amounts of landtype 64.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See Appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves, and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; loose; medium sand.
	0 to 10 inches thick; strong brown; friable; sandy loam, or loamy sand; 0 to 20 percent gravel.
Subsoil	10 to 40 inches thick; dark brown; very friable; sandy loam, loam, or silt loam; 10 to 35 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—schist
Drainage class—well to moderately well
Typical landform—nearly level to very steep non-glaciated valley sideslopes and ridgetops. Slopes range from 0 to 80 percent; most are between 35 and 65 percent.
Depth to bedrock—10 to 40 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.13 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

This soil has a low to moderate water storage capacity.

This landtype is subject to mass failures.

In some places this landtype has a thin very fine ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

Engineering

The physical properties can change drastically over short distances, but as a general rule the bedrock is weak.

This material has moderate to high shrink swell properties, and unsurfaced roads are slippery when wet.

In most places this rock type is rippable.

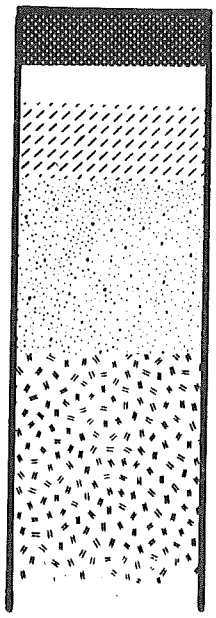
MAPPING UNIT 88

Mapping Unit 88 consists dominantly of landtype 88 and minor amounts of landtype 65.

This landtype ranges in elevation from 5000 to 6000 feet and supports a subalpine plant community. (See Appendix for definition)

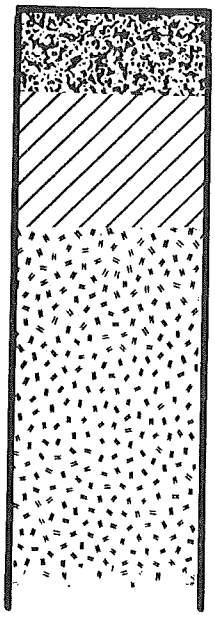
SOIL PROFILES

Timbered Soil



Duff	1 to 4 inches thick; needles, leaves and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; loose; medium sand.
	0 to 6 inches thick; strong brown; friable; sandy loam, or loamy sand; 0 to 20 percent gravel.
Subsoil	10 to 40 inches thick; dark brown; very friable; sandy loam, loam, or silt loam; 10 to 35 percent gravel.
Bedrock	Many feet thick

Meadow Soil



Surface Soil	2 to 10 inches thick; very dark grayish brown; very friable; loam, or silt loam.
Subsoil	8 to 38 inches thick; dark brown; very friable; loam or silt loam; 0 to 25 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—schist
Drainage class—well to moderately well
Typical landform—non-glaciated valley sideslopes and ridgetops. Slopes range from 5 to 80 percent; most are between 35 and 65 percent.
Depth to bedrock—10 to 40 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.13 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

This soil has a low to moderate water storage capacity.

This landtype is subject to mass failures.

In some places this landtype has a thin very fine ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

Engineering

The physical properties can change drastically over short distances, but as a general rule the bedrock is weak.

This material has moderate to high shrink swell properties, and unsurfaced roads are slippery when wet.

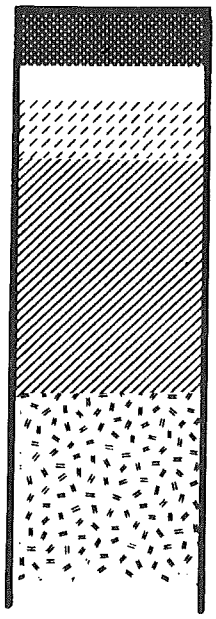
In most places this rock type is rippable.

MAPPING UNIT 95

Mapping Unit 95 consists dominantly of landtype 95 and minor amounts of landtypes 64, and 87.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves, and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; loose; medium sand.
	0 to 8 inches thick; strong brown; friable; sandy loam, or loamy sand; 0 to 20 percent gravel.
Subsoil	10 to 40 inches thick; dark brown; very friable, silt loam, or loam; 10 to 35 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—schist
Drainage class—moderately well to poorly drained
Typical landform—steep and very steep non-glaciated valley sideslopes and ridgetops. Slopes range from 35 to 85 percent; most are between 40 and 65 percent.
Depth of bedrock—10 to 40 inches
Natural stability—IV
Erosion hazard—very high
Compaction hazard—very high
Available water holding capacity—0.13 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—C
This soil has a moderate water storage capacity.
This landtype is unstable and is a potential source of silt and sediment causing stream pollution.

Engineering

This landtype is unstable and even in the undisturbed state slumps and other soil failures have occurred. In most cases, road construction will tend to accelerate slumping; therefore, special techniques are necessary to minimize soil losses.

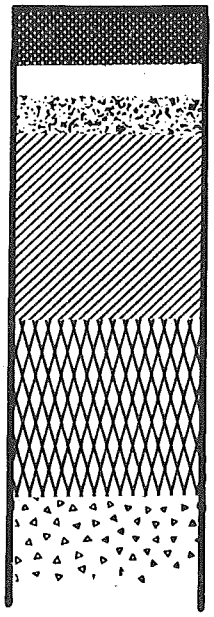
These materials have a high shrink swell and they become slippery when wet.

MAPPING UNIT 102

Mapping Unit 102 consists dominantly of landtype 102 and minor amounts of landtypes 106, 213, some soils less than 20 inches deep, and some exposed bedrock.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to 3 inches thick; needles, leaves, and twigs.
Surface Soil	0 to 1½ inches thick; grayish brown; loose; loamy sand.
	0 to 1½ inches thick; very dark grayish brown; very friable; loam, or sandy loam; 0 to 15 percent gravel.
Subsoil	10 to 30 inches thick; brown; friable; silt loam, loam, or sandy loam; 5 to 25 percent gravel.
Substratum	0 to 60 inches thick; grayish brown; silty clay loam, or clay loam; 0 to 20 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—pyroclastic bedrock
Drainage class—well and moderately well drained
Typical landform—nearly level to steep non-glaciated valley bottom, toe slopes and ridge tops. Slopes range from 0 to 40 percent; most are between 5 and 30 percent.
Depth to bedrock—20 to 70 plus inches
Natural stability—II
Erosion hazard—moderate
Compaction hazard—high
Available water holding capacity—0.13 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B
This landtype has moderate to high water storage capacity.

These soils are generally easy to revegetate, but are subject to frost heave.

In some places there is a thin very fine ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

Engineering

This material has weak structural qualities. There is a wide range in the engineering properties, so on-site investigations are needed.

Unsurfaced roads become slippery and are easily rutted when wet.

This material has moderate to high shrink swell.

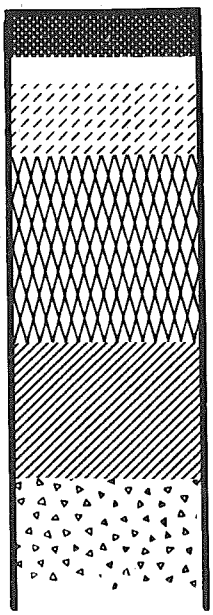
In most places the bedrock is rippable.

MAPPING UNIT 103

Mapping Unit 103 consists dominantly of landtype 103 and minor amounts of landtypes 107, 214, some soils less than 20 inches deep and some exposed bedrock.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves, and twigs.
Surface Soil	2 mm to 3 inches thick; light brownish gray; loose; medium sand, or loamy sand. 0 to 8 inches thick; strong brown; firm; silt loam, loam, or sandy loam; 0 to 15 percent gravel.
Subsoil	0 to 30 inches thick; brown; firm; silty clay loam, or clay loam; 5 to 25 percent gravel.
Substratum	10 to 60 plus inches thick; grayish brown; friable; silt loam, or loam; 0 to 20 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—pyroclastic bedrock
Drainage class—well and moderately well drained
Typical landform—nearly level to steep non-glaciated valley bottoms, toe slopes and ridge tops. Slopes range from 0 to 40 percent; most are between 5 and 30 percent.
Depth to bedrock—20 to 70 plus inches
Natural stability—II
Erosion hazard—moderate
Compaction hazard—high
Available water holding capacity—0.13 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B
This landtype has moderate to high water storage capacity.

These soils are generally easy to revegetate, but are subject to frost heave.

In some places there is a thin very fine ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

Engineering

This material has weak structural qualities. There is a wide range in the engineering properties, so on-site investigations are needed.

Unsurfaced roads become slippery and are easily rutted when wet.

This material has moderate to high shrink swell.

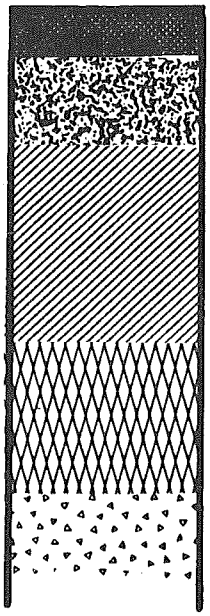
In most places the bedrock is rippable.

MAPPING UNIT 105

Mapping Unit 105 consists dominantly of landtype 105 and minor amounts of landtype 217, some soils less than 20 inches deep, and some exposed bedrock.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pine-Douglas-fir plant community. (See appendix for definition)

SOIL PROFILE



Duff	½ to 2½ inches thick; needles, leaves, and twigs.
Surface Soil	½ to 6 inches thick; very dark grayish brown; very friable loam, or sandy loam; 0 to 15 percent gravel.
Subsoil	10 to 30 inches thick; brown; friable; silt loam, loam, or sandy loam; 5 to 25 percent gravel.
Substratum	10 to 60 plus inches thick; light olive brown; firm; clay loam, or silty clay loam; 0 to 20 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—pyroclastic bedrock
Drainage class—well to mdoerately well drained
Typical landform—nearly level to very steep non-glaciated valley sideslopes. Slopes range from 0 to 80 percent, but most are between 30 and 65 percent.
Depth of bedrock—20 to 70 plus inches
Natural stability—III
Erosion hazard—moderate to high
Compaction hazard—high
Available water holding capacity—0.13 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B
This landtype has moderate to high water storage capacity.
These soils are generally easy to revegetate but are subject to frost heave.

In some places there is a thin very fine ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

Engineering

This material has weak structural qualities. There is a wide range in the engineering properties, so on-site investigations are needed.

Unsurfaced roads become slippery and are easily rutted when wet.

This material has moderate to high shrink swell.

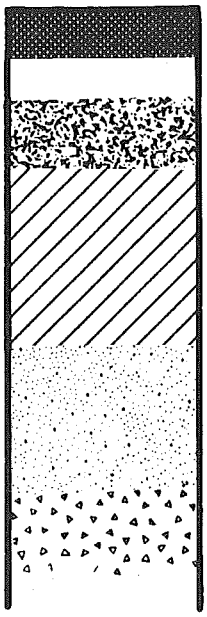
In most places the bedrock is rippable.

MAPPING UNIT 106

Mapping Unit 106 consists dominantly of landtype 106 and minor amounts of landtypes 102, 218, some soils less than 20 inches deep, and some exposed bedrock.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to 3 inches thick; needles, leaves, and twigs.
Surface Soil	0 to 1½ inches thick; grayish brown; loose; loamy sand.
	0 to 1½ inches thick; very dark grayish brown; very friable; loam, or sandy loam; 0 to 15 percent gravel.
Subsoil	5 to 30 inches thick; brown; friable; loam, or silt loam; 5 to 25 percent gravel.
Substratum	0 to 60 inches thick; grayish brown; friable; sandy loam, or loam; 0 to 20 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—pyroclastic bedrock
Drainage class—well to moderately well drained
Typical landform—steep and very steep non-glaciated valley sideslopes. Slopes range from 40 to 80 percent, most are between 45 and 65 percent.
Depth to bedrock—20 to 70 plus inches
Natural stability—III
Erosion hazard—moderate to high
Compaction hazard—high
Available water holding capacity—0.13 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

This landtype has moderate to high water storage capacity. These soils are generally easy to revegetate but are subject to frost heave.

In some places, there is a thin very fine ash layer on the surface that can cause a hydromorphic effect on

initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened, this is no longer a problem.

In some places, there may be slopes that have 4 to 9 drainge dissections per mile; however, most slopes have less than 4 per mile.

Engineering

This material has weak structural qualities. There is a wide range in the engineering properties, so on-site investigations are needed.

Unsurfaced roads become slippery and are easily rutted when wet. This material has moderate to high shrink swell. In most places, the bedrock is rippable.

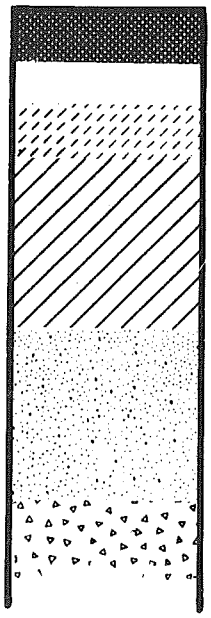
There are a few areas that have 4 to 9 drainage dissections per mile, and in these highly dissected areas there will be problems with road alignment, increased construction costs, and higher risk factor for soil erosion both during and after road construction.

MAPPING UNIT 107

Mapping Unit 107 consists dominantly of landtype 107 and minor amounts of landtypes 103, 219, some soils less than 20 inches deep, and some exposed bedrock.

This landtype ranges in elevation from 3000 to 6500 feet and supports a mixed conifer plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves and twigs.
Surface Soil	2 mm to 3 inches thick; light brownish gray; loose; loamy sand.
	0 to 6 inches thick; strong brown; firm; silt loam, or loam.
Subsoil	5 to 20 inches thick; brown; friable; loam, or silt loam; 5 to 25 percent gravel.
Substratum	10 to 60 inches thick; light olive brown; friable; sandy loam, or loam; 0 to 20 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—pyroclastic bedrock
Drainage class—well to moderately well drained
Typical landform—steep to very steep non-glaciated valley sideslopes. Slopes range from 40 to 80 percent, most are between 45 and 65 percent.
Depth to bedrock—20 to 70 plus inches
Natural stability—III
Erosion hazard—moderate to high
Compaction hazard—high
Available water holding capacity—0.13 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

This landtype has moderate to high water storage capacity. These soils are generally easy to revegetate, but are subject to frost heave.

In some places, there is a thin very fine ash layer on the surface that can cause a hydromorphic effect on

initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened, this is no longer a problem.

Engineering

This material has weak structural qualities. There is a wide range in the engineering properties, so on-site investigations are needed. Unsurfaced roads become slippery and are easily rutted when wet. This material has moderate to high shrink swell.

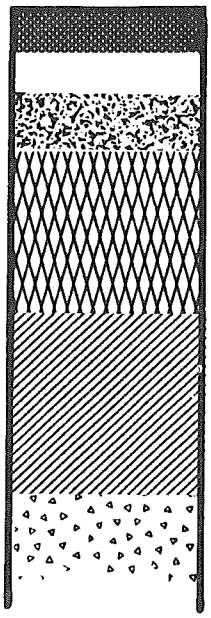
In most places, the bedrock is rippable.

MAPPING UNIT 110

Mapping Unit 110 consists dominantly of landtype 110 and minor amounts of landtypes 102 and 103.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to 3 inches thick; needles, leaves and twigs.
Surface Soil	0 to 1½ inches thick; grayish brown; loose; loamy sand. 0 to 1½ inches thick; very dark grayish brown; very friable; loam; 0 to 15 percent gravel.
Subsoil	4 to 28 inches thick; dark brown; firm; silty clay loam, or silt loam; 5 to 25 percent gravel.
Substratum	18 to 40 inches thick; grayish brown; firm; silt loam, loam or sandy loam; 10 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—pyroclastic bedrock
Drainage class—moderately well to poorly drained
Typical landform—nearly level to steep non-glaciated valley sideslopes and ridgetops. Slopes range from 0 to 35 percent, most are between 8 and 25 percent.*
Depth to bedrock—20 to 90 plus inches
Natural stability—IV
Erosion hazard—moderate to high
Compaction hazard—high to very high
Available water holding capacity—0.13 to 0.18 inches per inch

* Because of very small acreages, some map delineations in the ponderosa pine-Douglas fir plant community (see appendix for definition), were included in this unit.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—D
This landtype has a moderate to very high water storage capacity. Frost heave can be expected in open areas.

In some places, there is a thin very fine ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened, this is no longer a problem. These soils are generally easy to revegetate. They are characterized by hummocky topography and a complex slope pattern.

Engineering

This material is plastic, has high shrink swell, and is unstable when wet. Unsurfaced roads are easily rutted and are slippery.

The bedrock is rippable in most places.

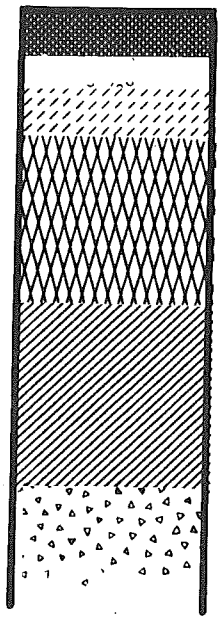
Mass failure is a problem in road construction.

MAPPING UNIT 111

Mapping Unit 111 consists dominantly of landtype 111 and minor amounts of landtypes 103 and 214.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves and twigs.
Surface Soil	2 mm to 3 inches thick; light brownish gray; loose; loamy sand.
Subsoil	0 to 8 inches thick; strong brown; firm; silt loam, or loam, 0 to 15 percent.
	4 to 30 inches thick; brown; firm; silty clay loam, or silt loam; 5 to 25 percent gravel.
Substratum	18 to 60 plus inches thick; grayish brown; firm; silt loam, or sandy loam; 10 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—pyroclastic bedrock
Drainage class—moderately well to poorly drained
Typical landform—nearly level to steep non-glaciated valley sideslopes and ridgetops. Slopes range from 0 to 35 percent, most are between 8 and 25 percent.
Depth to bedrock—20 to 90 plus inches
Natural stability—IV
Erosion hazard—moderate to high
Compaction hazard—high to very high
Available water holding capacity—0.13 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—D

This landtype has a moderate to very high water storage capacity. Frost heave can be expected in open areas.

In some places, there is a thin very fine ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened, this is no longer a problem.

These soils are generally easy to revegetate. They are characterized by hummocky topography and a complex slope pattern.

Engineering

This material is plastic, has high shrink swell, and is unstable when wet. Unsurfaced roads are easily rutted and are slippery.

The bedrock is rippable in most places.

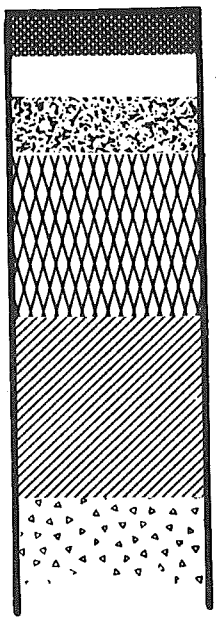
Mass failure is a problem in road construction.

MAPPING UNIT 114

Mapping Unit 114 consists dominantly of landtype 114 and minor amounts of landtypes 110 and 218.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to 3 inches thick; needles, leaves and twigs.
Surface Soil	0 to 1½ inches thick; grayish brown; loose; loamy sand. 0 to 1½ inches thick; very dark grayish brown; very friable; loam, or silt loam; 0 to 10 percent gravel.
Subsoil	4 to 28 inches thick; dark brown; firm; silty clay loam or silt loam; 5 to 25 percent gravel.
Substratum	18 to 40 inches thick; grayish brown; firm; silt loam, loam or sandy loam; 10 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—pyroclastic bedrock
Drainage class—moderately well to poorly drained
Typical landform—steep and very steep non-glaciated valley sideslopes. Slopes range from 35 to 80 percent, most are between 35 and 60 percent.*
Depth to bedrock—20 to 90 plus inches
Natural stability—V
Erosion hazard—very high
Compaction hazard—high
Available water holding capacity—0.13 to 0.18 inches per inch

* Because of very small acreages, some map delineations in the ponderosa pine-Douglas fir plant community (See appendix for definition), were included in this unit.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—D

Frost heave can be expected in open areas. In some places, there is a thin very fine ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened this is no longer a problem.

These soils are generally easy to revegetate. They are characterized by hummocky topography and a complex slope patter.

Engineering

The material is plastic, has high shrink swell, and is unstable when wet. Unsurfaced roads are easily rutted and are slippery.

The bedrock is rippable in most places.

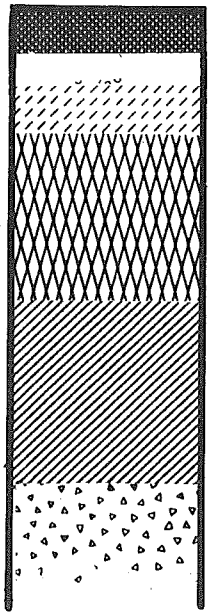
Mass failure is a problem in road construction.

MAPPING UNIT 115

Mapping Unit 115 consists dominantly of landtype 115 and minor amount of landtype 107.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves and twigs.
Surface Soil	2 mm to 3 inches thick; light brownish gray; loose; loamy sand.
Subsoil	0 to 8 inches thick; strong brown; firm; silt loam, or loam; 0 to 10 percent gravel.
	4 to 30 inches thick; brown; firm; silty clay loam, or silt loam; 5 to 25 percent gravel.
Substratum	10 to 60 inches thick; grayish brown; firm; silt loam, loam, or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—pyroclastic bedrock
Drainage class—moderately well to poorly drained
Typical landform—steep to very steep non-glaciated valley sideslopes. Slopes range from 35 to 80 percent, most are between 35 and 60 percent.
Depth to bedrock—20 to 90 inches
Natural stability—V
Erosion hazard—very high
Compaction hazard—high
Available water holding capacity—0.13 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—D

This landtype has a moderate to very high water storage capacity. Frost heave can be expected in open areas.

In some places, there is a thin very fine ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened, this is no longer a problem.

These soils are generally easy to revegetate. They are characterized by hummocky topography and a complex slope pattern.

Engineering

The material is plastic, has high shrink swell, and is unstable when wet. Unsurfaced roads are easily rutted and are slippery.

The bedrock is rippable in most places.

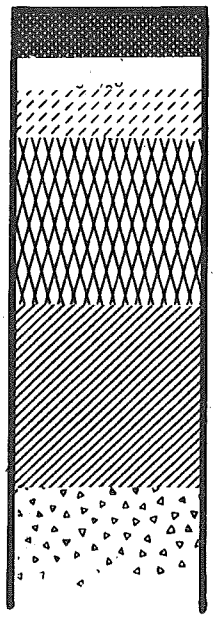
Mass failure is a problem in road construction.

MAPPING UNIT 119

Mapping Unit 119 consists dominantly of landtype 119 and minor amounts of landtypes 103, 107, 115, and some soils less than 20 inches deep.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves and twigs.
Surface Soil	2 mm to 3 inches thick; light brownish gray; loose; loamy sand.
Subsoil	0 to 8 inches thick; strong brown; firm; silt loam, or loam; 0 to 10 percent gravel.
	4 to 30 inches thick; brown; firm; silty clay loam, or silt loam; 0 to 25 percent gravel.
Substratum	10 to 60 inches thick; grayish brown; firm; silt loam, loam, or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—pyroclastic bedrock
Drainage class—well to moderately well drained
Typical landform—highly dissected steep and very steep non-glaciated valley sideslopes (4 to 9 drainages per mile). Slopes range from 40 to 90 percent, most are between 60 and 80 percent.
Depth to bedrock—20 to 90 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.13 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B
This landtype has moderate to high water storage capacity. Frost heave can be expected in open areas. These soils are generally easy to revegetate.

In some places, there is a thin very fine ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened, this is no longer a problem.

Engineering

This material generally has weak structural qualities. There is a wide range in the engineering properties, so on-site investigations are needed. Unsurfaced roads are slippery, and are easily rutted when wet. This material has moderate to high shrink swell.

In most places, the bedrock is rippable. The highly dissected landform (4 to 9 drainages per mile) adversely affects road alignment, substantially adds to road construction costs and greatly increases the risk of soil (construction sites) being eroded into streams and rivers.

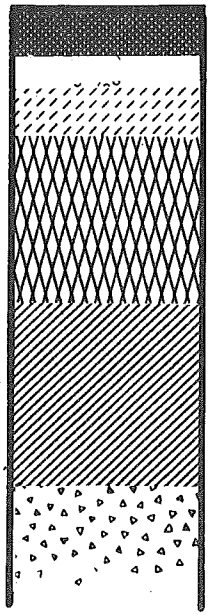
MAPPING UNIT 120

Mapping Unit 120 consists dominantly of landtype 120 and minor amounts of some soils less than 20 inches deep, and some areas that have gentle slopes and have less than four drainage dissections per mile.

This landtype ranges in elevation from 4500 to 6000 feet and supports a sub-alpine plant community. (See appendix for definition)

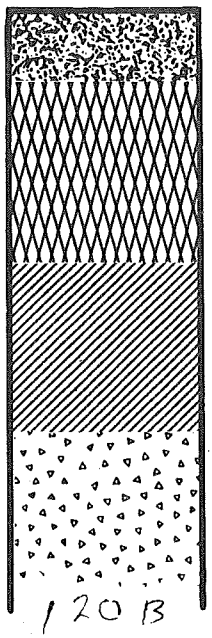
SOIL PROFILES

Timbered Soil



Duff	1 to 4 inches thick; needles, leaves and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; loose; loamy sand.
Subsoil	0 to 6 inches thick; strong brown; firm; loam, or silt loam; 0 to 10 percent gravel.
	4 to 30 inches thick; brown; firm; silty clay loam, or silt loam; 0 to 25 percent gravel.
Substratum	10 to 60 inches thick; grayish brown; firm; silt loam, loam, or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Meadow Soil



Surface soil	2 to 10 inches thick; very dark grayish brown; very friable; loam, or silt loam; 0 to 10 percent gravel.
Subsoil	5 to 20 inches thick; dark brown; firm; silty clay loam, or silt loam; 0 to 25 percent gravel.
Substratum	10 to 70 inches thick; grayish brown; firm; silt loam, loam, or sandy loam; 0 to 30 percent slopes.
Bedrock	Many feet thick

Soil Characteristics

Parent material—pyroclastic bedrock
Drainage class—well to moderately well drained
Typical landform—highly dissected sloping to very steep non-glaciated valley sideslopes (4 to 9 drainages per mile). Slopes range from 10 to 90 percent, most are between 60 and 80 percent.
Depth to bedrock—20 to 90 percent
Natural stability—III
Erosion hazard—moderate to high
Compaction hazard—high
Available water holding capacity—0.13 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations.

Watershed

Hydrologic group—B

This landtype has moderate to high water storage capacity. Frost heave can be expected in open areas. These soils are generally easy to revegetate.

In some places, there is a thin, very fine ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly moistened, this is no longer a problem.

Engineering

This material generally has weak structural qualities. There is a wide range in the engineering properties, so on-site investigations are needed. Unsurfaced roads are slippery, and are easily rutted when wet. This material has moderate to high shrink swell.

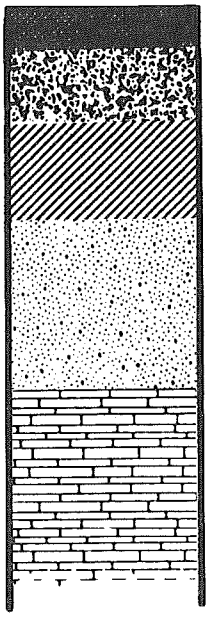
In most places, the bedrock is rippable. The highly dissected landform (4 to 9 drainages per mile) adversely affects road alignment, substantially adds to road construction costs, and greatly increases the risk of soil (construction sites) being eroded into streams and rivers.

MAPPING UNIT 132

Mapping Unit 132 consists dominantly of landtype 132 and minor amounts of landtype 137.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pine-Douglas fir plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to 1 inch thick; needles; leaves and twigs.
Surface Soil	½ to 6 inches thick; very dark grayish brown; friable; loam, or sandy loam; 0 to 15 percent gravel.
Subsoil	0 to 20 inches thick; dark yellowish brown; firm; sandy clay loam, or clay loam; 0 to 10 percent gravel;
Substratum	15 to 40 inches thick; yellowish brown; friable; sandy loam, or loam; 0 to 20 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—swauk sandstone
Drainage class—well
Typical landform—nearly level to steep non-glaciated valley sideslopes and ridgetops. Slopes range from 0 to 35 percent; most are between 5 and 25 percent.
Depth to bedrock—15 to 40 inches
Natural stability—II
Erosion hazard—moderate
Compaction hazard—high
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B
This soil has a low to moderate water storage capacity
Soils on the dip slope have more overland flow, hence more sheet and rill erosion than do soils on the scarp face.

These soils occur in a zone that gets one or more "Chinooks" per year, creating a high risk for soil erosion. Summer high intensity rainstorms also cause a high risk for soil erosion.

Engineering

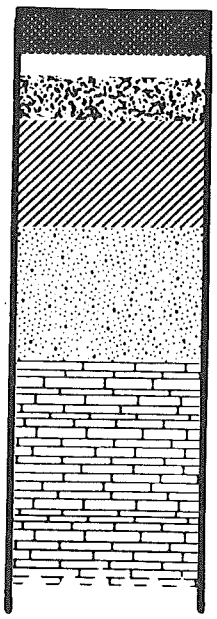
Bedrock is soft to moderately hard. The dip slopes are particularly sensitive to mass failures.
Exposed subsoil and substratum materials are difficult to revegetate, and are highly erosive.
This material is subject to frost heave and becomes sticky and plastic when wet.
Unsurfaced roads are dusty when dry and slippery when wet.

MAPPING UNIT 133

Mapping Unit 133 consists dominantly of landtype 133 and minor amounts of landtype 138.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff	½ to 2½ inches thick; needles, leaves and twigs.
Surface Soil	0 to 1½ inches thick; grayish brown; loose; loamy sand or medium sand.
Subsoil	0 to 1½ inches thick; very dark grayish brown; very friable; sandy loam, or loam; 0 to 10 percent gravel. 0 to 24 inches thick; dark yellowish brown; firm; sandy clay loam, or clay loam; 0 to 15 percent gravel.
Substratum	15 to 36 inches thick; yellowish brown; friable; sandy loam, or loam; 0 to 20 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—swauk sandstone
Drainage Class—well
Typical landform—nearly level to steep non-glaciated valley sideslopes and ridgetops. Slopes range from 0 to 35 percent; most are between 5 and 25 percent.
Depth to bedrock—15 to 48 inches
Natural stability—II
Erosion hazard—moderate
Compaction hazard—high
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

This soil has a low to moderate water storage capacity.

Soils on the dip slope have more overland flow, hence more sheet and rill erosion than do soils on the scarp face.

These soils occur in a zone that gets one or more "Chinooks" per year, creating a high risk for soil erosion. Summer high intensity rainstorms also cause a high risk for soil erosion.

Engineering

Bedrock is soft to moderately hard. The dip slopes are particularly sensitive to mass failures.
Exposed subsoil and substratum materials are difficult to revegetate and are highly erosive.
This material is subject to frost heave and becomes sticky and plastic when wet.
Unsurfaced roads are dusty when dry and slippery when wet.

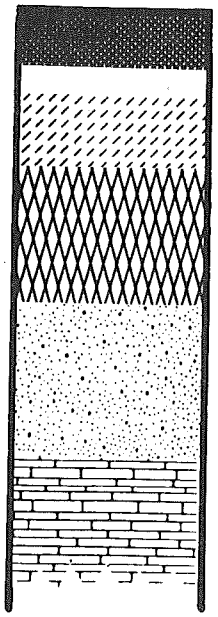
MAPPING UNIT 135

Mapping Unit 135 consists dominantly of landtype 135 and minor amounts of rock outcrops. Also in some places there are more than four drainage dissections per mile.

This landtype ranges in elevation from 5000 to 6000 feet and supports a sub-alpine plant community. (See appendix for definition)

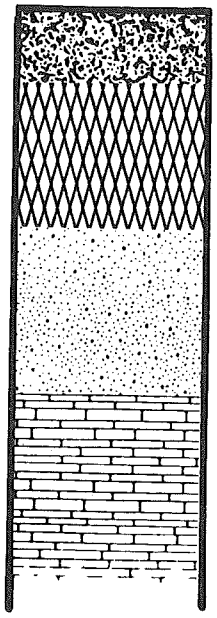
SOIL PROFILES

Timbered Soil



Duff	1 to 4 inches thick; needles, leaves and twigs
Surface Soil	2mm to 3 inches thick; light gray; loose; medium sand.
Subsoil	0 to 6 inches thick; strong brown; firm; loam, or sandy loam; 0 to 10 percent gravel.
	0 to 24 inches thick; dark yellowish brown; firm; sandy clay loam, or clay loam; 0 to 15 percent gravel.
Substratum	10 to 30 inches thick; yellowish brown; friable; sandy loam, or loam; 0 to 20 percent gravel.
Bedrock	Many feet thick

Meadow Soil



Surface Soil	2 to 10 inches thick; very dark grayish brown; friable; loam, or sandy loam; 0 to 10 percent gravel.
Subsoil	0 to 24 inches thick; dark yellowish brown; firm; sandy clay loam or clay loam; 0 to 15 percent gravel.
Substratum	10 to 30 inches thick; yellowish brown; friable; sandy loam, or loam; 0 to 20 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—swauk sandstone
Drainage class—well to moderately well drained
Typical landform—nearly level to very steep non-glaciated valley sideslopes and ridgetops. Slopes range from 0 to 80 percent; most are between 10 and 35 percent.
Depth to bedrock—15 to 36 inches
Natural stability—II
Erosion hazard—moderate to high
Compaction hazard—high
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

This soil has a low to moderate water storage capacity.

Soils on the dip slope have more overland flow, hence more sheet and rill erosion than do soils on the scarp face.

These soils occur in a zone that gets one or more "Chinooks" per year creating a high risk for soil erosion. Summer high intensity rainstorms also cause a high risk for soil erosion.

Engineering

Bedrock is soft to moderately hard. The dip slopes are particularly sensitive to mass failures.

Exposed subsoil and substratum materials are difficult to revegetate and are highly erosive.

This material is subject to frost heave and becomes sticky and plastic when wet.

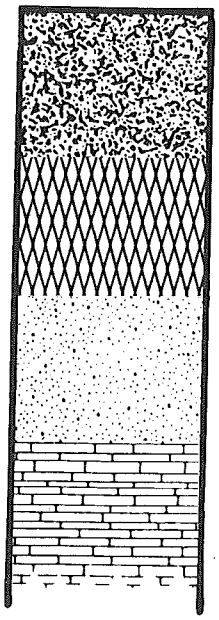
Unsurfaced roads are dusty when dry and slippery when wet.

MAPPING UNIT 136g

Mapping Unit 136g consists dominantly of landtype 136g and minor amounts of rock outcrops.

This landtype ranges in elevation from 740 to 3800 feet and supports a bunchgrass plant community. (See appendix for definition)

SOIL PROFILE



Surface Soil	2 to 12 inches thick; very dark grayish brown or dark brown; very friable; sandy loam, or loam; 0 to 10 percent gravel.
Subsoil	0 to 30 inches thick; dark yellowish brown; firm; sandy clay loam, or clay loam; 0 to 15 percent gravel.
Substratum	10 to 36 inches thick; yellowish brown; friable; sandy loam, or loam; 0 to 20 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—swauk sandstone
Drainage class—well to somewhat excessively drained
Typical landform—nearly level to very steep non-glaciated valley sideslopes and ridgetops. Slopes range from 5 to 95 percent; most are between 35 and 75 percent.
Depth to bedrock—15 to 40 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B
This soil has a low to moderate water storage capacity.
Soils on the dip slope have more overland flow, hence more sheet and rill erosion than do soils on the scarp face.

These soils occur in a zone that gets one or more "Chinooks" per year, creating a high risk for soil erosion. Summer high intensity rainstorms also cause a high risk for soil erosion.

Engineering

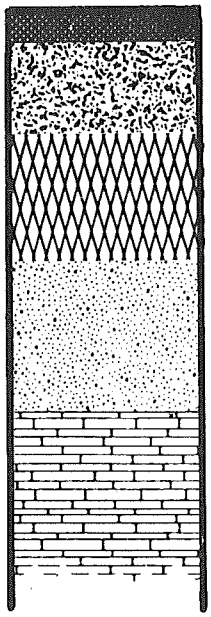
Bedrock is soft to moderately hard. The dip slopes are particularly sensitive to mass failures.
Exposed subsoil and substratum materials are difficult to revegetate and are highly erosive.
This material is subject to frost heave and becomes sticky and plastic when wet.
Unsurfaced roads are dusty when dry and slippery when wet.

MAPPING UNIT 136

Mapping Unit 136 consists dominantly of landtype 136 and minor amounts of rock outcrops.

This landtype ranges in elevation from 1000 to 3500 feet and supports a bunchgrass-ponderosa pine plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to ½ inch thick; needles, leaves and twigs
Surface Soil	2 to 8 inches thick; dark brown; very friable; sandy loam, or loam; 0 to 10 percent gravel.
Subsoil	0 to 30 inches thick; dark yellowish brown; firm; sandy clay loam, or clay loam; 0 to 15 percent gravel.
Substratum	10 to 36 inches thick; yellowish brown; friable; sandy loam, or loam; 0 to 20 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—swauk sandstone
Drainage class—well to somewhat excessively drained
Typical landform—nearly level to very steep non-glaciated valley sideslopes and ridgetops. Slopes range from 5 to 95 percent; most are between 35 and 75 percent.
Depth to bedrock—15 to 40 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B
This soil has a low to moderate water storage capacity.
Soils on the dip slope have more overland flow, hence more sheet and rill erosion than do soils on the scarp face.

These soils occur in a zone that gets one or more "Chinooks" per year, creating a high risk for soil erosion. Summer high intensity rainstorms also cause a high risk for soil erosion.

Engineering

Bedrock is soft to moderately hard. The dip slopes are particularly sensitive to mass failures.

Exposed subsoil and substratum materials are difficult to revegetate, and are highly erosive.

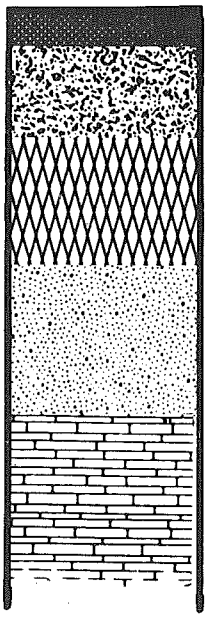
This material is subject to frost heave and becomes sticky and plastic when wet. Unsurfaced roads are dusty when dry and slippery when wet.

MAPPING UNIT 137

Mapping Unit 137 consists dominantly of landtype 137 and minor amounts of landtype 132.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pine-Douglas fir plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to 1 inch thick; needles, leaves, and twigs.
Surface Soil	½ to 6 inches thick; very dark grayish brown; very friable; loam or sandy loam; 0 to 10 percent gravel.
Subsoil	0 to 20 inches thick; dark yellowish brown; firm; sandy clay loam, or clay loam; 0 to 15 percent gravel.
Substratum	10 to 40 inches thick; yellowish brown; friable; sandy loam, or loam; 0 to 25 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—swauk sandstone
Drainage class—well to somewhat excessively drained
Typical landform—steep and very steep non-glaciated valley sideslopes. Slopes range from 40 to 85 percent, most are between 45 and 70 percent.
Depth to bedrock—15 to 40 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

This soil has a low to moderate water storage capacity.

Soils on the dip slope have more overland flow, hence more sheet and rill erosion than do soils on the scarp face.

These soils occur in a zone that gets one or more "Chinooks" per year, creating a high risk for soil erosion. Summer high intensity rainstorms also cause a high risk for soil erosion.

Engineering

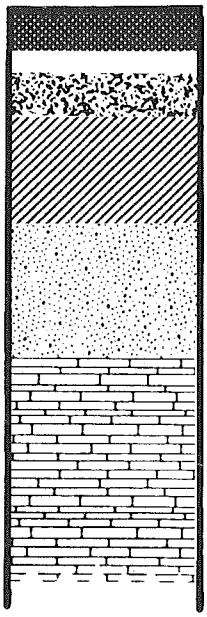
Bedrock is soft to moderately hard. The dip slopes are particularly sensitive to mass failures.
Exposed subsoil and substratum materials are difficult to revegetate and are highly erosive.
This material is subject to frost heave and becomes sticky and plastic when wet.
Unsurfaced roads are dusty when dry and slippery when wet.

MAPPING UNIT 138

Mapping Unit 138 consists dominantly of landtype 138 and minor amounts of landtype 133. Also included are a few areas less than 15 inches deep to bedrock.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff	½ to 2½ inches thick; needles, leaves, twigs.
Surface Soil	0 to 1½ inches thick; grayish brown; loose; loamy sand.
	0 to 1½ inches thick; very dark grayish brown; very friable; sandy loam, or loam; 0 to 10 percent gravel.
Subsoil	0 to 24 inches thick; dark yellowish brown; friable; sandy clay loam, or clay loam; 0 to 15 percent gravel.
Substratum	10 to 36 inches thick; yellowish brown; friable; sandy loam, or loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—swauk sandstone
Drainage class—well to somewhat excessively drained
Typical landform—steep and very steep non-glaciated valley sideslopes. Slopes range from 35 to 85 percent; most are between 40 and 70 percent.
Depth to bedrock—15 to 40 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

This soil has a low to moderate water storage capacity.

Soils on the dip slope have more overland flow, hence more sheet and rill erosion than do soils on the scarp face.

These soils occur in a zone that gets one or more "Chinooks" per year, creating a high risk for soil erosion. Summer high intensity rainstorms also cause a high risk for soil erosion.

Engineering

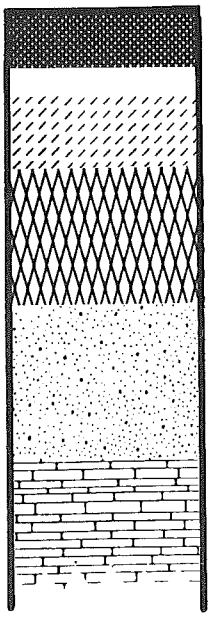
Bedrock is soft to moderately hard. The dip slopes are particularly sensitive to mass failures.
Exposed subsoil and substratum materials are difficult to revegetate and are highly erosive.
This material is subject to frost heave and becomes sticky and plastic when wet.
Unsurfaced roads are dusty when dry and slippery when wet.

MAPPING UNIT 139

Mapping Unit 139 consists dominantly of landtype 139 and minor amounts of rock outcrops.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves, and twigs.
Surface Soil	2 mm to 3 inches thick; light brownish gray; loose; loamy sand or medium sand.
	0 to 8 inches thick; strong brown; firm; loam or sandy loam; 0 to 10 percent gravel.
Subsoil	0 to 20 inches thick; dark yellowish brown; friable; loam, or clay loam; 0 to 20 percent gravel.
Substratum	10 to 40 inches thick; yellowish brown; friable; sandy loam, or loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—swauk sandstone
Drainage class—well to somewhat excessively drained
Typical landform—nearly level to very steep non-glaciated valley sideslopes and ridgetops. Slopes range from 5 to 85 percent; most are between 35 and 70 percent.
Depth to bedrock—15 to 40 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B
This soil has a low to moderate water storage capacity.

Soils on the dip slope have more overland flow, hence more sheet and rill erosion than do soils on the scarp face.

These soils occur in a zone that gets one or more "Chinooks" per year, creating a high risk for soil erosion. Summer high intensity rainstorms also cause a high risk for soil erosion.

Engineering

Bedrock is soft to moderately hard. The dip slopes are particularly sensitive to mass failures.

Exposed subsoil and substratum materials are difficult to revegetate, and are highly erosive.

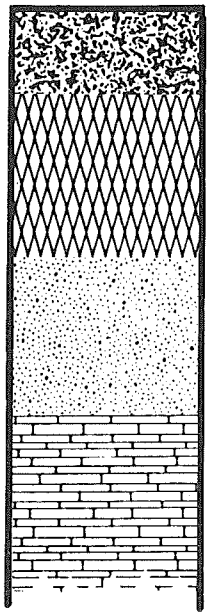
This material is subject to frost heave and becomes sticky and plastic when wet.

Unsurfaced roads are dusty when dry and slippery when wet.

MAPPING UNIT 141g

Mapping Unit 141g consists dominantly of landtype 141g and minor amounts of landtype 136g. This landtype ranges in elevation from 740 to 3800 feet and supports a bunchgrass plant community. (See appendix for definition)

SOIL PROFILE



Surface Soil	2 to 12 inches thick; very dark grayish brown; very friable; sandy loam, or loam; 0 to 10 percent gravel.
Subsoil	0 to 30 inches thick; dark yellowish brown; friable; sandy clay loam, or clay loam; 0 to 15 percent gravel.
Substratum	13 to 36 inches thick; yellowish brown; friable; sandy loam, or loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—swauk sandstone
Drainage class—well to somewhat excessively drained
Typical landform—highly dissected (4 to 9 drainage dissections per mile), non-glaciated valley sideslopes. Slopes range from 50 to 90 percent; most are between 65 and 75 percent.
Depth to bedrock—15 to 40 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

This soil has a low to moderate water storage capacity.

Soils on the dip slope have more overland flow, hence more sheet and rill erosion than do soils on the scarp face.

These soils occur in a zone that gets one or more "Chinooks" per year, creating a high risk for soil erosion. Summer high intensity rainstorms also cause a high risk for soil erosion.

Engineering

Bedrock is soft to moderately hard. The dip slopes are particularly sensitive to mass failures.

Exposed subsoil and substratum materials are difficult to revegetate and are highly erosive.

This material is subject to frost heave and becomes sticky and plastic when wet.

Unsurfaced roads are dusty when dry and slippery when wet.

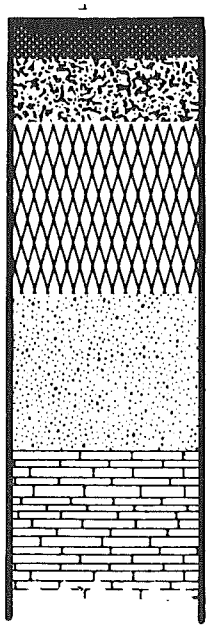
The highly dissected landform (4 to 9 drainage dissections per mile) adversely affects road alignment, substantially adds to road construction costs, and greatly increases the risk of soil from construction sites being eroded into streams and rivers.

MAPPING UNIT 141

Mapping Unit 141 consists dominantly of landtype 141 and minor amounts of landtype 136.

This landtype ranges in elevation from 1000 to 3500 feet and supports a bunchgrass-ponderosa pine plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to ½ inch thick; needles, leaves and twigs.
Surface Soil	2 to 8 inches thick; dark brown; very friable; sandy loam, or loam; 0 to 10 percent gravel.
Subsoil	0 to 30 inches thick; dark yellowish brown; friable; sandy clay loam, or clay loam; 0 to 20 percent gravel.
Substratum	13 to 36 inches thick; yellowish brown; friable; sandy loam, or loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—swauk sandstone
Drainage class—well to somewhat excessively drained
Typical landform—highly dissected (4 to 9 drainage dissections per mile), non-glaciated valley sideslopes. Slopes range from 50 to 90 percent; most are between 65 and 75 percent.

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B
This soil has a low to moderate water storage capacity.

Soils on the dip slope have more overland flow, hence more sheet and rill erosion than do soils on the scarp face.

These soils occur in a zone that gets one or more "Chinooks" per year, creating a high risk for soil erosion. Summer high intensity rainstorms also cause a high risk for soil erosion.

Engineering

Bedrock is soft to moderately hard. The dip slopes are particularly sensitive to mass failures.

Exposed subsoil and substratum materials are difficult to revegetate and are highly erosive.

This material is subject to frost heave and becomes sticky and plastic when wet.

Unsurfaced roads are dusty when dry and slippery when wet.

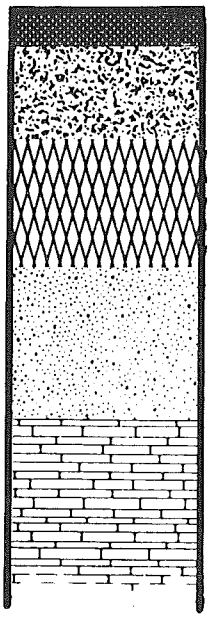
The highly dissected landform (4 to 9 drainage dissections per mile), adversely affects road alignment, substantially adds to road construction costs, and greatly increases the risk of soil from construction sites being eroded into streams and rivers.

MAPPING UNIT 142

Mapping Unit 142 consists dominantly of landtype 142 and minor amounts of landtype 137.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pine-Douglas-fir plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to 1 inch thick; needles, leaves and twigs.
Surface Soil	½ to 6 inches thick; very dark grayish brown; very friable; sandy loam or loam; 0 to 10 percent gravel.
Subsoil	0 to 20 inches thick; dark yellowish brown; friable; sandy clay loam, or clay loam; 0 to 20 percent gravel.
Substratum	15 to 40 inches thick; yellowish brown; friable; sandy loam, or loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—swauk sandstone
Drainage class—well to somewhat excessively drained
Typical landform—highly dissected (4 to 9 drainage dissections per mile), non-glaciated valley sideslopes. Slopes range from 50 to 90 percent; most are between 65 and 75 percent.
Depth to bedrock—15 to 40 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

This soil has a low to moderate water storage capacity.

Soils on the dip slope have more overland flow, hence more sheet and rill erosion than do soils on the scarp face.

These soils occur in a zone that gets one or more "Chinooks" per year, creating a high risk for soil erosion. Summer high intensity rainstorms also cause a high risk for soil erosion.

Engineering

Bedrock is soft to moderately hard. The dip slopes are particularly sensitive to mass failures.

Exposed subsoil and substratum materials are difficult to revegetate, and are highly erosive.

This material is subject to frost heave and becomes sticky and plastic when wet.

Unsurfaced roads are dusty when dry and slippery when wet.

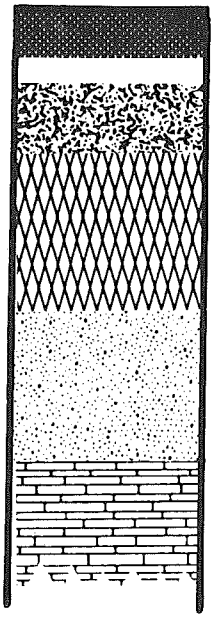
The highly dissected landform (4 to 9 drainage dissections per mile), adversely affects road alignments, substantially adds to road construction costs, and greatly increases the risk of soil from construction sites being eroded into streams and rivers.

MAPPING UNIT 143

Mapping Unit 143 consists dominantly of landtype 143 and minor amounts of landtype 138.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff	½ to 2½ inches thick; needles, leaves and twigs.
Surface Soil	0 to 1½ inches thick; grayish brown; loose; loamy sand.
	0 to 1½ inches thick; very dark grayish brown; very friable; sandy loam, or loam; 0 to 10 percent gravel.
Subsoil	0 to 24 inches thick; dark yellowish brown; friable; sandy clay loam, or clay loam; 0 to 20 percent gravel.
Substratum	15 to 36 inches thick; yellowish brown; friable; sandy loam, or loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—swauk sandstone
Drainage class—well to somewhat excessively drained
Typical landform—highly dissected (4 to 9 drainage dissection per mile), non-glaciated valley sideslopes. Slopes range from 50 to 90 percent; most are between 65 and 75 percent.
Depth to bedrock—15 to 40 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B
This soil has a low to moderate water storage capacity.

Soils on the dip slopes have more overland flow, hence more sheet and rill erosion than do soils on the scarp face.

These soils occur in a zone that gets one or more "Chinooks" per year, creating a high risk for soil erosion. Summer high intensity rainstorms also cause a high risk for soil erosion.

Engineering

Bedrock is soft to moderately hard. The dip slopes are particularly sensitive to mass failures.

Exposed subsoil and substratum materials are difficult to revegetate and are highly erosive.

This material is subject to frost heave and becomes sticky and plastic when wet.

Unsurfaced roads are dusty when dry and slippery when wet.

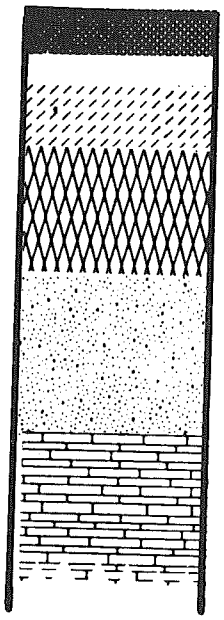
The highly dissected landform (4 to 9 drainage dissections per mile), adversely affects road alignment, substantially adds to road construction costs, and greatly increases the risk of soil from construction sites being eroded into streams and rivers.

MAPPING UNIT 144

Mapping Unit 144 consists dominantly of landtype 144 and minor amounts of landtype 139.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves and twigs.
Surface Soil	2 mm to 3 inches thick; light brownish gray; loose; loamy sand, or medium sand.
Subsoil	0 to 8 inches thick; strong brown; firm; loam, or sandy loam; 0 to 10 percent gravel. 0 to 20 inches thick; dark yellowish brown; friable; sandy clay loam, or clay loam; 0 to 20 percent gravel.
Substratum	0 to 40 inches thick; yellowish brown; friable; sandy loam, or loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—swauk sandstone
Drainage class—well to somewhat excessively drained
Typical landform—highly dissected (4 to 9 drainage dissections per mile), non-glaciated valley sideslopes. Slopes range from 50 to 90 percent; most are between 65 and 75 percent.
Depth to bedrock—15 to 40 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

This soil has a low to moderate water storage capacity.

Soils on the dip slope have more overland flow, hence more sheet and rill erosion than do soils on the scarp face.

These soils occur in a zone that gets one or more "Chinooks" per year, creating a high risk for soil erosion. Summer high intensity rainstorms also cause a high risk for soil erosion.

Engineering

Bedrock is soft to moderately hard. The dip slopes are particularly sensitive to mass failures.

Exposed subsoil and substratum materials are difficult to revegetate and are highly erosive.

This material is subject to frost heave and becomes sticky and plastic when wet.

Unsurfaced roads are dusty when dry and slippery when wet.

The highly dissected landform (4 to 9 drainage dissections per mile), adversely affects road alignment, substantially adds to road construction costs and greatly increases the risk of soil from construction sites being eroded into streams and rivers.

MAPPING UNIT 150

Mapping Unit 150 consists dominantly of landtype 150 and varying amounts of landtypes 156, 157, 158, and 159.

This landtype ranges in elevation from 2000 to 6000 feet and supports very little vegetation.

Landtype 150 is composed of 15 to 50 percent exposed serpentine bedrock and 20 to 45 percent soil less than 6 inches deep to serpentine bedrock.

Landtype 150 occurs on all slopes, but most often it occurs on steep or very steep slopes.

This landtype is excessively drained. Permeability is slow.

Some Important Landtype Limitations and Interpretations

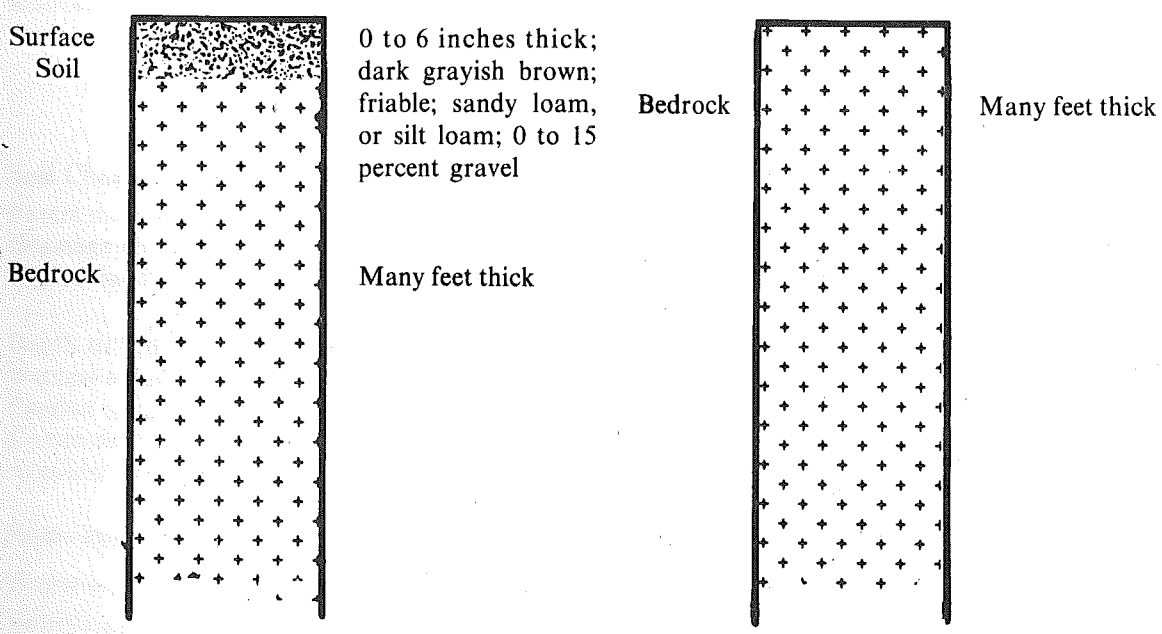
Watershed

Subject to rapid runoff. Available water holding capacity— 0.06 inches per inch.

Engineering

Bedrock is generally soft.

SOIL PROFILES

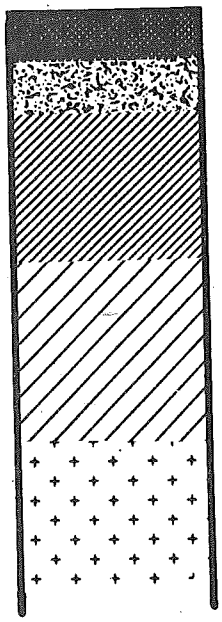


MAPPING UNIT 156

Mapping Unit 156 consists dominantly of landtype 156 and minor amounts of landtype 150.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pine-Douglas fir plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to 1 inch thick; needles, leaves, and twigs.
Surface Soil	½ to 4 inches thick; dark grayish brown; very friable; sandy loam, or loam; 0 to 15 percent gravel.
Subsoil	2 to 10 inches thick; dark grayish brown; friable; silt loam or loam; 0 to 25 percent gravel.
Substratum	10 to 40 inches thick; grayish brown; friable; loam, or sandy loam; 0 to 40 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—serpentine
Drainage class—well to somewhat excessively drained
Typical landform—steep and very steep non-glaciated valley sideslopes. Slopes range from 35 to 90 percent; most are between 45 and 65 percent.
Depth to bedrock—14 to 50 inches
Natural stability—IV
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.07 to 0.16 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B
This landtype is very erosive and difficult to revegetate.
Soil losses are often high even on undisturbed sites.

Engineering

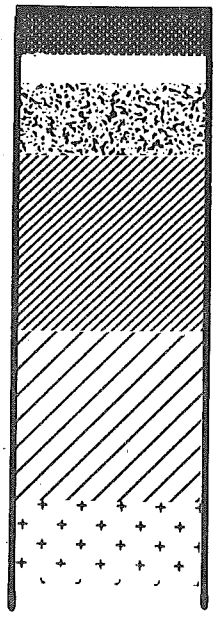
Bedrock is soft to moderately hard, and is rippable.
Unsurfaced roads are slippery when wet and are easily rutted.

MAPPING UNIT 157

Mapping Unit 157 consists dominantly of landtype 157 and minor amounts of landtype 150. Also included are some small wet areas.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See Appendix for definition)

SOIL PROFILE



Duff	½ to 2½ inches thick; needles, leaves, twigs.
Surface Soil	0 to 1½ inches thick; grayish brown; loose; loamy sand. 0 to 1½ inches thick; very dark grayish brown; very friable; sandy loam, or loam; 0 to 15 percent gravel.
Subsoil	2 to 10 inches thick; grayish brown; friable; silt loam or loam; 0 to 25 percent gravel.
Substratum	10 to 40 inches thick; grayish brown; friable; loam, or sandy loam; 0 to 40 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—serpentine
Drainage class—well to somewhat excessively drained
Typical landform—nearly level to very steep non-glaciated valley sideslopes. Slopes range from 5 to 90 percent; most are between 35 and 65 percent.
Depth to bedrock—14 to 50 inches
Natural stability—IV
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.07 to 0.16 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B
This landtype is very erosive and is difficult to revegetate.
Soil losses are often high even on undisturbed sites.

Engineering

Bedrock is soft to moderately hard and is rippable.

Unsurfaced roads are slippery when wet and are easily rutted.

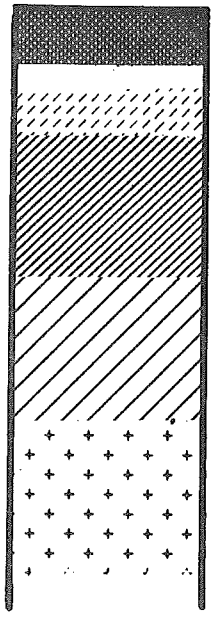
In some places slopes are highly dissected (4 to 9 dissections per mile). Where this occurs road alignment is affected, more culverts are needed, and there is a much higher risk of soil erosion, both during and after road construction.

MAPPING UNIT 158

Mapping Unit 158 consists dominantly of landtype 158 and minor amounts of landtype 150. Also included are some small wet areas.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See Appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves, and twigs.
Surface Soil	2 mm to 3 inches thick; light brownish gray; loose; loamy sand, or medium sand.
	0 to 8 inches thick; strong brown; firm; loam, or sandy loam.
Subsoil	2 to 10 inches thick; dark grayish brown; friable; silt loam, or loam; 0 to 20 percent gravel.
Substratum	10 to 40 inches thick; grayish brown; friable; loam, or sandy loam; 0 to 40 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—serpentine
Drainage class—well to somewhat excessively well drained
Typical landform—nearly level to very steep non-glaciated valley sideslopes. Slopes range from 5 to 90 percent, most are between 35 and 65 percent.
Depth to bedrock—14 to 50 inches
Natural stability—IV
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.07 to 0.16 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B
This landtype is very erosive and is very difficult to revegetate.
Soil losses are often high even on undisturbed sites.

Engineering

Bedrock is soft to moderately hard, and is rippable.

Unsurfaced roads are slippery when wet and are easily rutted.

In some places slopes are highly dissected (4 to 9 dissections per mile). Where this occurs road alignment is affected, more culverts are required, and there is a much higher risk of stream pollution both during and after road construction.

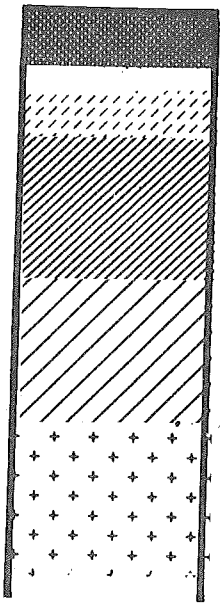
MAPPING UNIT 159

Mapping Unit 159 consists dominantly of landtype 159 and minor amounts of landtype 150. Also included are some small wet areas.

This landtype ranges in elevation from 5000 to 6000 feet and supports a subalpine plant community. (See appendix for definition)

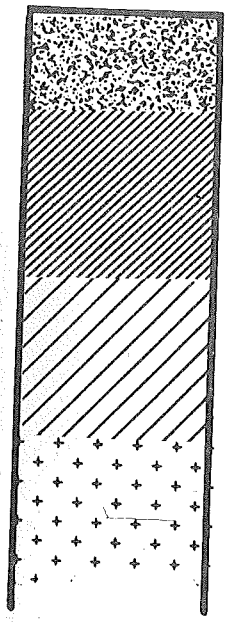
SOIL PROFILES

Timbered Soil



Duff	1 to 4 inches thick; needles, leaves, and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; loose; loamy sand, or medium sand.
Subsoil	0 to 6 inches thick; strong brown; firm; loam, or sandy loam.
	2 to 10 inches thick; dark grayish brown; friable; silt loam, or loam; 0 to 25 percent gravel.
Substratum	10 to 30 inches thick; grayish brown; friable; loam or sandy loam; 0 to 40 percent gravel.
Bedrock	Many feet thick

Meadow Soil



Surface Soil	2 to 10 inches thick; very dark grayish brown; very friable; loam, or sandy loam; 0 to 10 percent gravel.
Subsoil	2 to 10 inches thick; dark grayish brown; friable; silt loam, or loam; 0 to 20 percent gravel.
Substratum	10 to 25 inches thick; grayish brown; friable; loam or sandy loam; 0 to 40 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—serpentine
Drainage class—well to somewhat excessively drained
Typical landform—steep and very steep non-glaciated valley sideslopes. Slopes from 35 to 85 percent, most are between 45 and 70 percent.
Depth to bedrock—15 to 40 inches
Natural stability—IV
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.07 to 0.16 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

This landtype is very erosive and is very difficult to revegetate. Soil losses are often high even on undisturbed sites.

Engineering

Bedrock is soft to moderately hard, and rippable.

Unsurfaced roads are slippery when wet and are easily rutted.

In some places slopes are highly dissected (4 to 9 dissections per mile). Where this occurs road alignment if affected, more culverts are required, and there is a much higher risk of stream pollution both during and after road construction.

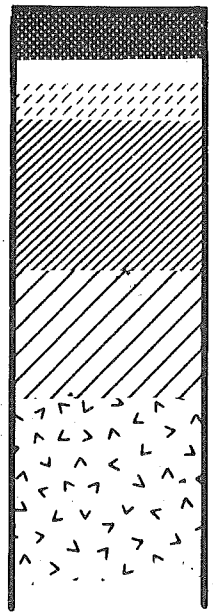
MAPPING UNIT 206

Mapping Unit 206 consists dominantly of landtype 206 and minor amounts of landtypes 210 and 215.

This landtype ranges in elevation from 5000 to 6000 feet and supports a subalpine plant community. (See appendix for definition)

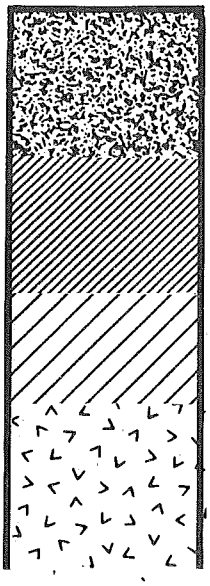
SOIL PROFILES

Timbered Soil



Duff	1 to 4 inches thick; needles, leaves, and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; loose; loamy sand, or fine sand.
Subsoil	0 to 6 inches thick; strong brown; firm; loam, or silt loam; 0 to 20 percent gravel. 1 to 15 inches thick; dark brown; firm; silt loam, or loam; 0 to 25 percent gravel.
Substratum	0 to 18 inches thick; brown; firm; loam, or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Meadow Soil



Surface Soil	2 to 10 inches thick; very dark grayish brown; very friable; loam, or silt loam; 0 to 20 percent gravel.
Subsoil	1 to 15 inches thick; dark brown; firm; silt loam, or loam; 0 to 20 percent gravel.
Substratum	0 to 10 inches thick; brown; firm; loam, or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—basalt, andesite or rhyolite
Drainage class—well
Typical landform—nearly level to steep non-glaciated valley sideslopes. Slopes range from 0 to 35 percent, most are between 5 and 30 percent.
Depth to bedrock—4 to 20 inches
Natural stability—II
Erosion hazard—moderate to high
Compaction hazard—high
Available water holding capacity—0.15 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—D

This soil is droughty and is subject to overland flow.

Engineering

Depth to bedrock is less than 20 inches.

Material is dusty when dry and slippery when wet.

Bedrock in most places is not rippable.

The soil material is subject to frost heave.

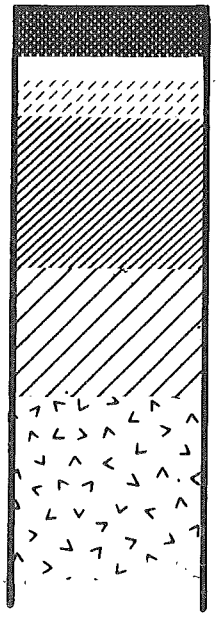
MAPPING UNIT 210

Mapping Unit 210 consists dominantly of landtype 210 and minor amounts of landtype 206 and 220.

This landtype ranges in elevation from 5000 to 6000 feet and supports a subalpine plant community. (See appendix for definition)

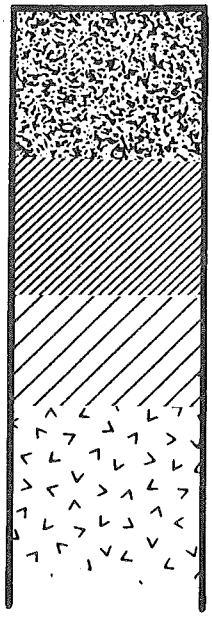
SOIL PROFILES

Timbered Soil



Duff	1 to 4 inches thick; needles, leaves and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; loose; loamy sand or fine sand.
Subsoil	0 to 6 inches thick; strong brown; firm; loam or silt loam; 0 to 20 percent gravel.
	1 to 15 inches thick; dark brown; firm; silt loam, or loam; 0 to 15 percent gravel.
Substratum	0 to 18 inches thick; brown; firm; loam, or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Meadow Soil



Surface Soil	2 to 10 inches thick; very dark grayish brown; very friable; loam, or silt loam; 0 to 10 percent gravel.
Subsoil	1 to 15 inches thick; dark brown; firm; silt loam, or loam; 0 to 25 percent gravel.
Substratum	0 to 10 inches thick; brown; firm; loam, or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—basalt, andesite, or rhyolite
Drainage class—well
Typical landform—steep to very steep non-glaciated valley sideslopes. Slopes range from 35 to 85 percent, most are between 40 and 70 percent.
Depth to bedrock—4 to 20 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.15 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—D

This soil is droughty and subject to overland flow.

Engineering

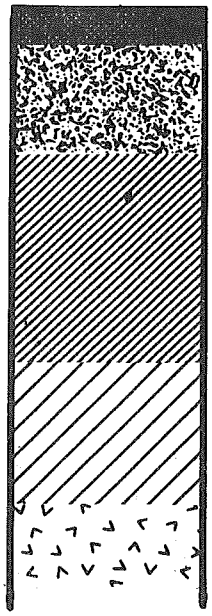
Depth to bedrock is less than 20 inches. Material is dusty when dry and slippery when wet. Bedrock in most places is not rippable. The soil material is subject to frost heave.

MAPPING UNIT 211

Mapping Unit 211 consists dominantly of landtype 211 and minor amounts of landtype 216, and some small areas less than twenty inches deep to bedrock.

This landtype ranges in elevation from 1000 to 3500 feet and supports a bunchgrass-ponderosa pine plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to ½ inch thick; needles, leaves and twigs.
Surface Soil	2 to 8 inches thick; very dark grayish brown; very friable; loam, or silt loam; 0 to 20 percent gravel.
Subsoil	1 to 5 inches thick; dark brown; firm; silt loam, or loam; 0 to 25 percent gravel.
Substratum	8 to 40 inches thick; brown; friable; loam or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—basalt, rhyolite or andesite
Drainage class—well
Typical landform—nearly level to steep non-glaciated valley sideslopes and ridge-tops. Slopes range from 0 to 40 percent, most are between 10 and 35 percent.
Depth to bedrock—20 to 40 inches
Natural stability—II
Erosion hazard—moderate
Compaction hazard—high
Available water holding capacity—0.15 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

In some places, there is a thin, very fine, ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted, this is no longer a problem.

These soils are generally easy to revegetate.

Engineering

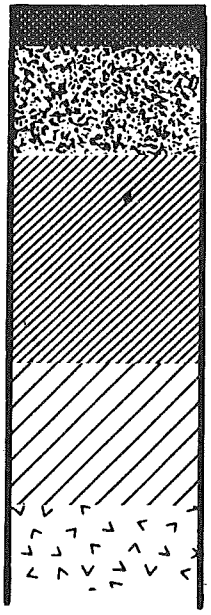
The bedrock in most places is very hard. It gives a very stable base for roads or buildings.
The soil material is plastic and sticky when wet and is subject to frost heave.
Unsurfaced roads are dusty when dry and are very sticky and slippery when wet.

MAPPING UNIT 212

Mapping Unit 212 consists dominantly of landtype 212 and minor amounts of landtype 217, and some small areas less than twenty inches deep to bedrock.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pina-Douglas fir plant community. (See Appendix for definition)

SOIL PROFILE



Duff	0 to 1 inch thick; needles, leaves and twigs.
Surface Soil	½ to 6 inches thick; very dark grayish brown; friable; loam or silt loam; 0 to 20 percent gravel.
Subsoil	0 to 20 inches thick; dark yellowish brown; friable; silt loam, or loam; 0 to 25 percent gravel.
Substratum	15 to 36 inches thick; brown; friable; loam, or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—basalt, andesite, and rhyolite
Drainage class—well
Typical landform—nearly level to steep non-glaciated valley sideslopes. Slopes range from 0 to 40 percent, most are between 10 and 30 percent.
Depth to bedrock—20 to 40 inches
Natural stability—II
Erosion hazard—moderate
Compaction hazard—high
Available water holding capacity—0.15 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

In most places, there is a thin, very fine ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted, this is no longer a problem.

These soils are generally easy to revegetate.

Engineering

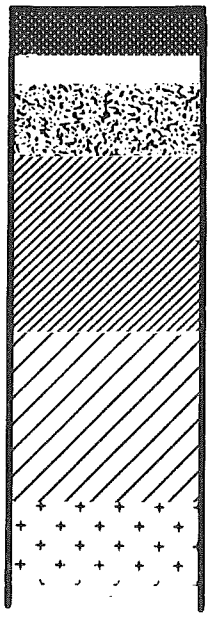
The bedrock in most places is very hard. It gives a very stable base for roads or buildings.
The soil material is plastic and sticky when wet and is subject to frost heave.
Unsurfaced roads are dusty when dry and are very sticky and slippery when wet.

MAPPING UNIT 213

Mapping Unit 213 consists dominantly of landtype 213 and minor amounts of landtype 218, and some small areas less than twenty inches deep to bedrock.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See Appendix for definition)

SOIL PROFILE



Duff	½ to 2½ inches thick; needles, leaves and twigs.
Surface Soil	0 to 1½ inches thick; grayish brown; loose; loamy sand, or fine sand. 0 to 1½ inches thick; very dark grayish brown; very friable; loam, or silt loam; 0 to 20 percent gravel.
Subsoil	0 to 20 inches thick; dark yellowish brown; friable; silt loam, or loam; 0 to 25 percent gravel.
Substratum	15 to 36 inches thick; brown; friable; loam, or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—basalt, andesite and rhyolite
Drainage class—well
Typical landform—nearly level to steep non-glaciated valley sideslopes. Slopes range from 0 to 40 percent, most are between 10 and 30 percent.
Depth to bedrock—20 to 40 inches
Natural stability—II
Erosion hazard—moderate
Compaction hazard—high
Available water holding capacity—0.15 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

In some places, there is a thin, very fine ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted, this is no longer a problem.

These soils are generally easy to revegetate.

Engineering

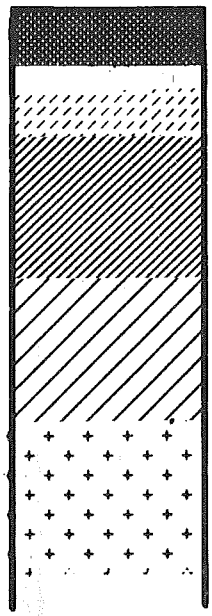
The bedrock in most places is very hard. It gives a very stable base for roads or buildings.
The soil material is plastic and sticky when wet and is subject to frost heave.
Unsurfaced roads are dusty when dry and are very sticky and slippery when wet.

MAPPING UNIT 214

Mapping Unit 214 consists dominantly of landtype 214 and minor amounts of landtype 219 and some small areas less than twenty inches deep to bedrock.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See Appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves, and twigs.
Surface Soil	2 mm to 3 inches thick; light brownish gray; loose; loamy sand, or fine sand.
	0 to 8 inches thick; strong brown; firm; loam, or silt loam; 0 to 20 percent gravel.
Subsoil	0 to 24 inches thick; dark yellowish brown; friable; silt loam, or loam; 0 to 25 percent gravel.
Substratum	10 to 40 inches thick; brown; friable; loam, or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—basalt, andesite, and rhyolite
Drainage class—well
Typical landform—nearly level to steep, non-glaciated valley sideslopes. Slopes range from 0 to 40 percent; most are between 10 and 35 percent.
Depth to bedrock—20 to 40 inches
Natural stability—II
Erosion hazard—moderate
Compaction hazard—high
Available water holding capacity—0.15 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

In some places there is a thin, very fine ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted, this is no longer a problem.

These soils are generally easy to revegetate.

Engineering

The bedrock in most places is very hard. It gives a very stable base for roads or buildings.
The soil material is plastic and sticky when wet and is subject to frost heave.
Unsurfaced roads are dusty when dry and are very sticky and slippery when wet.

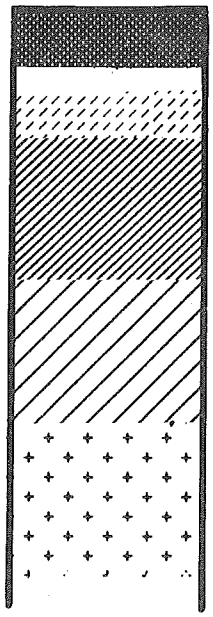
MAPPING UNIT 215

Mapping Unit 215 consists dominantly of landtype 215 and minor amounts of landtype 220, and some small areas less than twenty inches deep to bedrock.

This landtype ranges in elevation from 5000 to 6000 feet and supports a subalpine plant community. (See Appendix for definition)

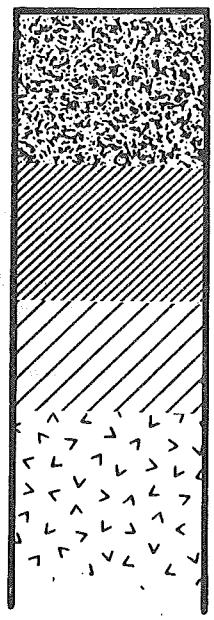
SOIL PROFILES

Timbered Soil



Duff	1 to 4 inches thick; needles, leaves, and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; loose; loamy sand, or fine sand.
	0 to 6 inches thick; strong brown; firm; loam, or silt loam.
Subsoil	1 to 15 inches thick; dark brown; firm; silt loam, or loam; 0 to 20 percent gravel.
Substratum	5 to 90 inches thick; brown; firm; loam, or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Meadow Soil



Surface Soil	2 to 10 inches thick; very dark grayish brown; very friable; loam, or silt loam; 0 to 20 percent gravel.
Subsoil	5 to 25 inches thick; dark brown; firm; silt loam, or loam; 0 to 25 percent gravel.
Substratum	5 to 90 inches thick; brown; firm; loam, or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—basalt, andesite, and rhyolite
Drainage class—well
Typical landform—nearly level to steep, non-glaciated valley sideslopes. Slopes range from 0 to 40 percent; most are between 5 and 30 percent.
Depth to bedrock—20 to 40 inches
Natural stability—II
Erosion hazard—moderate
Compaction hazard—high
Available water holding capacity—0.15 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

In some places there is a thin, very fine ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted, this is no longer a problem.

These soils are generally easy to revegetate.

Engineering

The bedrock in most places is very hard. It gives a very stable base for roads or buildings.

The soil material is plastic and sticky when wet and is subject to frost heave.

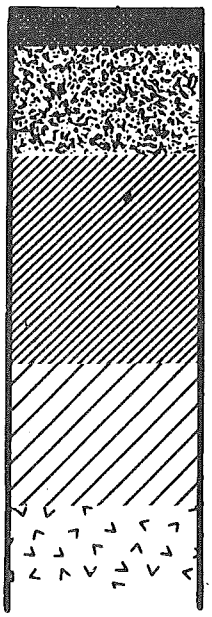
Unsurfaced roads are dusty when dry and are very sticky and slippery when wet.

MAPPING UNIT 216

Mapping Unit 216 consists dominantly of landtype 216 and minor amounts of landtype 211 and some small areas less than twenty inches deep to bedrock.

This landtype ranges in elevation from 1000 to 3500 feet and supports a bunchgrass-ponderosa pine plant community. (See Appendix for definition)

SOIL PROFILE



Duff	0 to ½ inch thick; needles, leaves and twigs.
Surface Soil	2 to 8 inches thick; very dark grayish brown; very friable; loam, or silt loam; 0 to 20 percent gravel.
Subsoil	1 to 15 inches thick; dark brown; firm; silt loam, or loam; 0 to 25 percent gravel.
Substratum	8 to 40 inches thick; brown; friable; loam, or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—basalt, rhyolite, or andesite
Drainage class—well
Typical landform—steep and very steep non-glaciated valley sideslopes. Slopes range from 35 to 85 percent; most are between 45 and 70 percent.
Depth to bedrock—20 to 40 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.15 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

In some places, there is a thin, very fine ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted, this is no longer a problem.

These soils are generally easy to revegetate.

Engineering

The bedrock in most places is very hard and cannot be ripped. It gives a very stable base for roads or buildings. The soil material is plastic and sticky when wet, and it is subject to frost heave. Unsurfaced roads are dusty when dry and very sticky and slippery when wet.

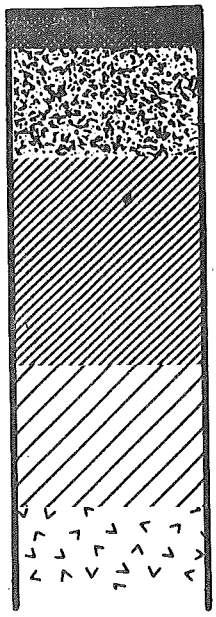
In some places, the slopes are highly dissected (4 to 9 dissections per mile). Where this occurs, road alignment is affected, more culverts are needed and there is a much higher risk of soil erosion, both during and after road construction.

MAPPING UNIT 217

Mapping Unit 217 consists dominantly of landtype 217 and minor amounts of landtype 212, and some small areas less than twenty inches deep to bedrock.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa pine-Douglas fir plant community. (See appendix for definition)

SOIL PROFILE



Duff	0 to 1 inch thick; needles; leaves and twigs.
Surface Soil	½ to 6 inches thick; very dark grayish brown; friable; loam, or silt loam; 0 to 20 percent gravel.
Subsoil	0 to 20 inches thick; dark yellowish brown; friable; silt loam, or loam; 0 to 25 percent slopes.
Substratum	15 to 36 inches thick; brown; friable; loam; or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—basalt, andesite and rhyolite
Drainage class—well
Typical landform—steep and very steep, non-glaciated valley sideslopes. Slopes range from 40 to 90 percent, most are between 45 and 65 percent.
Depth to bedrock—20 to 40 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.15 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B
In some places, there is a thin ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted, this is no longer a problem.
These soils are generally easy to revegetate.

Engineering

The bedrock in most places is very hard. It gives a very stable base for roads or buildings.

The soil material is plastic and sticky when wet and is subject to frost heave.

Unsurfaced roads are dusty when dry and very sticky and slippery when wet.

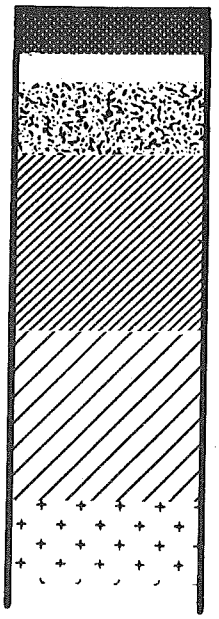
In some places, the slopes are highly dissected (4 to 9 dissections per mile). Where this occurs, road alignment is affected, more culverts are needed and there is a much higher risk of soil erosion, both during and after road construction.

MAPPING UNIT 218

Mapping Unit 218 consists dominantly of landtype 218 and minor amounts of landtype 213, and some small areas less than twenty inches deep to bedrock.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff	½ to 2½ inches thick; needles, leaves, and twigs.
Surface Soil	0 to 1½ inches thick; grayish brown; loose; loamy sand, or fine sand.
	0 to 1½ inches thick; very dark grayish brown; very friable; loam, or silt loam; 0 to 20 percent gravel.
Subsoil	0 to 20 inches thick; dark yellowish brown; friable; silt loam, or loam; 0 to 25 percent gravel.
Substratum	15 to 36 inches thick; brown; friable; loam, or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—basalt, andesite, and rhyolite
Drainage class—well
Typical landform—steep to very steep, non-glaciated valley sideslopes. Slopes range from 40 to 90 percent, most are between 45 and 65 percent.
Depth to bedrock—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.15 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

In some places there is a thin very fine ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted, this is no longer a problem.

These soils are generally easy to revegetate.

Engineering

The bedrock in most places is very hard. It gives a very stable base for roads or buildings.

The soil material is plastic and sticky when wet and is subject to frost heave.

Unsurfaced roads are dusty when dry and are very sticky and slippery when wet.

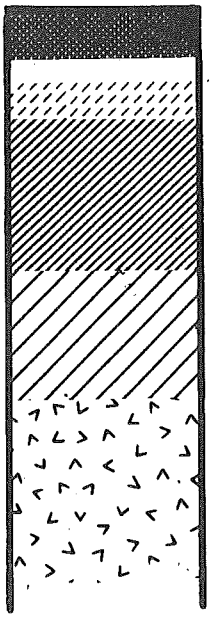
In some places the slopes are highly dissected (4 to 9 dissections per mile). Where this occurs, road alignment is affected, more culverts are needed, and there is a much higher risk of soil erosion, both during and after road construction.

MAPPING UNIT 219

Mapping Unit 219 consists dominantly of landtype 219 and minor amounts of landtype 214, and some small areas less than twenty inches deep to bedrock.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves, and twigs.
Surface Soil	2 mm to 3 inches thick; light brownish gray; loose; loamy sand, or fine sand.
Subsoil	0 to 8 inches thick; strong brown; firm; loam, or silt loam; 0 to 20 percent gravel.
	0 to 24 inches thick; dark yellowish brown; friable; silt loam or loam; 0 to 20 percent gravel.
Substratum	10 to 40 inches thick; brown; friable; loam, or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—basalt, andesite, and rhyolite
Drainage class—well
Typical landform—steep and very steep, non-glaciated valley sideslopes. Slopes range from 40 to 90 percent, most are between 40 and 70 percent.
Depth to bedrock—20 to 40 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.15 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

In some places there is a thin very fine ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted, this is no longer a problem.

These soils are generally easy to revegetate.

Engineering

The bedrock in most places is very hard. It gives a very stable base for roads or buildings.

The soil material is plastic and sticky when wet and is subject to frost heave.

Unsurfaced roads are dusty when dry and are very sticky and slippery when wet.

In some places the slopes are highly dissected (4 to 9 dissections per mile). Where this occurs, road alignment is affected, more culverts are needed, and there is a much higher risk of soil erosion, both during and after road construction.

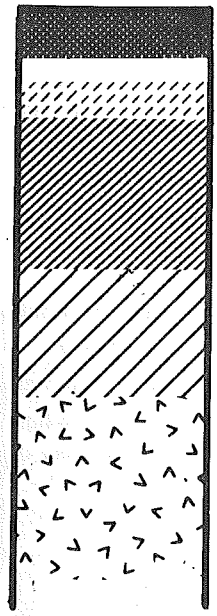
MAPPING UNIT 220

Mapping Unit 220 consists dominantly of landtype 200 and minor amounts of landtypes 210, 215, and some small areas less than twenty inches deep to bedrock.

This landtype ranges in elevation from 5000 to 6000 feet and supports a subalpine plant community. (See appendix for definition)

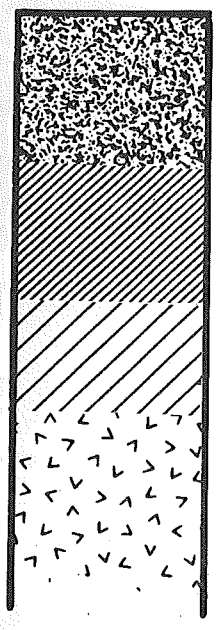
SOIL PROFILE

Timbered Soil



Duff	1 to 4 inches thick; needles, leaves, and twigs.
Surface Soil	2 mm to 3 inches thick; light gray; loose; loamy sand, or fine sand.
Subsoil	0 to 6 inches thick; strong brown; firm; loam, or silt loam.
	1 to 15 inches thick; dark brown; firm; silt loam, or loam; 0 to 20 percent gravel.
Substratum	10 to 40 inches thick; brown; firm; loam, or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Meadow Soil



Surface Soil	2 to 10 inches thick; very dark grayish brown; very friable; loam, or silt loam; 0 to 20 percent gravel.
Subsoil	1 to 15 inches thick; dark brown; firm; silt loam, or loam; 0 to 25 percent gravel.
Substratum	10 to 40 inches thick; brown; firm; loam, or sandy loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—basalt, andesite and rhyolite
Drainage class—well
Typical landform—steep and very steep, non-glaciated valley sideslopes. Slopes range from 40 to 90 percent, but most are between 45 and 65 percent.
Depth to bedrock—20 to 40 inches
Natural stability—III
Erosion hazard—high
Compaction hazard—high
Available water holding capacity—0.15 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

In some places there is a thin very fine ash layer on the surface that can cause a hydromorphic effect on initial wetting. This effect will increase the risk of overland flow. Once the surface has been thoroughly wetted, this is no longer a problem.

These soils are generally easy to revegetate.

Engineering

The bedrock in most places is very hard. It gives a very stable base for roads or buildings.

The soil material is plastic and sticky when wet and is subject to frost heave.

Unsurfaced roads are dusty when dry and are very sticky and slippery when wet.

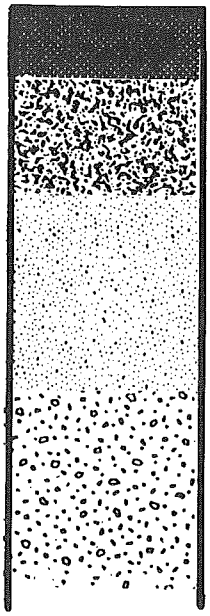
In some places the slopes are highly dissected (4 to 9 dissections per mile). Where this occurs, road alignment is affected, more culverts are needed, and there is a much higher risk of soil erosion, both during and after road construction.

MAPPING UNIT 252

Mapping Unit 252 consists dominantly of landtype 252 and minor amounts of rock outcrops.

This landtype ranges in elevation from 1500 to 3600 feet and supports a ponderosa-pine-Douglas fir plant community. (See appendix for definition)

SOIL PROFILE



Duff — 0 to 1 inch thick; needles, leaves, and twigs.

Surface Soil — ½ to 6 inches thick; very dark grayish brown; very friable; sandy loam, loam, or loamy sand; 10 to 35 percent gravel.

Subsoil — 0 to 30 inches thick; brown; friable; sandy loam, or loam; 15 to 50 percent gravel.

Substratum — 30 to 60 plus inches thick; yellowish brown; friable; loamy sand, sandy loam, or loam; 20 to 60 percent gravel.

Soil Characteristics

Parent material—colluvium
Drainage class—well to excessively drained
Typical landform—nearly level to steep toe slopes. Slopes range from 5 to 40 percent, most are between 10 and 25 percent.
Depth to bedrock—12 feet plus
Natural stability—III
Erosion hazard—moderate
Compaction hazard—low
Available water holding capacity—0.07 to 0.16 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—A

These soils are very rapidly permeable, and are droughty and difficult to revegetate.

These soils are stratified and have wide ranges in both texture and amount of gravel occurring within very short distances.

Engineering

These soils have good bearing strength, and are non-sticky and non-plastic.

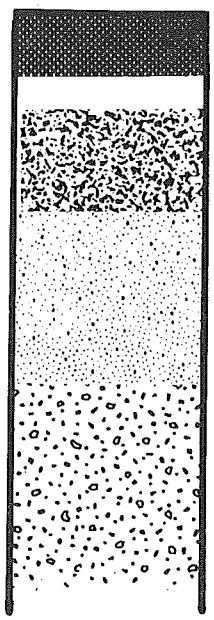
Their position on the landscape makes them subject to overland flow during spring runoff and heavy rainstorms.

MAPPING UNIT 253

Mapping Unit 253 consists dominantly of landtype 253 and minor amounts of rock outcrops.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff	½ to 2½ inches thick; needles, leaves and twigs.
Surface Soil	0 to ½ inch thick; grayish brown; loose; loamy sand.
	0 to 2½ inches thick; very dark grayish brown; very friable; sandy loam, loam, or loamy sand; 10 to 35 percent gravel.
Subsoil	0 to 30 inches thick; brown; friable; sandy loam, or loam; 15 to 50 percent gravel.
Substratum	30 to 60 inches thick; yellowish brown; friable; loamy sand, sandy loam, or loam; 20 to 60 percent gravel.

Soil Characteristics

Parent material—colluvium
Drainage class—well to excessively drained
Typical landform—nearly level to steep toe slopes. Slopes range from 4 to 40 percent, most are between 10 and 25 percent.
Depth to bedrock—12 feet plus
Natural stability—III
Erosion hazard—moderate
Compaction hazard—low
Available water holding capacity—0.07 to 0.16 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—A

These soils are very rapidly permeable, and are droughty and difficult to revegetate.

These soils are stratified and have wide ranges in both texture and amount of gravel occurring within very short distances.

Engineering

These soils have good bearing strength, and are non-sticky and non-plastic.

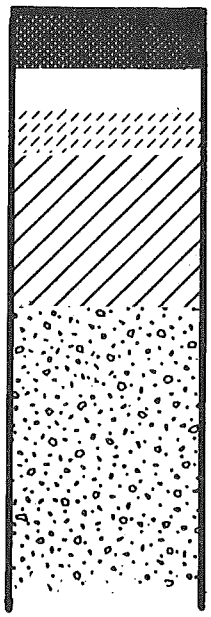
Their position on the landscape makes them subject to overland flow during spring runoff and heavy rainstorms.

MAPPING UNIT 263

Mapping Unit 263 consists dominantly of landtype 263 and minor amounts of rock outcrops.

This landtype ranges in elevations from 3000 to 5000 feet and supports a mixed conifer plant community. (See appendix for definition)

SOIL PROFILE



Duff — 1 to 4 inches thick; needles, leaves, and twigs.

Surface Soil — 0 to ½ inch thick; grayish brown; loose; loamy sand, or medium sand.

Subsoil — 0 to 8 inches thick; strong brown; firm; sandy loam, loam, or loamy sand; 0 to 25 percent gravel.

0 to 30 inches thick; brown; friable; loam, or sandy loam; 10 to 50 percent gravel.

Substratum — 30 to 60 inches thick; yellowish brown; friable; loamy sand, sandy loam, or loam; 20 to 60 percent gravel.

Soil Characteristics

Parent material—colluvium
Drainage class—well to excessively drained
Typical landform—nearly level to steep toe slopes. Slopes range from 5 to 40 percent, most are between 10 and 25 percent.
Depth to bedrock—10 feet plus
Natural stability—III
Erosion hazard—moderate
Compaction hazard—low to moderate
Available water holding capacity—0.07 to 0.16 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic group—B

These soils are rapidly permeable, and are droughty and difficult to revegetate.

They are stratified and can have wide ranges in both texture and amount of gravel occurring within very short distances.

Engineering

These soils have a fair to good bearing strength.

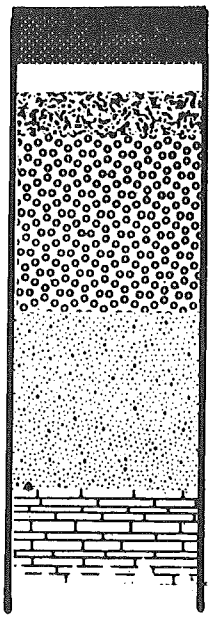
Their position on the landscape makes them subject to overland flow during spring runoff and heavy rainstorms.

MAPPING UNIT 271

Mapping Unit 271 consists dominantly of landtype 271 and minor amounts of landtype 138.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves, and twigs.
Surface Soil	0 to 1½ inches thick; grayish brown; loose; loamy sand. 0 to 1½ inches thick; very dark grayish brown; very friable; ashy loamy sand or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 55 mm. dia.).
Subsoil	10 to 60 inches thick; white to brown; loose; ashy loamy sand, or ashy sandy loam; 20 to 95 percent ash and pumice (0.5 to 50 mm. dia.).
Substratum	10 to 48 inches thick; yellowish brown; friable; sandy loam, or loam; 0 to 30 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—pumice overlying swauk sandstone
Drainage class—well to excessively drained
Typical landform—steep and very steep non-glaciated valley sideslopes. Slopes range from 35 to 85 percent, most are between 40 and 60 percent.
Depth to bedrock—10 to 120 plus inches
Natural stability—IV
Erosion hazard—high
Compaction hazard—low
Available water holding capacity—0.09 to 0.18 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

In many places there is a thin very fine ash layer on the surface that causes a hydromorphic effect on initial wetting of the soil. Once the soil has been thoroughly moistened this is no longer a problem.

Unprotected pumice material is very erosive both by wind and water.

All of this landtype occurs in the Chiwawa River drainage.

Included in this unit are some small acreages that occur in the ponderosa pine-Douglas fir and in the mixed conifer plant community zones.

Engineering

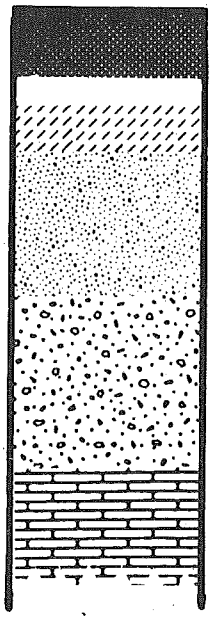
Pumice has fair bearing strength when confined, but ravels badly and is unstable when not confined. Piping is a problem in road cuts, along with cut bank ravel which occurs on slopes steeper than 4:1. Unsurfaced roads are very dusty when dry.

MAPPING UNIT 298

Mapping Unit 298 consists dominantly of landtype 298 and minor amounts of rock outcrop.

This landtype ranges in elevation from 3000 to 5000 feet and supports a mixed conifer plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves, and twigs.
Surface Soil	0 to 2 inches thick; grayish brown; loose; loamy sand. 0 to 8 inches thick; strong brown; firm; sandy loam, or loam; 0 to 15 percent gravel.
Subsoil	10 to 30 inches thick; brown; friable; sandy loam, or loamy sand; 10 to 30 percent gravel.
Substratum	0 to 40 inches thick; grayish brown; friable; loamy sand, or sandy loam; 15 to 50 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—sandstone (hard)
Drainage class—well and moderately well drained
Typical landform—nearly level to very steep non-glaciated valley sideslopes. Slopes range from 5 to 90 percent; most are between 40 and 70 percent.
Depth to bedrock—15 to 60 inches
Natural stability—II
Erosion hazard—moderate
Compaction hazard—low to moderate
Available water holding capacity—0.07 to 0.15 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

These soils are rapidly permeable.

In places there are some highly dissected slopes (4 to 9 dissections per mile), but these areas are small and are not extensive. Also there are a few subalpine areas included with this landtype because of small acreages.

Engineering

This material has good bearing strength.

Bedrock in most palces is hard.

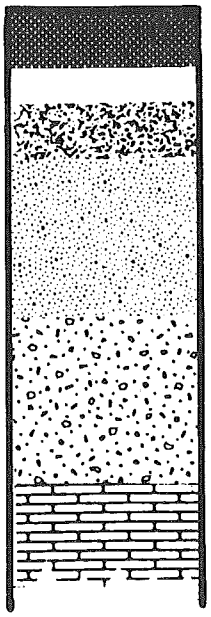
These soils have a low clay content and are rarely sticky or plastic.

MAPPING UNIT 301

Mapping Unit 301 consists dominantly of landtype 301 and minor amounts of rock outcrops.

This landtype ranges in elevation from 2500 to 4800 feet and supports an associated species plant community. (See appendix for definition)

SOIL PROFILE



Duff	1 to 4 inches thick; needles, leaves, and twigs.
	0 to 1½ inches thick; grayish brown; loose; loamy sand.
Surface Soil	0 to 1½ inches thick; very dark grayish brown; very friable; sandy loam, or loam; 0 to 15 percent gravel.
Subsoil	10 to 30 inches thick; brown; friable; sandy loam, or loamy sand; 10 to 30 percent gravel.
Substratum	0 to 40 inches thick; grayish brown; friable; loamy sand, or sandy loam; 15 to 50 percent gravel.
Bedrock	Many feet thick

Soil Characteristics

Parent material—sandstone (hard)
Drainage class—well and moderately well drained
Typical landform—steep and very steep non-glaciated valley sideslopes, some of which have up to 9 drainage dissections per mile. Slopes range from 5 to 90 percent; most are between 40 and 70 percent.
Depth to bedrock—15 to 60 inches
Natural stability—II
Erosion hazard—high
Compaction hazard—low to moderate
Available water holding capacity—0.07 to 0.15 inches per inch

Some Important Landtype Limitations and Interpretations

Watershed

Hydrologic Group—B

These soils are rapidly permeable.

Part of the mapped areas have highly dissected slopes (4 to 9 drainage dissections per mile) and the rest has less than 4 dissections per mile. Slopes with 4 to 9 dissections per mile have a much higher erosion rate than do the less dissected slopes.

Engineering

This material has good bearing strength.

Bedrock in most places is hard.

These soils have a low clay content and are rarely sticky plastic.

SECTION III

EXTERNAL CHARACTERISTICS

This table lists some external factors that affect the use and management of each landtype. The values shown are intended to be the norm for each land type.

COLUMN #	DESCRIPTION
1	Full Slope Range
2	Most Common Slope Range
3	Dissections Per Mile
4	Plant Community
5	Precipitation Zone
6	Percent Rock Outcrop
7	Susceptibility to Dustiness
8	Susceptibility to Muddiness
9	Potential for High Surface Temperature
10	Frost Heave

Full Slope Range (Column #1)

This column lists the full slope range, in percent, for each land type. These slope ranges identify the maximum limts for each land type.

Most Common Slope Range (Column #2)

This column lists the most common slope range, in percent, for each land type. Below the land types are separated into two groups, those having slopes less than forty percent, and those steeper than forty percent. Those land types that have slopes that overlap into both groups, will only be listed in the one that has the largest part of the range.

Less Than 40 Percent		
3	52	132
10	53	133
11	55	135
12	57	206
13	59	211
14	71	212
15	72	213
24	73	214
25	75	215
35	102	252
36	103	253
37	105	263
38	110	
51	111	

More Than 40 Percent				
2	34	66	107	144
4	40	67	114	150
5	41	68	115	156
6	42	70	119	157
7	48	76	120	158
8	49	77	136g	159
9	50	78	136	210
27	61g	79	137	216
28	61	85	138	217
29	62	86	139	218
30	63	87	141g	219
31	64	88	141	220
32	65	95	142	271
33	66g	106	143	298
				301

Dissections Per Mile (Column #3)

Indicates the number of drainage dissections per mile.

N/A **No rating** at all, which is used for landtypes that normally do not have dissections that affect their use and management.

< 4 **Less than four drainage dissections per mile**—A dissection is considered to be a drainageway that is ten feet or more deep and twenty feet or more wide. The rating given reflects the number of dissections per mile that occur within a landtype delineation. Three or less drainage dissections per mile, constitute normal conditions for road location and design.

4-9+ **Four to nine-plus drainage dissections per mile**—A dissection is considered to be a drainageway that is ten feet or more deep and twenty feet or more wide. The rating given reflects the number of dissections per mile that occur within a landtype delineation. Four or more dissections per mile constitute significant design and cost considerations for road construction.

N/A	< 4 dissections/mile				4-9+ dissections/mile
3	2	52	87	157	8
4	6	53	88	158	32
5	7	55	95	159	33
10	9	57	102	206	34
11	14	59	103	210	48
12	15	61g	105	211	49
13	24	61	106	212	66g
50	25	62	107	213	66
150	27	63	110	214	67
	28	64	111	215	68
	29	65	114	216	69
	30	71	115	217	70
	31	72	132	218	119
	35	73	133	219	120
	36	75	135	220	141g
	37	76	136g	252	141
	38	77	136	253	142
	40	78	137	263	143
	41	79	138	271	144
	42	85	139	298	301
	51	86	156		

Plant Community (Column #4)

This column identifies the plant community that most commonly occurs on each particular landtype. Changes from one plant community to another are seldom abrupt, so the boundary between them is based on landform, topography, aspect, elevation, soils, precipitation and field estimate. The groupings used for this soil resource inventory are listed below.

Legend	Community Type	Description
bg	Bunchgrass	The common plants are: (1) Deciduous trees and Shrubs—mock orange, sumac, rabbit brush, choke cherry, alder, vine maple, currant, dogwood, service berry, sagebrush, and bitterbrush; (2) Grass—bluebunch wheatgrass, cheatgrass, Idaho fescue, Sandberg bluegrass, squirrel tail, and needlegrass.
bg-pp	Bunchgrass-ponderosa pine	The common plants are: (1) Trees—ponderosa pine; (2) Deciduous Trees and Shrubs—sagebrush, bitterbrush, rabbit brush, willow, choke cherry, alder, vine maple, dogwood, ocean spray, Penstemon, service berry, snowberry and elderberry; (3) Grasses and Sedges—bluebunch wheatgrass, cheatgrass, Idaho fescue, Sandberg bluegrass, bentgrass, pinegrass, and elk sedge; (4) Sclerophyllous—Snowbruch ceanothus and kinnikinnick.
pp-Df	Ponderosa pine-Douglas fir	The common plants are: (1) Trees—ponderosa pine, Douglas fir, lodgepole pine, and Engelmann spruce; (2) Deciduous Trees and Shrubs—chock cherry, alder, maple, currant, dogwood, Oregon boxwood, ocean

		spray, service berry, Penstemon, snowberry, and elderberry; (3) Grasses and Sedges—bluebunch wheatgrass, cheatgrass, Ross sedge, Idaho fescue, Sandberg bluegrass, bentgrass, pinegrass, elk sedge, and mountain brome; (4) Sclerophyllous—Snowbruch ceanothus, kinnikinnick, and pachistima. Natural overstory composition is 40 to 60 percent ponderosa pine and 40 to 60 percent Douglas fir. Engelmann spruce makes up less than 10 percent of the stand and is mainly confined to areas that have poor air drainage. Lodgepole pine may occur in almost pure stands on burned over lands.
Assoc	Associated Species	The common plants are: (1) Trees—grand fir, white fir, Douglas fir, western white pine, western larch, Engelmann spruce, ponderosa pine and lodgepole pine; (2) Deciduous Trees and Shrubs—bitter cherry, alder, maple, currant, Penstemon, dogwood, Oregon boxwood, ocean spray, service berry and snowberry; (3) Grasses and Sedges—pinegrass, bentgrass, mountain brome, Ross sedge and elk sedge; (4) Sclerophyllous—snowbrush ceanothus, kinnikinnick, and pachistima. Natural overstory composition is 1 to 10 percent ponderosa pine, 20 to 50 percent Douglas fir, and 40 to 70 percent other conifers (mainly true firs.)
Mix	Mixed conifers	The common plants are: (1) Trees—silver fir, western hemlock, mountain hemlock, white fir, grand fir, Douglas fir, Engelmann spruce, western larch, and lodgepole pine; (2) Deciduous Trees and Shrubs—Aspen, cottonwood, alder, vine maple, dogwood, mountain huckleberry; (3) Grasses and Sedges—bentgrass, mountain brome. Natural overstory composition is 50 to 90 percent true firs, 0 to 35 percent Douglas fir and 15 to 50 percent other species.
Sub	Subalpine	The common plants are: (1) Trees—western white pine, lodgepole pine, white bark pine, Engelmann spruce, mountain hemlock, alpine larch, and alpine fir; (2) Deciduous Trees and Shrubs—kinnikinnick, heather, and heath; (3) Grasses and Sedges—green fescue, black sedge, bentgrass, bluebunch wheatgrass, Idaho fescue, Sandberg bluegrass, and dry land sedges. Natural overstory composition is 30 to 100 percent subalpine fir and white bark pine, and 0 to 55 percent other conifers. In most places, the timber stand remains fairly well closed with few openings until the amount of subalpine fir and white bark pine (combination of) reaches 50 percent. Then, as the percentage of these two species increase, the size and frequency of open meadow areas also increase, until at timberline the open areas are very large.
All	Cross section of two or more plant community types.	

bg	bg-pp	pp-Df	Assoc	mix	sub	All
61g	27	28	24	25	4	2
66g	35	32	29	30	31	3
136g	51	36	33	34	49	5
141g	61	40	37	38	55	6
	66	52	41	42	65	7
	71	57	53	48	70	8
	76	62	63	59	75	9
	136	67	68	64	88	10
	141	72	73	69	120	11
	211	77	78	79	135	12
	216	85	86	87	159	13
		105	102	95	206	14
		132	106	103	210	15
		137	110	107	215	50
		142	114	111	220	150
		156	133	115		
		212	138	119		
		217	143	139		
		252	157	144		
			213	158		
			218	214		
			253	219		
			271	263		
			301	298		

Precipitation Zone (Column #5)

This grouping is based on available isohetal data. The general groupings given are:

All—This grouping is for those landtypes that occur in all precipitation zones.

The other groupings given are based upon broad isohetal separations as related to plant communities.

All	9-15" ppt	15-25" ppt	25-40" ppt	40-70" ppt		70-120"+ ppt	
2	14	14	14	4	88	4	95
3	61g	27	28	6	102	6	103
5	66g	35	32	7	106	7	107
9	136g	51	36	8	110	8	111
10	141g	61	40	15	114	25	115
11		66	52	24	120	30	120
12		71	57	29	133	31	119
13		76	62	33	135	34	135
50		136	67	37	138	38	139
150		141	72	41	143	42	144
		211	77	49	157	48	158
		216	85	53	159	49	159
			105	55	206	55	206
			132	63	210	59	210
			137	65	213	64	214
			142	68	215	65	215
			156	70	218	69	219
			212	73	220	70	220
			217	75	253	75	263
			252	78	271	79	298
				79	301	87	
				86		88	

Percent Rock Outcrop (Column #6)

The values given are for the soil as a whole, and can be utilized only as a guide.

0-5%	0-10%	0-15%	0-20%	25-50%	>50%
2	24	35	85	7	6
3	25	36	86	8	7
4	27	37	87		9
5	28	38	88		50
10	29	40	136g		150
11	30	41	136		
12	31	42	137		
13	32	48	138		
14	33	49	139		
15	34	51	141g		
95	71	52	141		
102	72	53	142		
103	73	55	143		
105	75	57	144		
106	76	59	156		
107	77	61g	157		
110	78	61	158		
111	79	62	159		
114		63			
115		64			
119		65			
132		66g			
133		66			
135		67			
252		68			
253		69			
263		70			
		120			
		206			
		210			
		211			
		212			
		213			
		214			
		215			
		216			
		217			
		218			
		219			
		220			
		271			
		298			
		301			

Susceptibility to Dustiness (Column #7)

This interpretation pertains mainly to campgrounds, unsurfaced roads and to trails. These areas often lack protective vegetative cover; therefore, dust abatement usually required using some specialized techniques.

Low—Factors indicate that dust will not be a problem.

Moderate—Under normal conditions dust will not be a problem, but under heavy use and drougty conditions, dust, very likely, will be a problem.

High—Factors indicate that dust is a problem.

Low	Moderate			High
3	2	66g	138	12
4	10	66	139	35
5	13	67	141g	36
6	14	68	141	37
7	15	69	142	38
8	24	70	143	40
9	25	85	144	41
11	27	86	156	42
50	28	87	157	48
95	29	88	158	49
150	30	102	159	71
	31	103	206	72
	32	105	210	73
	33	106	211	75
	34	107	212	76
	51	110	213	77
	52	111	214	78
	53	114	215	79
	55	115	216	271
	57	119	217	
	59	120	218	
	61g	132	219	
	61	133	220	
	62	135	252	
	63	136g	253	
	64	136	263	
	65	137	298	
			301	

Susceptibility to Muddiness (Column #8)

This interpretation pertains to the physical qualities of the soil material when wet. Stickiness, plasticity and slipperiness are all inferred qualities in this rating.

Low—Factors indicate that muddiness is not a problem.

Moderate—Soils become muddy for short periods. Usually not considered to be a problem. Road rock is usually needed for road protection and vehicle safety.

High—Once the soils become muddy they usually remain muddy for long periods of time. Road rock is necessary for road protection and vehicle safety. Camp and/or road closure may be necessary during wet periods, if abatement procedures have not been installed.

Low		Moderate	High
2	53	3	4
5	55	10	11
6	57	13	95
7	59	85	110
8	61g	86	111
9	61	87	114
12	62	88	115
14	63	102	206
15	64	103	210
24	65	105	211
25	66g	106	212
27	66	107	213
28	67	119	214
29	68	120	215
30	69	132	216
31	70	133	217
32	71	135	218
33	72	136g	219
34	73	136	220
35	75	137	
36	76	138	
37	77	139	
38	78	141g	
40	79	141	
41	252	142	
42	253	143	
48	263	144	
49	271	150	
50	298	156	
51	301	157	
52		158	
		159	

Potential For High Surface Temperature Column #9)

This interpretation pertains to the zone approximately one-half inch above and one-quarter inch below the surface of the soil. This is an estimated rating based bare exposed mineral soil having natural soil colors. The rating will apply only to soils occurring on southeast, south, southwest, or west aspects. Also, soils on slopes steeper than forty percent, that are on south and southwest aspects seem to have the highest risk of damage from high surface soil temperature.

L—**Low**—Temperatures usually do not get high enough to cause injury to evergreen seedlings, or if they do they remain there for only short periods.

H—**High**—Temperatures rise high enough to cause injury to evergreen seedlings in most years. The injury often results in death.

Low		**High**		
3	87	2	57	132
4	88	5	61g	133
6	95	9	61	136g
7	103	10	62	136
8	107	11	63	137
25	115	12	66g	138
30	119	13	66	141g
31	120	14	67	141
34	135	15	68	142
38	139	24	71	143
42	144	27	72	150
48	158	28	73	156
49	159	29	76	157
55	206	32	77	211
59	210	33	78	212
64	214	35	85	213
65	215	36	86	216
69	219	37	102	217
70	220	40	105	218
70	263	41	106	252
79	298	50	110	253
		51	111	271
		52	114	301
		53		

Frost Heave (Column #10)

This column indicates the estimated risk of damage to roads, and seedlings from frost heave.

L—**Low**—little or no risk of damage from frost heave.

H—**High**—high risk of damage from frost heave.

Low			**High**		
2	35	65	3	119	156
5	36	66g	4	120	157
7	37	66	6	132	158
8	38	67	85	133	159
9	40	68	86	135	206
10	41	69	87	136g	210
11	42	70	88	136	211
12	48	71	95	137	212
13	49	72	102	138	213
14	50	73	103	139	214
15	51	75	105	141g	215
24	52	76	106	141	216
25	53	77	107	142	217
27	55	78	110	143	218
28	57	79	111	144	219
29	59	252	114	150	220
30	61g	253	115		
31	61	263			
32	62	271			
33	63	298			
34	64	301			

EXTERNAL CHARACTERISTICS

Land Type	1) Full Slope Range (Percent)	2) Most Common Slope Range (Percent)	3) Dissections Per Mile	4) Plant Community	5) Precipitation Zone	6 Percent Rock Outcrop	7) Susceptibility to Dustiness	8) Susceptibility to Muddiness	9) Potential For High Surf Temp	10) Frost Heave
2	45-90	60-80	<4	All	All	0-5	M	L	H	L
3	0-8	0-3	N/A	All	All	0-5	L	M	L	H
4	0-85	50-85	N/A	Sub	40"+	0-5	L	H	L	H
5	55-95	65-85	<4	All	All	0-5	L	L	H	L
6	5-95	50-80	<4	All	40"+	50-90	L	L	L	H
7	40-90	50-80	<4	All	40"+	30-80	L	L	L	L
8	40-95	60-75	>9	All	40"+	25-50	L	L	L	L
9	85-150	90-120	<4	All	All	80-100	L	L	H	L
10	0-20	0-12	N/A	All	All	0-5	M	M	H	L
11	0-10	0-3	N/A	All	All	0-5	L	H	H	L
12	0-20	0-12	N/A	All	All	0-5	H	L	H	L
13	0-10	0-3	N/A	All	All	0-5	M	M	H	L
14	0-30	0-12	<4	All	9-40"	0-5	M	L	H	L
15	0-30	0-15	<4	All	40-70"	0-5	M	L	H	L
24	3-40	5-25	<4	Assoc	40-70"	0-10	M	L	H	L
25	3-40	5-25	<4	Mix	70-120"+	0-10	M	L	L	L
27	5-85	40-65	<4	bg-pp	15-25"	0-10	M	L	H	L
28	5-85	40-65	<4	pp-Df	25-40"	0-10	M	L	H	L
29	40-90	40-65	<4	Assoc	40-70"	0-10	M	L	H	L
30	40-85	40-65	<4	Mix	70-120"+	0-10	M	L	L	L
31	10-90	40-65	<4	Sub	30-120"+	0-10	M	L	L	L
32	40-90	50-80	4-9	pp-Df	25-40"	0-10	M	L	H	L
33	45-85	50-80	4-9	Assoc	40-70"	0-10	M	L	H	L
34	45-85	50-80	4-9	Mix	70-120"+	0-10	M	L	L	L
35	3-80	10-30	<4	bg-pp	15-25"	0-15	H	L	H	L
36	3-40	10-30	<4	pp-Df	25-40"	0-15	H	L	H	L
37	3-40	10-30	<4	Assoc	40-70"	0-15	H	L	H	L
38	3-40	10-30	<4	Mix	70-120"+	0-15	H	L	L	L
40	40-80	45-65	<4	pp-Df	25-40"	0-15	H	L	H	L
41	40-80	45-65	<4	Assoc	40-70"	0-15	H	L	H	L
42	40-80	45-65	<4	Mix	70-120"+	0-15	H	L	L	L
48	40-85	45-65	4-9	Mix	70-120"+	0-15	H	L	L	L
49	3-85	20-65	4-9	Sub	40-120"+	0-15	H	L	L	L
50	All	All	N/A	All	All	85-100	L	L	H	L
51	3-90	15-50	<4	bg-pp	15-25"	0-15	M	L	H	L

Land Type	1) Full Slope Range (Percent)	2) Most Common Slope Range (Percent)	3) Dissections Per Mile	4) Plant Community	5) Precipitation Zone	6) Percent Rock Outcrop	7) Susceptibility to Dustiness	8) Susceptibility to Muddiness	9) Potential For High Surf Temp	10) Frost Heave
52	3-90	15-50	< 4	pp-Df	25-40"	0-15	M	L	H	L
53	3-90	15-50	< 4	Assoc	40-70"	0-15	M	L	H	L
55	3-90	15-50	< 4	Sub	40-120"+	0-15	M	L	L	L
57	0-40	5-25	< 4	pp-Df	25-40"	0-15	M	L	H	L
59	0-40	4-25	< 4	Mix	70-120"+	0-15	M	L	L	L
61g	5-90	45-65	< 4	bg	9-15"	0-15	M	L	H	L
61	5-90	45-65	< 4	bg-pp	15-25"	0-15	M	L	H	L
62	45-90	55-65	< 4	pp-Df	25-40"	0-15	M	L	H	L
63	45-90	55-65	< 4	Assoc	40-70"	0-15	M	L	H	L
64	45-90	55-65	< 4	Mix	70-120"+	0-15	M	L	L	L
65	5-90	20-65	< 4	Sub	40-120"+	0-15	M	L	L	L
66g	45-90	55-75	4-9	bg	9-15"	0-15	M	L	H	L
66	45-90	55-75	4-9	bg-pp	15-25"	0-15	M	L	H	L
67	45-90	55-75	4-9	pp-Df	25-40"	0-15	M	L	H	L
68	45-90	55-75	4-9	Assoc	50-70"	0-15	M	L	H	L
69	45-90	55-75	4-9	Mix	70-120"+	0-15	M	L	L	L
70	45-90	55-75	4-9	Sub	40-120"+	0-15	M	L	L	L
71	0-40	8-25	< 4	bg-pp	15-25"	0-10	H	L	H	L
72	0-40	8-25	< 4	pp-Df	25-40"	0-10	H	L	H	L
73	0-40	8-25	< 4	Assoc	40-70"	0-10	H	L	H	L
75	0-90	20-50	< 4	Sub	40-120"+	0-10	H	L	L	L
76	40-90	50-70	< 4	bg-pp	15-25"	0-10	H	L	H	L
77	40-90	50-70	< 4	pp-Df	25-40"	0-10	H	L	H	L
78	40-90	50-70	< 4	Assoc	40-70"	0-10	H	L	H	L
79	5-90	40-70	< 4	Mix	70-120"+	0-10	H	L	L	L
85	35-80	45-65	< 4	pp-Df	25-40"	0-20	M	M	H	H
86	35-80	45-65	< 4	Assoc	40-70"	0-20	M	M	H	H
87	0-80	35-65	< 4	Mix	70-120"+	0-20	M	M	L	H
88	5-80	35-65	< 4	Sub	40-120"+	0-20	M	M	L	H
95	35-85	40-65	< 4	Mix	70-120"+	0-5	L	H	L	H
102	0-40	5-30	< 4	Assoc	40-70"	0-5	M	M	H	H
103	0-40	5-30	< 4	Mix	70-120"+	0-5	M	M	L	H
105	0-80	30-65	< 4	pp-Df	25-40"	0-5	M	M	H	H
106	40-80	45-65	< 4	Assoc	40-70"	0-5	M	M	H	H
107	40-80	45-65	< 4	Mix	70-120"+	0-5	M	M	L	H
110	0-35	8-25	< 4	Assoc	40-70"	0-5	M	H	H	H

EXTERNAL CHARACTERISTICS

Land Type	1) Full Slope Range (Percent)	2) Most Common Slope Range (Percent)	3) Dissections Per Mile	4) Plant Community	5) Precipitation Zone	6) Percent Rock Outcrop	7) Susceptibility to Dustiness	8) Susceptibility to Muddiness	9) Potential For High Surf Temp	10) Frost Heave
111	0-35	8-25	< 4	Mix	70-120"+	0-5	M	H	H	H
114	35-80	35-60	< 4	Assoc	40-70"	0-5	M	H	H	H
115	35-80	35-60	< 4	Mix	70-120"+	0-5	M	H	L	H
119	40-90	60-80	4-9	Mix	70-120"+	0-5	M	M	L	H
120	10-90	60-80	4-9	Sub	40-120"+	0-15	M	M	L	H
132	0-35	5-25	< 4	pp-Df	25-40"	0-5	M	M	H	H
133	0-35	5-25	< 4	Assoc	40-70"	0-5	M	M	H	H
135	0-80	10-35	< 4	Sub	40-120"+	0-5	M	M	L	H
136g	5-95	35-75	< 4	bg	9-15"	0-20	M	M	H	H
136	5-95	35-75	< 4	bg-pp	15-40"	0-20	M	M	H	H
137	40-85	45-70	< 4	pp-Df	25-40"	0-20	M	M	H	H
138	35-85	40-70	< 4	Assoc	40-70"	0-20	M	M	H	H
139	5-85	35-70	< 4	Mix	70-120"+	0-20	M	M	L	H
141g	50-90	65-75	4-9	bg	9-15"	0-20	M	M	H	H
141	50-90	65-75	4-9	bg-pp	15-25"	0-20	M	M	H	H
142	50-90	65-75	4-9	pp-Df	25-40"	0-20	M	M	H	H
143	50-90	65-75	4-9	Assoc	40-70"	0-20	M	M	H	H
144	50-90	65-75	4-9	Mix	70-120"+	0-20	M	M	L	H
150	All	35-75	N/A	All	All	85-100	L	M	H	H
156	35-90	45-65	<4	pp-Df	25-40"	0-20	M	M	H	H
157	5-90	35-65	<4	Assoc	40-70"	0-20	M	M	H	H
158	5-90	35-65	<4	Mix	70-120"+	0-20	M	M	L	H
159	35-85	45-70	<4	Sub	40-120"+	0-20	M	M	L	H
206	0-35	5-30	<4	Sub	40-120"+	0-15	M	H	L	H
210	35-85	40-70	<4	Sub	40-120"+	0-15	M	H	L	H
211	0-40	10-35	<4	bg-pp	15-25"	0-15	M	H	H	H
212	0-40	10-30	<4	pp-Df	25-40"	0-15	M	H	H	H
213	0-40	10-30	<4	Assoc	40-70"	0-15	M	H	H	H
214	0-40	10-35	<4	Mix	70-120"+	0-15	M	H	L	H
215	0-40	5-30	<4	Sub	40-120"+	0-15	M	H	L	H
216	35-85	45-70	<4	bg-pp	15-25"	0-15	M	H	H	H
217	40-90	45-65	<4	pp-Df	25-40"	0-15	M	H	H	H
218	40-90	45-65	<4	Assoc	40-70"	0-15	M	H	H	H
219	40-90	45-65	<4	Mix	70-120"+	0-15	M	H	L	H

Land Type	1) Full Slope Range (Percent)	2) Most Common Slope Range (Percent)	3) Dissections Per Mile	4) Plant Community	5) Precipitation Zone	6) Percent Rock Outcrop	7) Susceptibility to Dustiness	8) Susceptibility to Muddiness	9) Potential For High Surf Temp	10) Frost Heave
220	40-90	45-65	< 4	Sub	40-120"+	0-15	M	H	L	H
252	5-40	10-25	< 4	pp-Df	25-40"	0-5	M	L	H	L
253	5-40	10-25	< 4	Assoc	40-70"	0-5	M	L	H	L
263	5-40	10-25	< 4	Mix	70-120"+	0-5	M	L	L	L
271	35-85	40-60	< 4	Assoc	40-70"	0-15	H	L	H	L
298	5-90	40-70	< 4	Mix	70-120"+	0-15	M	L	L	L
301	5-90	40-70	4-9	Assoc	40-70"	0-15	M	L	H	L

Broad Gen geology

Landform

Magnitude

Unit

Dol

6
7-8
10

8
10

=

48

=

<10

3001

5 K?

hard crust
gneiss
granite
rhyolite

1. glacial Grave

7-2 0 5

0 veg
Silver wildflowers
NF Richmond
other vegetation

Sed
Chemical
Sedim

Volcan

1

Surface

1

INTERNAL CHARACTERISTICS

This table lists some internal soil qualities that affect use and management. The interpretations are broad, being based upon the average or the normal range for any single landtype.

Column #	Description
1	Parent Material
2	Depth to bedrock
3	Bedrock composition
4	Effective rooting depth
5	Compaction hazard
6	Permeability
7	Natural fertility
8	Percent course fragments
9	Textural class
10	Estimated Available Water Capacity

Parent Material (Column #1)

This column identifies the kind and/or mode of deposition of the various materials from which the various landtypes have developed. The miscellaneous land types are grouped separately, because of the high degree of variablity in materials.

1 Miscellaneous Land Types	2 Alluvial Outwash and Colluvial Soils	3 Glacial Till	4 Pumice Overlying Glacial Till	5 Granitic & Hard Sedimentary residuum		6 Pumice Overlying Granitic or Sedimentary residuum
2	10	24	35	50	64	71
3	11	25	36	51	65	72
4	12	27	37	52	66g	73
5	13	28	38	53	66	75
6	14	29	40	55	67	76
7	15	30	41	57	68	77
8	252	31	42	59	69	78
9	253	32	48	61g	70	79
	263	33	49	61	298	271
		34		62	301	
				63		

7 Schist Residuum	8 Pyroclastic Residuum		9 Swauk Sandstone Residuum		10 Serpentine Residuum	11 Basalt Residuum	
85	102	111	132	139	150	206	215
86	103	114	133	141g	156	210	216
87	105	115	135	141	157	211	217
88	106	119	136g	142	158	212	218
95	107	120	136	143	159	213	219
	110		137	144		214	220
			138				

Depth To Bedrock (Column #2)

This is intended to mean a continuous underlying rock that may or may not be fractured, and has original rock texture and structure regardless of the hardness. Compacted glacial till material is not considered to be bedrock. Depths greater than 60" deep are given in feet. Listed below, the landtypes have been grouped to more easily identify similarities and differences between different landtypes. Some landtypes will be listed in more than one group.

less than 20"		**20 to 40"**		**40 to 72"**		**6-12 feet**	**<12 feet**
6	142	4	110	3	72	3	2
7	143	5	111	4	73	5	5
8	144	6	114	5	75	6	6
9	150	7	115	6	76	7	7
50	156	8	119	7	77	8	8
51	157	57	120	8	78	71	10
52	158	59	132	57	79	72	11
53	159	61g	133	59	102	73	12
55	206	61	135	61g	103	75	13
85	210	62	136g	61	105	76	14
86	211	63	136	62	106	77	15
87	212	64	137	63	107	78	24
88	213	65	138	64	110	79	25
95	214	66g	139	65	111	110	27
132	215	66	141g	66g	114	111	28
133	216	67	141	66	115	114	29
135	217	68	142	67	119	115	30
136g	218	69	143	68	120	119	31
136	219	70	144	69	133	120	32
137	220	71	156	70	156	271	33
138	271	72	157	71	157		34
139	298	73	158		158		35
141g	301	75	159		271		36
141		76	211		298		37
		77	212		301		38
		78	213				40
		79	214				41
		85	215				42
		86	216				48
		87	217				49
		88	218				252
		95	219				253
		102	220				263
		103	271				
		105	298				
		106	301				
		107					

Bedrock Composition (Column #3)

This column identifies the dominate bedrock material underlying each landtype. In some cases, the bedrock is the material from which the soils formed, and in others the bedrock is quite different than the materials in which the soil has formed. Many landtypes have developed in transported materials, so may be underlain by any rock type recognized in the survey area.

Any		**Granite & gneiss**		**schist**	**Pyroclastic**	**Sandstone & conglomerate**	**Serpentine**	**Basalt andesite & rhyolite**
2	29	50	66	85	102	132	150	206
3	29	51	67	86	103	133	156	210
4	31	52	68	87	105	135	157	211
5	32	53	69	88	106	136g	158	212
6	33	55	70	95	107	136	159	213
7	34	57	71		110	137		214
8	35	59	72		111	138		215
9	36	61g	73		114	139		216
10	37	61	75		115	141g		217
11	38	62	76		119	141		218
12	40	63	77		120	142		219
13	41	64	78			143		220
14	42	65	79			144		
15	48	66g				271		
24	49					298		
25	252					301		
27	253							
28	263							

Effective Rooting Depth (Column #4)

This column identifies the distance from the soil surface to any layer in the soil that is highly restrictive to air, water, and root movement. It can be bedrock, stratified material, compacted layers, hardpan, or cemented layers. This information is particularly useful in predicting windthrow hazard. Some land-types may be listed in more than one group, because of variable characteristics of the soil.

less than 20" deep

2
3
4
5
6
7
8
9
14
15
50
51
52
53
55
85
86
87
88
95
132
133
135
136g
136
137
138
139
141g
141
142
143
144
150
156
157
158
159
206
210
211
212
213
214
215
216
217
218
219
220
271
298
301

20 to 40 inches deep

8
10
11
12
13
14
15
24
25
27
28
29
30
31
32
33
34
35
36
37
38
40
41
42
48
49
57
59
61g
61
62
63
64
65
66g
66
67
68
69
70
71
72
75
79
85
86
87
88
95
102
103
105
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136g
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deeper than 40 inches

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Compaction Hazard (Column #5)

Under this heading there are four ratings. Three of which refer to the relative ease with which different land types are compacted. The fourth rating is self explanatory. (Compaction as used here is defined as the point at which the soil macroscopic pore space is reduced by one-half or more, or when the bulk density is increased by fifteen percent or more above the natural state.) Some landtypes may have more than one rating.

H—**High**—High risk of soil compaction. Includes part of the moderately coarse textures, all of the medium and fine textures, and soils that remain wet for long periods.

M—**Medium**—Medium risk of soil compaction. Includes the moderately coarse, and coarse textured soils.

L—**Low**—Low risk of soil compaction. This grouping is for soils with a pumice surface layer. Some compaction may actually be beneficial for moisture retention and plant growth.

N/A—Not applicable—for barren lands or rock outcrops.

High		**Medium**		**Low**	**N/A**
3	136	2	55	7	5
4	137	7	57	8	6
10	138	8	59	35	9
11	139	10	61g	36	50
24	141g	12	61	37	150
25	141	13	62	38	
85	142	14	63	40	
86	143	15	64	41	
87	144	24	65	42	
88	156	25	66g	48	
95	157	27	66	49	
102	158	28	67	71	
103	159	29	68	72	
105	206	30	69	73	
106	210	31	70	75	
107	211	32	252	76	
110	212	33	253	77	
111	213	34	263	78	
114	214	51	298	79	
115	215	52	301	271	
119	216	53			
120	217				
132	218				
133	219				
135	220				
136g					

Permeability (Column #6)

That quality of the soil that enables it to transmit water or air. It can be measured quantitively in terms of rate of flow of water through a unit cross section of saturated soil in unit time, under specified temperature and hydraulic conditions. Percolation under gravity with a ½ inch head and drainage through cores can be measured by a standard procedure involving presaturation of samples. Rates of percolation are expressed in inches per hour. Two symbols with a slash between (ie M/VR) means the first symbol identifies the permeability of the upper material, and the second the permeability of the underlying material. Unless there is a difference of two or more classes this type rating will not be given.

		inches per hour
VS	Very slow	Less than 0.05
S	Slow	0.05 to 0.20
MS	Moderately slow	0.20 to 0.80
M	Moderate	0.80 to 2.50
MR	Moderately rapid	2.50 to 5.00
R	Rapid	5.00 to 10.00
VR	Very Rapid	over 10.00

Variable—Conditions not classifiable.

Slow	Moderately Slow	Moderate		Moderately Rapid	M/VS	M/VR	R/M/VS	R/MS	R/M	Variable
3	85	10	103	13	24	14	35	271	71	2
4	86	11	105	14	25	15	36		72	5
95	87	51	106	252	27		37		73	6
110	88	52	107	253	28		38		75	7
111	132	53	119	263	29		40		76	8
114	133	55	120		30		41		77	9
115	135	57	206		31		42		78	50
	136g	59	210		32		48		79	150
	136	61g	211		33		49			
	137	61	212		34					
	138	62	213							
	139	63	214							
	141g	64	215							
	141	65	216							
	142	66g	217							
	143	66	218							
	144	67	219							
	156	68	220							
	157	69	298							
	158	70	301							
	159	102								

Natural Fertility (Column #7)

The relative level of inherent fertility. This is based upon thickness and organic matter content of the surface layer, mineralogy and estimates based upon productivity of the different landtypes.

L—**Low**—definite evidence of low nutrient levels, nutrient tie-ups, low organic matter content, severe erosion, or any combination of these factors.

M—**Moderate**—intermediate level of natural fertility. These soils are commonly deficient in adequate levels of nitrogen and sulfur and generally respond favorably to applications of both. Soil erosion is no worse than moderate and a major portion of the surface soil remains.

H—**High**—These soils by comparison to the other soils have higher levels of organic matter, thicker surface soils, and are more productive than the other soils. They too may be lacking in adequate amounts of nitrogen and sulfur.

Low		**Moderate**			**High**
2	70	14	69	138	3
5	71	15	85	139	4
6	72	24	86	141g	10
7	73	25	87	141	11
8	75	27	88	142	12
9	76	28	95	143	113
31	77	29	102	144	
35	78	30	103	211	
36	79	32	105	212	
37	120	33	106	213	
38	150	34	107	214	
40	156	57	110	215	
41	157	59	111	216	
42	158	61g	114	217	
48	159	61	115	218	
49	206	62	119	219	
50	210	63	132	220	
51	215	64	133	252	
52	220	65	135	253	
53	271	66g	136g	263	
55		66	136	298	
		67	137	301	
		68			

Percent Coarse Fragments (Column #8)

The percentage of the soil, on the volumetric basis, made up by rock fragments that are two millimeters or larger in diameter. Listed below are three columns that separate the lands at groups. Some land-types will appear in more than one column.

less than 40 percent			**40 to 60 percent**		**greater than 60 percent**
2	59	120	2	65	2
3	61g	132	6	66g	5
4	61	133	7	66	6
6	62	135	8	67	7
7	63	136g	12	68	8
8	64	136	13	69	14
9	65	137	14	70	15
10	66g	138	15	71	32
11	66	139	24	72	33
12	67	141g	25	73	34
14	68	141	27	75	35
15	69	142	28	76	36
24	70	143	29	77	37
25	71	144	30	78	38
27	72	156	31	79	40
28	73	157	32	102	41
29	75	158	33	103	42
30	76	159	34	105	48
31	77	206	35	106	49
32	78	210	36	107	50
33	79	211	37	110	61
34	85	212	38	111	66g
35	86	213	40	114	66
36	87	214	41	115	71
37	88	215	42	119	72
38	95	216	48	120	73
40	102	217	49	252	75
41	103	218	50	253	76
42	105	219	61	263	77
48	106	220	62	271	78
49	107	252	63	298	79
50	110	253	64	301	110
51	111	263			150
52	114	271			252
53	115	298			253
55	119	301			263
57					271

Textural Class (Column #9)

Texture, as used here, refers to all of the mineral soil material. Texture is relative proportions of sand (2.0 mm to 0.05 mm.), silt (0.05 mm to 0.002 mm.), and clay (less than 0.002 mm.). Specific textural definitions are given in the glossary. For the purpose of seeing the relationship between different landtypes, general textural terms are used for the groupings listed below.

Abbreviation	General Class	Basic Soil Textural Class Name
c—	coarse textured soils	sands, loamy sands
mc—	moderately coarse textured soils	sandy loam, fine sandy loam
m—	medium textured soils	very fine sandy loam, loam, silt loam, silt
mf—	moderately fine textured soils	clay loam, sandy clay loam, silty clay loam
f—	fine textured soils	sandy clay, silty clay, clay

Some landtypes have several textures, so may be listed in more than one grouping. N/A is used for a few landtypes that really have no definable texture.

coarse textured Soils		moderately coarse textured Soils			medium textured Soils		moderately fine textured Soils		fine textured Soils	N/A
2	64	2	57	119	2	107	3	114	110	5
6	65	4	59	120	3	110	4	115	111	150
7	66g	6	61g	132	4	111	51	119	114	
9	66	7	62	133	7	114	52	120	115	
10	67	8	63	135	8	115	53	132		
11	68	9	64	136g	9	119	55	133		
12	69	10	65	136	10	120	57	135		
13	70	11	66g	137	11	132	59	136g		
14	71	12	66	138	12	133	61g	136		
15	72	13	67	139	13	135	61	137		
24	73	14	68	141g	14	136g	62	138		
25	75	15	69	141	15	136	63	139		
27	76	24	70	142	27	137	64	141g		
28	77	25	71	143	28	138	65	141		
29	78	27	72	144	31	139	66g	142		
30	79	28	73	156	51	141g	66	143		
31	85	29	75	157	52	141	67	144		
32	86	30	76	158	53	142	68	211		
33	87	31	77	159	55	143	69	212		
34	88	32	78	206	57	144	70	213		
35	95	33	79	210	59	156	95	214		
36	132	34	85	212	61g	157	102	215		
37	133	35	86	213	61	158	103	216		
38	135	36	87	214	62	159	105	217		
40	136g	37	88	215	63	206	106	218		
41	136	38	95	217	64	210	107	219		
42	137	40	102	218	65	211	110	220		
48	138	41	103	219	66g	212	111	271		
49	139	42	105	220	66	213				
50	141g	48	106	252	67	214				
51	141	49	107	253	68	215				
52	142	50	110	263	69	216				
53	143	51	111	271	70	217				
54	144	52	114	298	85	218				
57	252	53	115	301	86	219				

Textural Class (Column −9) continued

Course Textured Soils	
59	253
61g	263
61	271
62	298
63	301

Moderately Course Textured Soils
55

Medium Textured Soils	
87	220
88	252
95	253
102	263
103	271
105	298
106	301

Estimated Available Water Capacity (Column #10)

Expressed in inches of water per inch of soil. The value shown reflects the effect of the texture, structure, and percentage of coarse fragments. This value excludes compensations for coarse fragments or bedrock. For purposes of comparison the values have been divided into four groups, that can be thought of as: very low, low, moderate, and high in relation to their available water holding capacity. Many landtypes will be listed in more than one group. These values do not represent compacted layers or bedrock.

Very low	**low**		**moderate**			**high**	
less than .06"/inch	**.07 through .12"/inch**		**.13 through .16"/inch**			**greater than .17"/inch**	
5	2	66	2	61g	133	3	106
6	6	67	4	61	135	4	107
7	7	68	6	62	136g	6	110
8	8	69	8	63	136	10	111
9	24	70	10	64	137	11	114
50	25	71	11	65	138	12	115
150	27	72	12	66g	139	13	119
	28	73	13	66	141g	14	120
	29	75	14	67	141	15	132
	30	76	15	68	142	35	133
	31	77	24	69	143	36	135
	32	78	25	70	144	37	136g
	33	79	27	71	156	38	136
	34	132	28	72	157	40	137
	35	133	29	73	158	41	138
	36	135	30	75	159	42	139
	37	136g	31	76	206	48	141g
	38	136	32	77	210	49	141
	40	137	33	85	211	71	142
	41	138	34	86	212	72	143
	42	139	35	87	213	73	144
	48	141g	36	88	214	75	206
	49	141	37	95	215	76	210
	51	142	38	102	216	77	211
	52	143	40	103	217	78	212
	53	144	41	105	218	79	213
	55	156	42	106	219	85	214
	57	157	48	107	220	86	215
	59	158	49	110	252	87	216
	61g	159	51	111	253	88	217
	61	252	52	114	263	95	218
	62	253	53	115	271	102	219
	63	263	55	119	298	103	220
	64	271	57	120	301	105	271
	65	298	59	132			
	66g	301					

INTERNAL CHARACTERISTICS

Land Type	(1) Parent Material	(2) Depth to BR	(3) Bedrock Composition	(4) Effective Rooting Depth	(5) Compaction Hazard	(6) Permeability	(7) Natural Fertility	(8) Percent Coarse Frag.	(9) Textural Class	(10) Estimated Available Water Capacity
2	Terrace Escarpment	> 12'	Any	< 20"	M	Variable	L	0-80	c-mc-m	.07-.16
3	Wet Meadow	4-12'	Any	< 20"	H	S	H	0-30	m-mf	.17-.20
4	Alpine Meadow	2-5'	Any	< 20"	H	S	H	5-35	mc-m-mf	.15-.19
5	Talus Slopes & Boulder Deposits	> 3'	Any	< 10"	N/A	Variable	L	90-100	N/A	< .06
6	Rock Outcrops, Talus & Alpine Meadows	0-20"	Any	< 20"	N/A	Variable	L	10-50	c-mc	.01-.20
7	Rugged Rocky Land Form w/Low Timber Site	0-20"	Any	< 20"	L-M	Variable	L	10-60	c-mc-m	.01-.12
8	Highly Dissected Land Forms w/Low Timber Site	0-20"	Any	< 30"	L-M	Variable	L	10-40	mc-m	.01-.15
9	Barren Slide Areas	0-6"	Any	< 5"	N/A	Variable	L	0-30	c-mc-m	< .06
10	Alluvium	> 12'	Any	20-50"	M-H	M	H	0-40	c-mc-m	.13-.17
11	Alluvium	> 12'	Any	20-50"	H	M	H	0-40	c-mc-m	.13-.18
12	Pumicy Alluvium	> 12'	Any	20-50"	L-M	MR	H	20-90	c-mc-m	.16-.20
13	Pumicy Alluvium	> 12'	Any	20-50"	M	MR	H	20-90	c-mc-m	.16-.20
14	Glacial Outwash	> 12'	Any	10-36"	M	M/VR	M	5-90	c-mc-m	.15-.18
15	Glacial Outwash	> 12'	Any	10-36"	M	M/VR	M	0-98	c-mc-m	.15-.18
24	Glacial Till	> 12'	Any	20-40"	M-H	M/VS	M	5-65	c-mc	.09-.16
25	Glacial Till	> 12'	Any	20-40"	M-H	M/VS	M	10-65	c-mc	.09-.16
27	Glacial Till	> 12'	Any	20-40"	M	M/VS	M	10-65	c-mc-m	.09-.16
28	Glacial Till	> 12'	Any	20-40"	M	M/VS	M	10-65	c-mc-m	.09-.16
29	Glacial Till	> 12'	Any	20-40"	M	M/VS	M	5-65	c-mc	.09-.16
30	Glacial Till	> 12'	Any	20-40"	M	M/VS	M	10-65	c-mc	.09-.16
31	Glacial Till	> 12'	Any	20-40"	M	M/VS	M	0-65	c-mc-m	.09-.16
32	Glacial Till	> 12'	Any	20-40"	M	M/VS	M	0-65	c-mc	.09-.16
33	Glacial Till	> 12'	Any	20-40"	M	M/VS	M	0-65	c-mc	.09-.16
34	Glacial Till	> 12'	Any	20-40"	M	M/VS	M	0-65	c-mc	.09-.16
35	Pumice/Glacial Till	> 12'	Any	20-50"	L	R/M/VS	L	10-95	c-mc	.09-.18
36	Pumice/Glacial Till	> 12'	Any	20-50"	L	R/M/VS	L	10-95	c-mc	.09-.18
37	Pumice/Glacial Till	> 12'	Any	20-50"	L	R/M/VS	L	10-95	c-mc	.09-.18
38	Pumice/Glacial Till	> 12'	Any	20-50"	L	R/M/VS	L	10-95	c-mc	.09-.18
40	Pumice/Glacial Till	> 12'	Any	20-50"	L	R/M/VS	L	10-95	c-mc	.09-.18
41	Pumice/Glacial Till	> 12'	Any	20-50"	L	R/M/VS	L	10-95	c-mc	.09-.18
42	Pumice/Glacial Till	> 12'	Any	20-50"	L	R/M/VS	L	10-95	c-mc	.09-.18

Land Type	(1) Parent Material	(2) Depth to BR	(3) Bedrock Composition	(4) Effective Rooting Depth	(5) Compaction Hazard	(6) Permeability	(7) Natural Fertility	(8) Percent Coarse Frag.	(9) Textural Class	(10) Estimated Available Water Capacity
48	Pumice/Glacial Till	> 12'	Any	20-50"	L	R/M/VS	L	10-95	c-mc	.09-.18
49	Pumice/Glacial Till	> 12'	Any	20-50"	L	R/M/VS	L	10-95	c-mc	.09-.18
50	Granitic Rock Outcrop	0-6"	granite & gneiss	< 6"	N/A	Variable	L	5-85	c-mc	< .06
51	Granitic & Gneissic Residuum	0-20"	granite & gneiss	< 20"	M	M	L	0-45	c-mc-m-mf	.09-.16
52	Granitic & Gneissic Residuum	0-20"	granite & gneiss	< 20"	M	M	L	0-45	c-mc-m-mf	.09-.16
53	Granitic & Gneissic Residuum	0-20"	granite & gneiss	< 20"	M	M	L	0-45	c-mc-m-mf	.09-.16
55	Granitic & Gneissic Residuum	0-20"	granite & gneiss	< 20"	M	M	L	0-45	c-mc-m-mf	.09-.16
57	Granitic & Gneissic Residuum	20-60"	granite & gneiss	20-60"	M	M	M	0-40	c-mc-m-mf	.09-.16
59	Granitic & Gneissic Residuum	20-60"	granite & gneiss	20-60"	M	M	M	0-40	c-mc-m-mf	.09-.16
61g	Granitic & Gneissic Residuum	20-60"	granite & gneiss	20-60"	M	M	M	0-40	c-mc-m-mf	.09-.16
61	Granitic & Gneissic Residuum	20-60"	granite & gneiss	20-60"	M	M	M	0-40	c-mc-m-mf	.09-.16
62	Granitic & Gneissic Residuum	20-60"	granite & gneiss	20-60"	M	M	M	0-40	c-mc-m-mf	.09-.16
63	Granitic & Gneissic Residuum	20-60"	granite & gneiss	20-60"	M	M	M	0-40	c-mc-m	.09-.16
64	Granitic & Gneissic Residuum	20-60"	granite & gneiss	20-60"	M	M	M	0-40	c-mc-m	.09-.16
65	Granitic & Gneissic Residuum	20-60"	granite & gneiss	20-60"	M	M	M	0-40	c-mc-m-mf	.09-.16
66g	Granitic & Gneissic Residuum	20-60"	granite & gneiss	20-60"	M	M	M	0-40	c-mc-m-mf	.09-.16
66	Granitic & Gneissic Residuum	20-60"	granite & gneiss	20-60"	M	M	M	0-40	c-mc-m-mf	.09-.16
67	Granitic & Gneissic Residuum	20-60"	granite & gneiss	20-60"	M	M	M	0-40	c-mc-m-mf	.09-.16
68	Granitic & Gneissic Residuum	20-60"	granite & gneiss	20-60"	M	M	M	0-40	c-mc-m-mf	.09-.16
69	Granitic & Gneissic Residuum	20-60"	granite & gneiss	20-60"	M	M	M	0-40	c-mc-m-mf	.09-.16
70	Granitic & Gneissic Residuum	20-60"	granite & gneiss	20-60"	M	M	L	0-40	c-mc-m-mf	.09-.16
71	Pumice/Granitic & Gneissic Residuum	20-108"	granite & gneiss	20-108"	L	R/M	L	10-90	c-mc	.09-.18
72	Pumice/Granitic & Gneissic Residuum	20-108"	granite & gneiss	20-108"	L	R/M	L	10-90	c-mc	.09-.18
73	Pumice/Granitic & Gneissic Residuum	20-108"	granite & gneiss	20-108"	L	R/M	L	10-90	c-mc	.09-.18
75	Pumice/Granitic & Gneissic Residuum	20-108"	granite & gneiss	20-108"	L	R/M	L	10-90	c-mc	.09-.18
76	Pumice/Granitic & Gneissic Residuum	20-108"	granite & gneiss	20-108"	L	R/M	L	10-90	c-mc	.09-.18
77	Pumice/Granitic & Gneissic Residuum	20-108"	granite & gneiss	20-108"	L	R/M	L	10-90	c-mc	.09-.18
78	Pumice/Granitic & Gneissic Residuum	20-108"	granitic & gneiss	20-108"	L	R/M	L	10-90	c-mc	.09-.18
79	Pumice/Granitic & Gneissic Residuum	20-108"	granitic & gneiss	20-108"	L	R/M	L	10-90	c-mc	.09-.18

INTERNAL CHARACTERISTICS

Land Type	(1) Parent Material	(2) Depth to BR	(3) Bedrock Composition	(4) Effective Rooting Depth	(5) Compaction Hazard	(6) Permeability	(7) Natural Fertility	(8) Percent Coarse Frag.	(9) Textural Class	(10) Estimated Available Water Capacity
85	Schist Residuum	10-40"	schist	10-40"	H	MS	M	0-35	c-mc-m	.13-.18
86	Schist Residuum	10-40"	schist	10-40"	H	MS	M	0-35	c-mc-m	.13-.18
87	Schist Residuum	10-40"	schist	10-40"	H	MS	M	0-35	c-mc-m	.13-.18
88	Schist Residuum	10-40"	schist	10-40"	H	MS	M	0-35	c-mc-m	.13-.18
89	Schist Residuum	10-40"	schist	10-40"	H	MS	M	0-35	c-mc-m	.13-.18
95	Schist Residuum	10-40"	schist	10-40"	H	S	M	0-35	c-mc-m-mf	.15-.18
102	Pyroclastic Residuum	20-70"	pyroclastics	20-70"	H	M	M	0-25	mc-m-mf	.13-.18
103	Pyroclastic Residuum	20-70"	pyroclastics	20-70"	H	M	M	0-25	mc-m-mf	.13-.18
105	Pyroclastic Residuum	20-70"	pyroclastics	20-70"	H	M	M	0-25	mc-m-mf	.13-.18
106	Pyroclastic Residuum	20-70"	pyroclastics	20-70"	H	M	M	0-25	mc-m-mf	.13-.18
107	Pyroclastic Residuum	20-70"	pyroclastics	20-70"	H	M	M	0-25	mc-m-mf	.13-.18
110	Pyroclastic Residuum	20-90"	pyroclastics	20-90"	H	S	M	0-30	mc-m-mf-f	.13-.18
111	Pyroclastic Residuum	20-90"	pyroclastics	20-90"	H	S	M	0-30	mc-m-mf-f	.13-.18
114	Pyroclastic Residuum	20-90"	pyroclastics	20-90"	H	S	M	0-30	mc-m-mf-f	.13-.18
115	Pyroclastic Residuum	20-90"	pyroclastics	20-90"	H	S	M	0-30	mc-m-mf-d	.13-.18
119	Pyroclastic Residuum	20-90"	pyroclastics	20-90"	H	M	M	0-30	mc-m-mf	.13-.18
120	Pyroclastic Residuum	20-90"	pyroclastics	20-90"	H	M	M	0-30	mc-m-mf	.13-.18
132	Swauk Sandstone Residuum	15-40"	sandstones & conglomerate	15-40"	H	MS	M	0-20	c-mc-m-mf	.09-.18
133	Swauk Sandstone Residuum	15-48"	sandstones & conglomerate	15-40"	H	MS	M	0-20	c-mc-m-mf	.09-.18
135	Swauk Sandstone Residuum	15-36"	sandstones & conglomerate	15-36"	H	MS	M	0-20	c-mc-m-mf	.09-.18
136g	Swauk Sandstone Residuum	15-40"	sandstones & conglomerate	15-40"	H	MS	M	0-20	c-mc-m-mf	.09-.18
136	Swauk Sandstone Residuum	15-40"	sandstones & conglomerate	15-40"	H	MS	M	0-20	c-mc-m-mf	.09-.18
137	Swauk Sandstone Residuum	15-40"	sandstones & conglomerate	15-40"	H	MS	M	0-25	c-mc-m-mf	.09-.18
138	Swauk Sandstone Residuum	15-40"	sandstones & conglomerate	15-40"	H	MS	M	0-30	c-mc-m-mf	.09-.18
139	Swauk Sandstone Residuum	15-40"	sandstones & conglomerate	15-40"	H	MS	M	0-30	c-mc-m-mf	.09-.18
141g	Swauk Sandstone Residuum	15-40"	sandstones & conglomerate	15-40"	H	MS	M	0-30	c-mc-m-mf	.09-.18
141	Swauk Sandstone Residuum	15-40"	sandstones & conglomerate	15-40"	H	MS	M	0-30	c-mc-m-mf	.09-.18

Land Type	(1) Parent Material	(2) Depth to BR	(3) Bedrock Composition	(4) Effective Rooting Depth	(5) Compaction Hazard	(6) Permeability	(7) Natural Fertility	(8) Percent Coarse Frag.	(9) Textural Class	(10) Estimated Available Water Capacity
142	Swauk Sandstone Residuum	15-40"	sandstones & conglomerate	15-40"	H	MS	M	0-30	c-mc-m-mf	.09-.18
143	Swauk Sandstone Residuum	15-40"	sandstones & conglomerate	15-40"	H	MS	M	0-30	c-mc-m-mf	.09-.18
144	Swauk Sandstone Residuum	15-40"	sandstones & conglomerate	15-40"	H	MS	M	0-30	c-mc-m-mf	.09-.18
150	Serpentine Rock Outcrop	< 20"	serpentine	<6"	N/A	Variable	L	10-90	N/A	< .06
156	Serpentine Residuum	14-50"	serpentine	14-50"	H	MS	L	0-40	mc-m	.07-.16
157	Serpentine Residuum	14-50"	serpentine	14-50"	H	MS	L	0-40	mc-m	.07-.16
158	Serpentine Residuum	14-50"	serpentine	14-50"	H	MS	L	0-40	mc-m	.07-.16
159	Serpentine Residuum	15-40"	serpentine	15-40"	H	MS	L	0-40	mc-m	.07-.16
206	Basalt Residuum	4-20"	basalt, andesite rhyolite	< 20"	H	M	L	0-30	mc-m	.15-.18
210	Basalt Residuum	4-20"	basalt, andesite rhyolite	< 20"	H	M	L	0-30	mc-m	.15-.18
211	Basalt Residuum	15-40"	basalt, andesite rhyolite	20-40"	H	M	M	0-30	m-mf	.15-.18
212	Basalt Residuum	15-40"	basalt, andesite rhyolite	20-40"	H	M	M	0-30	mc-m-mf	.15-.18
213	Basalt Residuum	15-40"	basalt, andesite rhyolite	20-40"	H	M	M	0-30	mc-m-mf	.15-.18
214	Basalt Residuum	15-40"	basalt, andesite rhyolite	20-40"	H	M	M	0-30	mc-m-mf	.15-.18
215	Basalt Residuum	15-40"	basalt, andesite rhyolite	20-40"	H	M	M	0-30	mc-m-mf	.15-.18
216	Basalt Residuum	15-40"	basalt, andesite rhyolite	20-40"	H	M	M	0-30	m-mf	.15-.18
217	Basalt Residuum	15-40"	basalt, andesite rhyolite	15-40"	H	M	M	0-30	mc-m-mf	.15-.18
218	Basalt Residuum	15-40"	basalt, andesite rhyolite	15-40"	H	M	M	0-30	mc-m-mf	.15-.18
219	Basalt Residuum	15-40"	basalt, andesite rhyolite	15-40"	H	M	M	0-30	mc-m-mf	.15-.18
220	Basalt Residuum	15-40"	basalt, andesite rhyolite	15-40"	H	M	M	0-30	mc-m-mf	.15-.18
252	Colluvium	> 12'	Any	20-60"	M	MR	M	10-60	c-mc-m	.07-.16
253	Colluvium	> 12'	Any	20-16"	M	MR	M	10-60	c-mc-m	.07-.16

Land Type	(1) Parent Material	(2) Depth to BR	(3) Bedrock Composition	(4) Effective Rooting Depth	(5) Compaction Hazard	(6) Permeability	(7) Natural Fertility	(8) Percent Coarse Frag.	(9) Textural Class	(10) Estimated Available Water Capacity
263	Colluvium	12'	Any	20-60"	M	MR	M	0-60	c-mc-m	.07-.16
271	Pumice/Weak Sedimentary Residuum	10-120"	sandstone & conglomerate	10-120"	L	R/MS	L	0-90	c-mc-m-mf	.09-.18
298	Hard Sedimentary Residuum	15-60"	sandstone & conglomerate	15-60"	M	M	M	0-50	c-mc-m	.07-.15
301	Hard Sedimentary Residuum	15-60"	sandstone & conglomerate	15-60"	M	M	M	0-50	c-mc-m	.07-.15

EROSION AND HYDROLOGIC INTERPRETATIONS

Interpretations for erosion include two kinds of water related soil movement-surface and mass movement. Surface erosion includes, sheet, rill, and gully. Mass movement pertains to all types of subsurface soil movement and, in places, some forms of bedrock movement, ie, landslips, slumps, slides, rockfall, landflow, and debris avalanche.

Column #	Interpretation
1	Natural Stability
2	Nature of Mass Movement
3	Expected Stability Changes From Roadbuilding
4	Erosion Hazard
5	Suggestions For Controlling Erosion
6	Drainage Class
7	Water Yield Class
8	Bedrock Hydrologic Characteristics
9	Hydrologic Group
10	Sediment Yield Potential
11	Mixing and Displacement Hazard
12	Expected Erosion Sediment Size
13	Water/Resource Management Requirements

Natural Stability (Column #1) — This rating indicates the relative stability of each land type as it occurs in the natural state. This includes any movement or loss by slumps, slides and all other kinds of deep-seated failures. This rating applies throughout Region 6.

I - Very Stable — No evidence of failures.

II - Stable — Occasional failures are observed.

III - Moderately stable — Several failures are observed.

IV - Many failures are observed.

V - Very unstable — Entire area shows evidence of recent or past failures.

Note: A failure is considered to be 10 cubic yards of material.

I	II			III				IV		V
3	2	61	103	27	71	136	217	40	111	9
4	5	62	132	28	72	136	218	41	150	114
5	6	63	133	29	73	137	219	42	156	115
10	7	64	135	30	85	138	220	48	157	
11	8	65	206	31	86	139	252	49	158	
12	24	66g	211	32	87	141g	253	75	159	
13	25	66	212	33	88	141	263	76	271	
14	51	67	213	34	105	142		77		
15	52	68	214	35	106	143		78		
50	53	69	215	36	107	144		79		
57	55	70	298	37	119	210		95		
59	61g	102	301	38	120	216		110		

Nature of Mass Movement (Column #2)

Debris Avalanche, (also includes debris slides and debris flows, which are all genetically related, differing mainly by water content.) This grouping is characterized by initial failure of a mass of soil or mixed soil and organic debris above a relatively impermeable boundary. Failure is either by rotational or by translational sliding followed by rapid downslope movement. The main slide scarp may be spoon or

2) Revegetation — Proper seedbed preparations, seed adapted species, timeliness of seeding, seeding rate, and fertilizing.
3) Mulching — Chips, straw, hay, etc.
4) Terracing — terrace road cuts and other steep disturbed sites.

N/A — Not Applicable.

Drainage Class (Column #6) Soil drainage, in a dynamic or active sense, refers to the rapidity and extent of the removal of water from the soil, in relation to additions, especially by surface runoff and by flow through the soil to underground spaces.

Soil drainage, as a condition of the soil, refers to the frequency and duration of periods when the soil is free of saturation or partial saturation.

Excessively Drained — Water is removed from the soil very rapidly. Excessively drained soils are commonly lithosols or lithosolic, and may be steep, very porous, or both. Shallow soils on slopes may be excessively drained. Enough precipitation is commonly lost from these soils to make them unsuitable for ordinary crop production.

Somewhat Excessively Drained — Water is removed from the soil rapidly. Some of the soils are lithosolic. Many of them have little horizon differentiation and are sandy and very porous.

Well Drained — Water is removed from the soil readily but not rapidly. Well-drained soils are commonly intermediate in texture, although soils of other textural classes may also be well drained. Well drained soils commonly retain optimum amounts of moisture for plant growth after rains.

Moderately Well Drained — Water is removed from the soil somewhat slowly, so that the profile is wet for a small but significant part of the time. Moderately well drained soils commonly have a slowly permeable layer within or immediately beneath the solum, a relatively high water table, additions of water through seepage, or some combination of these conditions.

Somewhat Poorly Drained — Water is removed from the soil slowly enough to keep it wet for significant periods but not all the time. Imperfectly drained soils commonly have a slowly permeable layer within the profile, a high water table, additions through seepage, or a combination of these conditions.

Poorly Drained — Water is removed so slowly that the soil remains wet for a large part of the time. The water table is commonly at or near the surface during a considerable part of the year. Poorly drained conditions are due to a high water table, to a slowly permeable layer within the profile, to seepages or to some combination of these conditions.

Very Poorly Drained — Water is removed from the soil so slowly that the water table remains at or on the surface the greater part of the time. Soils of this drainage class usually occupy level or depressed sites and are frequently ponded.

Excessively	Somewhat Excessively		Well			Moderately Well	Somewhat Poorly	Poorly	Very Poorly
2	6	66	6	63	136g	4	4	3	3
5	7	67	7	64	136	6	6	4	4
6	9	68	8	65	137	8	11	6	11
7	12	69	10	66g	138	10	13	11	13
14	14	70	12	66	139	24	95	13	
15	15	71	14	67	141g	25	110	95	
50	32	72	15	68	141	27	111	110	
150	33	73	24	69	142	28	114	111	
252	34	75	25	70	143	29	115	114	
253	35	76	27	71	144	30		115	
263	36	77	28	72	156	31			
271	37	78	29	73	157	85			
	38	79	30	75	158	86			
	40	136g	31	76	159	87			
	41	136	32	77	206	88			
	42	137	33	78	210	95			
	48	138	34	79	211	102			
	49	139	35	85	212	103			
	51	141g	36	86	213	105			
	52	141	37	87	214	106			
	53	142	38	88	215	107			
	55	143	40	102	216	110			
	56	144	41	103	217	111			
	59	156	42	105	218	114			
	61g	157	48	106	219	115			
	61	158	49	107	220	119			
	62	159	56	119	252	120			
	63	252	59	120	253	135			
	64	253	61g	132	263	298			
	65	263	61	133	271	301			
	66g	271	62	135	298				
					301				

Water Yield Class (Column #7) — This interpretation is an indication of the rate and amount of water yield expected from each soil. It is based on factors such as texture, structure, infiltration rate, permeability, depth, slope, climate, vegetation and drainage patterns.

Class I — These soils have a high water detention storage capacity and a low rate of runoff. Little water is yielded to peak flows until detention storage capacity is exceeded or unless the soils are initially saturated or frozen. They are important in sustaining high base flow due to a relatively large volume of water held in detention storage.

Class II — These soils have a moderate water detention storage capacity and a moderate rate of runoff. Water contributes to both peak flows and base flows.

Class III — These soils have a low water detention storage capacity and a high rate of runoff. The storage capacity is low and easily exceeded with most of the water contributing to peak flow. Little water is yielded to sustain base flow.

Group A	Group B				Group C	Group D
5	24	63	106	214	2	3
6	25	64	107	215	95	4
7	27	65	119	216		6
8	28	66g	120	217		7
10	29	66	132	218		8
11	30	67	133	219		9
12	31	68	135	220		50
13	32	69	136g	271		51
14	33	70	136	298		52
15	34	71	137	301		53
525	35	72	138			55
253	36	73	139			110
263	37	75	141g			111
	38	76	141			114
	40	77	142			115
	41	78	143			150
	42	79	144			206
	48	85	156			210
	49	86	157			
	57	87	158			
	59	88	159			
	61g	102	211			
	61	103	212			
	62	105	213			

Sediment Yield Potential (Column #10) — This interpretation indicates the potential for water sedimentation and pollution from silt and clay particles carried in suspension following timber harvest, road construction, or other activities. Factors considered in making ratings are soil texture, soil structure, drainage patterns, landform, and climate.

Low — Sedimentation levels of silt and clay particles are not expected to be significant following management activities. Soils are generally moderately coarse textured.

Moderate — Sedimentation levels of silt and clay particles may be significantly increased following management activities with moderate loss of water quality and damage to fisheries. Soils are generally medium textured.

High — Sedimentation levels of silt and clay particles are expected to be high following management activities. Streams become turbid and there is considerable loss of water quality and damage to fisheries. Soils are generally fine to moderately fine textured.

Low		Moderate		High	
5	66	2	86	3	136g
7	67	6	87	4	136
8	68	10	88	6	137
14	69	11	102	9	138
15	70	24	103	10	139
50	71	25	105	11	141g
51	72	27	106	12	141
52	73	28	107	13	142
53	75	29	119	95	143
55	76	30	120	110	144
57	77	31	150	111	156
59	78	32	206	114	157
61g	79	33	210	115	158
61	252	34	211	132	159
62	253	35	212	133	271
63	263	36	213	135	
64	298	37	214		
65	301	38	215		
66g		40	216		
		41	217		
		42	218		
		48	219		
		49	220		
		85			

Mixing and Displacement Hazard (Column #11) — This interpretation indicates the general susceptability of the soil to physical disturbance.

Low — rating indicates little risk of significant amounts of soil mixing or displacement.

Moderate — rating indicates an intermediate risk of soil mixing and displacement.

High — rating indicates a high risk of soil mixing and/or displacement. Affected soils generally have low *bulk* density, or are sticky and plastic when wet, or occupy steep or very steep slopes, or are non-cohesive.

Low		Moderate				High		
5	214	7	53	102	298	2	95	150
6	215	8	55	103	301	3	105	156
10	252	12	61g	110		4	106	157
11	253	13	61	111		9	107	158
14	263	27	62	132		40	114	159
15		28	63	133		41	115	206
24		29	64	135		42	119	210
25		30	65	150		48	120	271
50		31	66g	206		49	136g	
51		32	66	210		75	136	
52		33	67	216		76	137	
53		34	68	217		77	138	
55		35	69	218		78	139	
57		36	70	219		79	141g	
59		37	71	220		85	141	
211		38	72	252		86	142	
212		51	73	253		87	143	
213		52	75	263		88	144	

Expected Erosion Sediment Size (Column #12) — This interpretation indicates the expected sediment size reaching the streams resulting from erosion of each unit. This interpretationis a statement of the dominate separates expected (gravel and sand, sand and silt, or silt and clay) from each soil unit.

Gravel and Sand	Sand and Silt			Silt and Clay	
2	4	59	87	3	219
10	5	61g	88	95	220
11	6	61	132	102	
12	7	62	133	103	
13	8	63	135	105	
14	9	64	136g	106	
15	24	65	136	107	
35	25	66g	137	110	
36	26	66	138	111	
37	27	67	139	114	
38	28	68	141g	115	
40	29	69	141	119	
41	30	70	142	120	
42	31	71	143	206	
48	32	72	144	210	
49	33	73	150	211	
252	34	75	156	212	
253	50	76	157	213	
263	51	77	158	214	
271	52	78	159	215	
	53	79	298	216	
	55	85	301	217	
	57	86		218	

Water/Resource Management Requirements (Column #13) — This interpretation indicates the relative level of management necessary to maintain high water quality standards. This interpretation also pertains to fishery values as affected by the failure to meet these standards, ie. damage resulting from sidecast waste and/or slides caused by management activities.

Low — This rating indicates that the management requirements necessary to maintain high water quality standards and fishery values are basic. The Standard Forest Service protective measures are usually adequate.

Moderate — This rating indicates that more intensive management practices are needed than are commonly in use in order to maintain high water quality and fishery values. Measures required may include some or all of the following: installing water bars on roads and trails, end hauling during road construction, limiting the logging season or kind of equipment to be used, etc.

High — This rating indicates that very intensive protective measures are required to maintain high water quality and fishery values. These include such measures as the following: full log suspension, minimum road construction during wet weather, intensive program for installing water bars and revegetating bare spots, and a critical analysis of cutting levels. This rating also includes soils of such a critical nature that present management techniques are not adequate.

Low
5
6
14
15
24
50
51
52
53
55
57
59
252
253
263

Moderate	
6	70
7	71
10	72
11	73
27	75
28	85
29	86
30	87
31	88
32	102
33	103
34	110
35	111
36	132
37	133
38	135
61g	206
61	211
62	212
63	213
64	214
65	215
66g	252
66	253
67	263
68	298
69	301

High	
2	137
3	138
4	139
8	141g
9	141
12	142
13	143
40	144
41	150
42	156
48	157
49	158
75	159
76	210
77	216
78	271
79	
95	
105	
106	
107	
114	
115	
119	
120	
136g	
136	

EROSION AND HYDROLOGIC INTERPRETATIONS

Land Type	(1) Natural Stability	(2) Nature of Mass Movement	(3) Expected Stability Changes from Road Building	(4) Erosion Hazard	(5) Suggestions for Controlling Erosion	(6) Drainage Class	(7) Water Yield Class	(8) Bedrock Hydrologic Characteristics	(9) Hydrologic Group	(10) Sediment Yield Potential	(11) Mixing & Displacement Hazard	(12) Expected Erosion Sediment Size	(13) Water Resource Management Requirements
2	II	Slumps and earth flow	Greatly increased	H-VH	1,2,3	E	III	N/A	C	M	H	Gravel and sand	H
3	I	N/A	Unchanged	L	1,2	P-VP	I	N/A	D	H	H	Silt & Clay	H
4	I	N/A	Unchanged	H	1,2	MW-P	I	N/A	D	H	H	Sand & Silt	H
5	I & II	Dry Creep & Sliding	Increased	L	N/A	E	III	N/A	A	L	L	Sand & Silt	L
6	II	Snow Slide	Unchanged	H	1,2	E-P	III	Variable	A & D	M-H	L	Sand & Silt	L-M
7	II	Snow Slide	Increased	H	1,2,3,4	E-SWE-W	III	Variable	A & D	L	M	Sand & Silt	M
8	II	Snow Slide	Increased	VH	1,2,3,4	W-MW	III	Variable	A & D	L	M	Sand & Silt	H
9	V	Dry Creep & Sliding	Greatly Increased	VH	N/A	E	III	Variable	D	H	H	Sand & Silt	H
10	I	N/A	Unchanged	H	1,2,3	W-MW	I	N/A	A	M-H	L	Gravel & Sand	M
11	I	N/A	Unchanged	H	1,2,3	SWP-VP	I	N/A	A	M-H	L	Gravel & Sand	M
12	I	N/A	Unchanged	VH	1,2,3	SWE-W	I	N/A	A	H	M	Gravel & Sand	H
13	I	N/A	Unchanged	VH	1,2,3	SWP-P-VP	I	N/A	A	H	M	Gravel & Sand	H
14	I	N/A	Unchanged	L	1,2,3	E-SWE-W	III	N/A	A	L	L	Gravel & Sand	L
15	I	N/A	Unchanged	L	1,2,3	E-SWE-W	III	N/A	A	L	L	Gravel & Sand	L
24	II	N/A	Unchanged	L	1,2,3	W-MW	I	N/A	B	M	L	Sand & Silt	L
25	II	N/A	Unchanged	L	1,2,3	W-MW	I	N/A	B	M	L	Sand & Silt	L
27	III	Deep Seated soil creep	Increased	M-H	1,2,3,4	W-MW	II	N/A	B	M	M	Sand & Silt	M
28	III	Deep Seated soil creep	Increased	M-H	1,2,3,4	W-MW	II	N/A	B	M	M	Sand & Silt	M
29	III	Deep Seated soil creep	Increased	M-H	1,2,3,4	W-MW	II	N/A	B	M	M	Sand & Silt	M
30	III	Deep Seated soil creep	Increased	M-H	1,2,3,4	W-MW	II	N/A	B	M	M	Sand & Silt	M
31	III	Deep Seated soil creep	Increased	M-H	1,2,3,4	W-MW	II	N/A	B	M	M	Sand & Silt	M
32	III	Snow Slide	Increased	H	1,2,3,4	SWE-W	II	N/A	B	M	M	Sand & Silt	M
33	III	Snow Slide	Increased	H	1,2,3,4	SWE-W	II	N/A	B	M	M	Sand & Silt	M
34	III	Snow Slide	Increased	H	1,2,3,4	SWE-W	II	N/A	B	M	M	Sand & Silt	M
35	III	N/A	Increased	M	1,2,3	SWE-W	I	N/A	B	M	M	Gravel & Sand	M
36	III	N/A	Increased	M	1,2,3	SWE-W	I	N/A	B	M	M	Gravel & Sand	M

EROSION AND HYDROLOGIC INTERPRETATIONS

Land Type	(1) Natural Stability	(2) Nature of Mass Movement	(3) Expected Stability Changes from Road Building	(4) Erosion Hazard	(5) Suggestions for Controlling Erosion	(6) Drainage Class	(7) Water Yield Class	(8) Bedrock Hydrologic Characteristics	(9) Hydrologic Group	(10) Sediment Yield Potential	(11) Mixing & Displacement Hazard	(12) Expected Erosion Sediment Size	(13) Water Resource Management Requirements
37	III	N/A	Increased	M	1,2,3	SWE-W	I	N/A	B	M	M	Gravel & Sand	M
38	III	N/A	Increased	M-H	1,2,3	SWE-W	I	N/A	B	M	M	Gravel & Sand	M
40	IV	Debris avalanche	Greatly increased	H-VH	1,2,3,4	SWE-W	II	N/A	B	M	H	Gravel & Sand	H
41	IV	Debris avalanche	Greatly increased	H-VH	1,2,3,4	SWE-W	II	N/A	B	M	H	Gravel & Sand	H
42	IV	Debris avalanche	Greatly increased	H-VH	1,2,3,4	SWE-W	II	N/A	B	M	H	Gravel & Sand	H
48	IV	Snow slide	Greatly increased	VH	1,2,3,4	SWE-W	II	N/A	B	M	H	Gravel & Sand	H
49	IV	Snow slide	Greatly increased	VH	1,2,3,4	SWE-W	II	N/A	B	M	H	Gravel & Sand	H
50	I	N/A	Unchanged	L	N/A	E	III	III	D	L	L	Sand & Silt	L
51	II	Dry creep & sliding	Unchanged	H	1,2,3	SWE	III	III	D	L	L-M	Sand & Silt	L
52	II	Dry creep & sliding	Unchanged	H	1,2,3	SWE	III	III	D	L	L-M	Sand & Silt	L
53	II	Dry creep & sliding	Unchanged	H	1,2,3	SWE	III	III	D	L	L-M	Sand & Silt	L
55	II	Dry creep & sliding	Unchanged	H	1,2,3	SWE	III	III	D	L	L-M	Sand & Silt	L
57	I	N/A	Unchanged	L	1,2,3	SWE-W	II	III	B	L	L	Sand & Silt	L
59	I	N/A	Unchanged	L	1,2,3	SWE-W	I	III	B	L	L	Sand & Silt	L
61g	II	Deep seated soil creep	Increased	M	1,2,3,4	SWE-W	II	III	B	L	M	Sand & Silt	M
61	II	Deep seated soil creep	Increased	M	1,2,3,4	SWE-W	II	III	B	L	M	Sand & Silt	M
62	II	Deep seated soil creep	Increased	M	1,2,3,4	SWE-W	II	III	B	L	M	Sand & Silt	M
63	II	Deep seated soil creep	Increased	M	1,2,3,4	SWE-W	I	III	B	L	M	Sand & Silt	M
64	II	Deep seated soil creep	Increased	M	1,2,3,4	SWE-W	I	III	B	L	M	Sand & Silt	M
65	II	Deep seated soil creep	Increased	M	1,2,3,4	SWE-W	I	III	B	L	M	Sand & Silt	M

Land Type	(1) Natural Stability	(2) Nature of Mass Movement	(3) Expected Stability Changes from Road Building	(4) Erosion Hazard	(5) Suggestions for Controlling Erosion	(6) Drainage Class	(7) Water Yield Class	(8) Bedrock Hydrologic Characteristics	(9) Hydrologic Group	(10) Sediment Yield Potential	(11) Mixing & Displacement Hazard	(12) Expected Erosion Sediment Size	(13) Water Resource Management Requirements
66g	II	Deep seated soil creep	Greatly increased	H	1,2,3,4	SWE-W	II	III	B	L	M	Sand & Silt	M
66	II	Deep seated soil creep	Greatly increased	H	1,2,3,4	SWE-W	II	III	B	L	M	Sand & Silt	M
67	II	Deep seated soil creep	Greatly increased	H	1,2,3,4	SWE-W	II	III	B	L	M	Sand & Silt	M
68	II	Snow slide	Greatly increased	H	1,2,3,4	SWE-W	I	III	B	L	M	Sand & Silt	M
69	II	Snow slide	Greatly increased	H	1,2,3,4	SWE-W	I	III	B	L	M	Sand & Silt	M
70	II	Snow slide	Greatly increased	H	1,2,3,4	SWE-W	I	III	B	L	M	Sand & Silt	M
71	III	Dry creep & sliding	Increased	H	1,2,3	SWE-W	I	III	B	L	M	Sand & Silt	M
72	III	Dry creep & sliding	Increased	H	1,2,3	SWE-W	I	III	B	L	M	Sand & Silt	M
73	III	Dry creep & sliding	Increased	H	1,2,3	SWE-W	I	III	B	L	M	Sand & Silt	M
75	IV	Debris avalanche	Greatly increased	VH	1,2,3,4	SWE-W	II	III	B	L	M-H	Sand & Silt	M-H
76	IV	Debris avalanche	Greatly increased	VH	1,2,3,4	SWE-W	II	III	B	L	H	Sand & Silt	H
77	IV	Debris avalanche	Greatly increased	VH	1,2,3,4	SWE-W	II	III	B	L	H	Sand & Silt	H
78	IV	Debris avalanche	Greatly increased	VH	1,2,3,4	SWE-W	I	III	B	L	H	Sand & Silt	H
79	IV	Debris avalanche	Greatly increased	VH	1,2,3,4	SWE-W	I	III	B	L	H	Sand & Silt	H
85	III	Deep seated soil creep	Increased	H	1,2,3	W-MW	III	II	B	M	H	Sand & Silt	H
86	III	Deep seated soil creep	Increased	H	1,2,3,4	W-MW	III	II	B	M	H	Sand & Silt	H
87	III	Deep seated soil creep	Increased	H	1,2,3,4	W-MW	III	II	B	M	H	Sand & Silt	H
88	III	Deep seated soil creep	Increased	H	1,2,3,4	W-MW	III	II	B	M	H	Sand & Silt	H

EROSION AND HYDROLOGIC INTERPRETATION

Land Type	(1) Natural Stability	(2) Nature of Mass Movement	(3) Expected Stability Changes from Road Building	(4) Erosion Hazard	(5) Suggestions for Controlling Erosion	(6) Drainage Class	(7) Water Yield Class	(8) Bedrock Hydrologic Characteristics	(9) Hydrologic Group	(10) Sediment Yield Potential	(11) Mixing & Displacement Hazard	(12) Expected Erosion Sediment Size	(13) Water Resource Management Requirements
89	IV	Snow slide	Increased	VH	1,2,3,4	MW-P	III	II	C	H	H	Silt & Clay	H
102	II	N/A	Unchanged	M	1,2,3	W-MW	I	II	B	M	M	Silt & Clay	M
103	II	N/A	Unchanged	M	1,2,3	W-MW	I	II	B	M	M	Silt & Clay	M
105	III	Deep seated soil creep	Increased	M-H	1,2,3,4	W-MW	II	II	B	M	H	Silt & Clay	H
106	III	Deep seated soil creep	Increased	M-H	1,2,3,4	W-MW	I	II	B	M	H	Silt & Clay	H
107	III	Deep seated soil creep	Increased	M-H	1,2,3,4	W-MW	I	II	B	M	H	Silt & Clay	H
110	IV	Slumps and earth flows	Increased	M-H	1,2,3	MW-P	I	II	D	H	M	Silt & Clay	M
111	IV	Slumps and earth flows	Increased	M-H	1,2,3	MW-P	I	II	D	H	M	Silt & Clay	M
114	V	Slumps and earth flows	Greatly increased	VH	1,2,3,4	MW-P	I	II	D	H	H	Silt & Clay	H
115	V	Slumps and earth flows	Greatly increased	VH	1,2,3,4	MW-P	I	II	D	H	H	Silt & Clay	H
119	III	Snow slide	increased	H	1,2,3,4	W-MW	I	II	B	M	H	Silt & Clay	H
120	III	Snow slide	increased	M-H	1,2,3,4	W-MW	I	II	B	M	H	Silt & Clay	H
132	II	N/A	Unchanged	M	1,2,3	W	II	I	B	H	M	Sand & Silt	M
133	II	N/A	Unchanged	M	1,2,3	W	I	I	B	H	M	Sand & Silt	M
135	II	N/A	Unchanged	M-H	1,2,3	W-MW	I	I	B	M	M	Sand & Silt	M
136g	III	Deep seated soil creep	Increased	H	1,2,3	SWE-W	II	I	B	H	H	Sand & Silt	H
136	III	Deep seated soil creep	Increased	H	1,2,3	SWE-W	II	I	B	H	H	Sand & Silt	H
137	III	Deep seated soil creep	Increased	H	1,2,3	SWE-W	II	I	B	H	H	Sand & Silt	H
138	III	Deep seated soil creep	Increased	H	1,2,3,4	SWE-W	I	I	B	H	H	Sand & Silt	H
139	III	Deep seated soil creep	Increased	H	1,2,3,4	SWE-W	I	I	B	H	H	Sand & Silt	H
141g	III	Deep seated soil creep	Increased	H	1,2,3,4	SWE-W	III	I	B	H	H	Sand & Silt	H

Land type	(1) Natural Stability	(2) Nature of Mass Movement	(3) Expected Stability Changes from Road Building	(4) Erosion Hazard	(5) Suggestions for Controlling Erosion	(6) Drainage Class	(7) Water Yield Class	(8) Bedrock Hydrologic Characteristics	(9) Hydrologic Group	(10) Sediment Yield Potential	(11) Mixing & Displacement Hazard	(12) Expected Erosion Sediment Size	(13) Water Resource Management Requirements
141	III	Deep seated soil creep	Increased	H	1,2,3,4	SWE-W	III	I	B	H	H	Sand & Silt	H
142	III	Deep seated soil creep	Increased	H	1,2,3,4	SWE-W	III	I	B	H	H	Sand & Silt	H
143	III	Snow slide	Increased	H	1,2,3,4	SWE-W	II	I	B	H	H	Sand & Silt	H
144	III	Snow slide	Increased	H	1,2,3,4	SWE-W	II	I	B	H	H	Sand & Silt	H
150	IV	Dry Creep & sliding	Increased	H	N/A	E	III	II	D	M	M-H	Sand & Silt	H
156	IV	Slumps & earth flow	Increased	H	1,2,3	SWE-W	III	II	B	H	H	Sand & Silt	H
157	IV	Slumps & earth flow	Increased	H	1,2,3,4	SWE-W	III	II	B	H	H	Sand & Silt	H
159	IV	Slumps & earth flow	Increased	H	1,2,3,4	SWE-W	III	II	B	H	H	Sand & Silt	H
206	II	N/A	Unchanged	M-H	1,2,3	W	III	I	D	M	M-H	Silt & Clay	M
210	III	Dry creep and sliding	Greatly increased	H	1,2,3	W	III	I	D	M	M-H	Silt & Clay	M
211	II	N/A	Unchanged	M	1,2,3	W	II	I	B	M	L	Silt & Clay	M
212	II	N/A	Unchanged	M	1,2,3	W	II	I	B	M	L	Silt & Clay	M
213	II	N/A	Unchanged	M	1,2,3	W	I	I	B	M	L	Silt & Clay	M
214	II	N/A	Unchanged	M	1,2,3	W	I	I	B	M	L	Silt & Clay	M
215	II	N/A	Unchanged	M	1,2,3	W	I	I	B	M	L	Silt & Clay	M
216	III	Deep seated soil creep	Increased	H	1,2,3,4	W	II	I	B	M	M	Silt & Clay	H
217	III	Deep seated soil creep	Increased	H	1,2,3,4	W	II	I	B	M	M	Silt & Clay	H
218	III	Deep seated soil creep	Increased	H	1,2,3,4	W	I	I	B	M	M	Silt & Clay	H
219	III	Deep seated soil creep	Increased	H	1,2,3,4	W	I	I	B	M	M	Silt & Clay	H
220	III	Deep seated soil creep	Increased	H	1,2,3,4	W	I	I	B	M	M	Silt & Clay	H
252	III	N/A	Unchanged	M	1,2,3	E-SWE-W	II	N/A	A	L	L-M	Gravel & Sand	L-M
253	III	N/A	Unchanged	M	1,2,3	E-SWE-W	II	N/A	A	L	L-M	Gravel & Sand	L-M
263	III	N/A	Unchanged	M	1,2,3	E-SWE-W	I	N/A	A	L	L-M	Gravel & Sand	L-M

EROSION AND HYDROLOGIC INTERPRETATIONS

Land Type	(1) Natural Stability	(2) Nature of Mass Movement	(3) Expected Stability Changes from Road Building	(4) Erosion Hazard	(5) Suggestions for Controlling Erosion	(6) Drainage Class	(7) Water Yield Class	(8) Bedrock Hydrologic Characteristics	(9) Hydrologic Group	(10) Sediment Yield Potential	(11) Mixing & Displacement Hazard	(12) Expected Erosion Sediment Size	Re Manage Requireme
271	IV	Debris avalanche	Greatly increased	H	1,2,3,4	E-SWE-W	II	I	B	H	H	Gravel & Sand	H
298	II	Deep seated soil creep	Increased	M	1,2,3,4	W-MW	II	III	B	L	M	Sand & Silt	M
301	II	Snow slide	Increased	H	1,2,3,4	W-MW	I	III	B	L	M	Sand & Silt	M

ENGINEERING INTERPRETATIONS

Interpretations are based upon the part or parts of a soil, (ie, surface soil, subsoil, etc.) that have the greatest influence upon the rating given. The rating given in one column may or may not be based upon the same part of a particular soil profile; therefore, it is important to read the short description for each interpretation.

Column #	Description
1	Unified Classification
2	Suitability for sewage filter field
3	Suitability as a source for sand & gravel
4	Suitability as a source for clay
5	Suitability as a source for road rock
6	Estimate of road rock thickness need
7	Susceptibility to cutbank sloughing & raveling
8	Estimated cut slope ratio
9	Cut bank failure hazard
10	Suitability for erosion control grass seeding.

Classification—Unified (Column #1)

This rating is based on physical properties of a soil. If the materials are reasonably uniform and the soils are deep, this rating is based on the ten to forty inch layer. For soils less than forty inches deep the entire area below the surface is used. If there are contrasting materials two or more ratings may be given. An N/A rating is given for rock outcrops and for some of the miscellaneous landtypes that have a very wide range of properties. If materials deeper than 40 inches are to be used, on-site sampling and analysis are necessary.

N/A	GS	GM		SP	SP-SM	SM		ML		ML-CL	CL
3	14	24	40	14	2	2	87	2	141g	102	95
4	15	25	41	15	252	10	88	95	141	103	110
5	85	27	42		253	11	132	102	142	105	111
6	86	28	48		263	12	133	103	143	106	114
7	87	29	49			13	135	105	144	107	115
8	88	30	71			51	136g	106	206	110	
9		31	72			52	136	107	210	111	
50		32	73			53	137	110	211	114	
150		33	75			55	138	111	212	115	
		34	76			57	139	114	213	119	
		35	77			59	141g	115	214	120	
		36	78			61g	141	119	215		
		37	79			61	142	120	216		
		38	271			62	143	132	217		
						63	144	133	218		
						64	156	135	219		
						65	157	136g	220		
						66g	158	136	252		
						66	159	137	253		
						67	252	138	263		
						68	253	139			
						69	263				
						70	298				
						85	301				
						86					

Suitability for sewage filter field (Column *2)

This interpretation evaluates the soil as to its suitability as a sewage filter field. Ratings are based on soil depth, texture, permeability, drainage, slope, type of bedrock, and on depth of water table. Ratings are given for septic tank filter fields and also for pit toilets. Both ratings are based on the general characteristics of a particular soil, so are *not* intended for individual site planning.

Septic tank filter field—suitable site requirements are: slopes less than fifteen percent; bedrock deeper than thirty six inches below the bottom of the filter field; seasonal water table that does not rise to within four feet of the filter field; locations at least two feet above the highest known flood water level; must have a percolation rate faster than 60 minutes per inch, but slower than 3 minutes per inch; and must be one hundred feet or more from streams, rivers or lakes.

The landtypes listed in the suited column generally meet the overall criteria; however, slopes on many of these landtypes range above 15 percent. The groupings are based solely on slope areas that are 15 percent or less.

Unsuited				Suited
2	42	78	141g	24
3	48	79	141	25
4	49	85	142	35
5	50	86	143	36
6	51	87	144	37
7	52	88	150	38
8	53	95	156	71
9	55	102	157	72
10	57	103	158	73
11	59	105	159	75
12	61g	106	206	132
13	61	107	210	133
14	62	110	216	135
15	63	111	217	211
27	64	114	218	212
28	65	115	219	213
29	66g	119	220	214
30	66	120	252	215
31	67	136g	253	
32	68	136	263	
33	69	137	271	
34	70	138	298	
40	76	139	301	
41	77			

Suitability of soil as a source for sand and gravel (Column #3)

This rating does not indicate the kind or quality, or refer to any specific use of the sand and/or gravel.

Suited— Has a layer composed of at least 80 percent, by volume, of sand and/or gravel, that is fifteen feet or more thick and has less than five feet of overburden.

Unsuited—All conditions that do not meet the requirements stated under suited.

Some landtypes may have enough variability to be classified in either category, depending upon local conditions. There are very few landtypes that have potential for meeting the criteria for suitable, and they are:

Suited		
2	11	13
10	12	14
		15

Suitability as a Possible Clay Source (Column #4)

This rating does not indicate the kind or quality of clay or refer to any specific use of the clay.

Suited— Must have three feet or more of material having a clay content greater than thirty-five percent, have less than thirty percent gravel, cobble, or stones, and have less than five feet of overburden.

Unsuited—All conditions that do not meet the requirements stated under suited.

Since there are only a few landtypes that have the possibility of having enough clayey material in them to meet the suited criteria, only those landtypes are listed.

Suited		
95	111	115
110	114	

Suitability as a source for road rock (Column #5)

This rating indicates both the availability of and the general stability of rock when used as road rock for base course or wearing surface. Ratings are based on sources that have less than twelve feet of overburden. Soils containing more than 50 percent gravel, cobbles, or stones are also rated. On-site sampling and testing is necessary before any detailed design or planning is done.

Good—rock is hard, dense and resists breakdown under logging traffic.

Fair—rock is hard and dense but tends to break down under logging traffic after about two years use. This grouping also includes unconsolidated materials, six feet or more thick, that contains more than fifty percent rock fragments (2 inch or larger) that meet the hardness requirements, and have soil textures of sandy loam or coarser.

Poor—rock is moderately hard and breaks down easily under logging traffic, usually in one or two years time. This grouping also includes unconsolidated material, six feet or more thick, that contain thirty to fifty percent rock fragments (2 inches or larger) that meet the hardness requirement for the fair rating, and have soil textures of sandy loam or coarser.

Unsuited—all other material that does not meet the requirements stated in the other categories.

Good				Fair				Poor				Unsuited	
5	38	69	141g	5	38	69	141g	5	42	72	132	2	158
6	40	70	141	6	40	70	141	6	48	73	133	3	159
7	41	71	142	7	41	71	142	7	49	75	135	4	252
8	42	72	143	8	42	72	143	8	50	76	136g	5	253
10	48	73	144	10	48	73	144	10	51	77	136	9	263
11	49	75	206	11	49	75	252	12	52	78	137	10	
12	50	76	210	12	50	76	253	13	53	79	138	11	
13	51	77	211	13	51	77	263	24	55	85	139	12	
14	52	78	212	14	52	78	271	25	57	86	141g	13	
15	53	79	213	15	53	79	298	27	59	87	141	102	
24	55	85	214	24	55	85	301	28	61g	88	142	103	
25	57	86	215	25	57	86		29	61	95	143	105	
27	59	87	216	27	59	87		30	62	102	144	106	
28	61g	88	217	28	61g	88		31	63	103	252	107	
29	61	95	218	29	61	95		32	64	105	253	110	
30	62	132	219	30	62	132		33	65	106	263	111	
31	63	133	220	31	63	133		34	66g	107	271	114	
32	64	135	252	32	64	135		35	66	110	298	115	
33	65	136g	253	33	65	136g		36	67	111	301	119	
34	66g	136	263	34	66g	136		37	68	114		120	
35	66	137	271	35	66	137		38	69	115		150	
36	67	138	298	36	67	138		40	70	119		156	
37	68	139	301	37	68	139		41	71	120		157	

Estimated Road Rock Thickness Needs (Column #6)

This interpretation refers to the amount of road rock (base course and wearing surface) generally needed on all-weather aggregate surfaced roads. Factors involved in making this rating are based upon field observations, and on soil texture, plasticity, wetness, depth to bedrock, aspect, etc. Ratings are based on compacted fills and on the use of high quality rock.

Cautionary Note: This information is for planning purposes only. Specific on site characterization data are required to accurately determine thickness needs.

Thin — 6 to 12 inches
Thick —12 to 24 inches

For asphalt surfaced roads on site sampling and testing is neccessary.

Thin	
2	52
5	53
6	55
7	57
8	59
9	61g
10	61
12	62
14	63
15	64
24	65
25	66g
27	66
28	67
29	68
30	69
31	70
32	71
33	72
34	73
35	75
36	76
37	77
38	78
40	79
41	252
42	253
48	263
49	271
50	298
51	301

Thick	
2	136
3	137
4	138
9	139
11	141g
13	141
85	142
86	143
87	144
88	150
95	156
102	157
103	158
105	159
106	206
107	210
110	211
111	212
114	213
115	214
119	215
120	216
132	217
133	218
135	219
136g	220

Susceptibility to Cutbank Sloughing & Raveling (Column #7)

Ratings are estimates based upon field experience, soil characteristics, aspect, and height of cutbank above bedrock. Forest cutbank design is generally as follows: cutbanks less than five feet high will be built on a 1½:1 (66.7% or 33.7 degrees) or flatter slope; cutbanks that are five to ten feet high will be built on a 1:1 (100% or 45 degrees) slope; and cutbanks more than ten feet high will be built on a ¾:1 (133.33% or 53.1 degrees) slope. All unconsolidated materials will slough or ravel until they reach their natural angle of repose which is often less than 1¼:1 (80% or 38.6 degrees).

Low— Minor problems requiring occasional road maintenance.

Moderate— Annual road maintenance is usually adequate.

High— Ditches and culverts require a lot of maintenance, average annual maintenance is not enough.

Low	Moderate		High
3	5	68	2
4	6	69	40
10	7	70	41
11	8	71	42
12	9	72	48
13	24	73	49
14	25	85	75
15	27	86	76
57	28	87	77
58	29	88	78
132	30	102	79
132	31	103	95
135	32	136g	105
206	33	136	106
210	34	137	107
211	35	138	110
212	36	139	111
213	37	141g	114
214	38	141	115
215	50	142	119
	51	143	120
	52	144	156
	53	150	157
	55	216	158
	61g	217	159
	61	218	271
	62	219	
	63	220	
	64	252	
	65	253	
	66g	263	
	66	298	
	67	301	

Estimated Cut Slopes Ratio (Column #8)

Ratings are guides as to the upper limit (slope rates) that a given soil material will stand in a stable condition over a period of time. Steepness of the natural ground does not alter the ratings given, because the ratings are based upon the natural angle of repose. Ratings are for cutbanks six feet or more high.

Cautionary Note: This information is for broad planning purposes only. Specific on site data is needed to determine the proper ratio.

Very Steep —Cutbank ratios steeper than 1¼:1
Steep —Cutbank ratios of 1¼:1 to 1½:1
Moderate —Cutbank ratios of 1½:1 to 2:1
Flat —Cutbank ratios 2:1 or flatter

Very Steep	Steep		Moderate	Flat
6	5	135	2	3
7	8	136g	24	4
9	57	136	25	10
50	59	137	27	11
51	61g	138	28	12
52	61	139	29	13
53	62	141g	30	14
55	63	141	31	15
206	64	142	32	35
210	65	143	33	36
	66g	144	34	37
	66	150	85	38
	67	211	86	40
	68	212	87	41
	69	213	88	42
	70	214	156	48
	102	215	157	49
	103	216	158	71
	105	217	159	72
	106	218	252	73
	107	219	253	75
	119	220	263	76
	120	298		77
	132	301		78
	133			79
				95
				110
				111
				114
				115
				271

Cutbank Failure Hazard (Column #9)

This interpretation is based upon cutbanks that are more than five feet high, and on cutslope ratios of **1:1** (45 degrees or 100 percent) or steeper.

S	**Stable**—Probability of no more than 1 failure (10 cubic yards) per mile of cutbank.
MS	**Moderately Stable**—probability of 2 to 3 failures (10 cubic yards each) per mile of cutbank.
U	**Unstable**—probability of 4 or more failures (10 cubic yards each) per mile of cutbank.
VU	**Very Unstable**—probability of 1 or more failures per mile of cutbank that is 50 cubic yards or larger.

The highest rate of failure occurs within the first two years after excavation.

Stable	Moderately Stable		Unstable		Very Unstable
8	5	68	2	106	35
9	6	69	3	107	36
50	7	70	4	119	37
51	24	102	10	120	38
52	25	103	11	136g	40
53	61g	132	12	136	41
55	61	133	13	137	42
57	62	135	14	138	48
59	63	150	15	139	49
206	64	216	27	141g	71
210	65	217	28	141	72
211	66g	218	29	142	73
212	66	219	30	143	75
213	67	220	31	144	76
214			32	156	77
215			33	157	78
298			34	158	79
301			85	159	95
			86	252	110
			87	253	111
			88	263	114
			105		115
					271

Suitability for erosion control grass seedings (Column #10)

This interpretation is intended for cutbanks, fill slopes, waste areas and other disturbed areas on slopes either at or less steep than their natural angle of repose. Slopes steeper than the natural angle of repose, must be treated in a special way to overcome the over steepened slope problems. Further, it is assumed that adapted plant species will be planted, using good agronomic practices in a timely manner for the initial establishment. Factors considered are soil texture, elevation, aspect, climate, natural drainage, and fertility.

Poor—Probability of success is low. Seeding generally is not successful the first time, may require special treatments.

Fair—Success is likely on about 50 percent of the area seeded. Requires at least one follow-up treatment for stand establishment.

Good—Probability of high success. Seeding usually well established within two years. Little follow-up treatment necessary.

Note: The time of seeding, using adapted species, and the techniques used are all critical factors as to whether or not the job results in success or failure. Much trouble with cutbank erosion control seeding stems from the fact that the *slopes are oversteepened*, and the erosional forces carry the seed, mulch and fertilizer to the lower portions of the cut slope along with the soil particles.

Some landtypes have more than one rating.

Poor		Fair			Good	
5	55	2	61g	111	3	137
6	65	4	61	114	10	138
7	70	14	62	115	11	139
8	71	15	63	119	12	141g
9	72	24	64	132	13	141
31	73	25	66g	133	95	142
35	75	27	66	135	102	143
36	76	28	67	136g	103	144
37	77	29	68	136	105	211
38	78	30	69	137	106	212
40	79	32	71	138	107	213
41	88	33	72	139	110	214
42	120	34	73	141g	111	216
48	150	35	75	141	114	217
49	156	36	76	142	115	218
50	157	37	77	143	132	219
51	158	38	78	144	133	252
52	159	40	79	252	135	253
53	206	41	85	253	136g	263
	210	42	86	263	136	
	215	48	87	271		
	220	49	95	298		
	271	57	110	301		
		59				

TABLE OF INTERPRETATIONS—ENGINEERING

Land Type #	(1 Unified Classification	(2 Suitability for Sewage Filter Field	(3 Suitability as a source for Sand & Gravel	(4 Suitability as a source for Clay	(5 Suitability as a source for Road Rock	(6 Estimate of Road Rock Thickness Need	(7 Susceptability to Cutbank Sloughing and Ravelling	(8 Estimated Cut Slope Ratio	(9 Cut Bank Failure Hazard	(10 Suitability for Erosion Control Grass Seeding
2	ML, SM, SP-SM	Unsuited	Unsuited-Suited	Unsuited	Unsuited	Thin-Thick	High	Moderate	U	Fair
3	N/A	Unsuited	Unsuited	Unsuited	Unsuited	Thick	Low	Flat	U	Good
4	N/A	Unsuited	Unsuited	Unsuited	Unsuited	Thick	Low	Flat	U	Fair
5	N/A	Unsuited	Unsuited	Unsuited	Unsuited to Good	Thin	Moderate	Steep	MS	Poor
6	N/A	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Very Steep	MS	Poor
7	N/A	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Very Steep	MS	Poor
8	N/A	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Steep	S	Poor
9	N/A	Unsuited	Unsuited	Unsuited	Unsuited	Thin to Thick	Moderate	Very Steep	S	Poor
10	SM	Unsuited	Unsuited to Suited	Unsuited	Unsuited-Good	Thin	Low	Flat	U	Good
11	SM	Unsuited	Unsuited to Suited	Unsuited	Unsuited-Good	Thick	Low	Flat	U	Good
12	SM	Unsuited	Unsuited to Suited	Unsuited	Unsuited-Good	Thin	Low	Flat	U	Good
13	SM	Unsuited	Unsuited to Suited	Unsuited	Unsuited-Good	Thick	Low	Flat	U	Good
14	GP or SP	Unsuited	Suited	Unsuited	Fair-Good	Thin	Low	Flat	U	Fair
15	GS or SP	Unsuited	Suited	Unsuited	Fair-Good	Thin	Low	Flat	U	Fair
24	GM	Suited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Moderate	MS	Fair
25	GM	Suited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Moderate	MS	Fair
27	GM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Moderate	U	Fair
28	GM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Moderate	U	Fair
29	GM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Moderate	U	Fair
30	GM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Moderate	U	Fair
31	GM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Moderate	U	Poor
32	GM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Moderate	U	Fair
33	GM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Moderate	U	Fair
34	GM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Moderate	U	Fair
35	GM	Suited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Flat	VU	Fair to Poor
36	GM	Suited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Flat	VU	Fair to Poor

TABLE OF INTERPRETATIONS—ENGINEERING

Land Type #	(1 Unified Classification	(2 Suitability for Sewage Filter Field	(4 Suitability as a source for Sand & Gravel	(5 Suitability as a source for Clay	(6 Suitability as a source for Road Rock	Estimate of Road Rock Thickness Need	(7 Susceptability to Cutbank Sloughing and Ravelling	(8 Estimated Cut Slope Ratio	(9 Cut Bank Failure Hazard	(10 Suitability for Erosion Control Grass Seeding
37	GM	Suited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Flat	VU	Fair to Poor
38	GM	Suited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Flat	VU	Fair to Poor
40	GM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	High	Flat	VU	Fair to Poor
41	GM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	High	Flat	VU	Fair to Poor
42	GM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	High	Flat	VU	Fair to Poor
48	GM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	High	Flat	VU	Poor
49	GM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Very Steep	S	Poor
50	N/A	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Very Steep	S	Poor
51	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Very Steep	S	Poor
52	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Very Steep	S	Poor
53	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Very Steep	S	Poor
55	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Low	Steep	S	Fair
57	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Low	Steep	S	Fair
59	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Steep	MS	Fair
61g	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Steep	MS	Fair
61	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Steep	MS	Fair
62	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Steep	MS	Fair
63	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Steep	MS	Fair
64	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Steep	MS	Poor
65	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Steep	MS	Fair
66g	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Steep	MS	Fair
66	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Steep	MS	Fair
67	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Steep	MS	Fair
68	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Steep	MS	Fair
69	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Steep	MS	Poor
70	SM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Flat	VU	Fair to Poor
71	GM	Suited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Flat	VU	Fair to Poor
72	GM	Suited	Unsuited	Unsuited	Poor-Good	Thin	Moderate	Flat	VU	Fair to Poor
73	GM	Suited	Unsuited	Unsuited	Poor-Good	Thin	High	Flat	VU	Poor
75	GM	Suited	Unsuited	Unsuited	Poor-Good	Thin	High	Flat	VU	Fair to Poor
76	GM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	High	Flat	VU	Fair to Poor
77	GM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	High	Flat	VU	Fair to Poor
78	GM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	High	Flat	VU	Fair to Poor

Land Type #	(1 Unified Classification	(2 Suitability for Sewage Filter Field	(3 Suitability as a source for Sand & Gravel	(4 Suitability as a source for Clay	(5 Suitability as a source for Road Rock	(6 Estimate of Road Rock Thickness Need	(7 Susceptability to Cutbank Sloughing and Ravelling	(8 Estimated Cut Slope Ratio	(9 Cut Bank Failure Hazard	(10 Suitability for Erosion Control Grass Seeding
79	GM	Unsuited	Unsuited	Unsuited	Poor-Good	Thin	High	Flat	VU	Fair to Poor
85	SM or GP	Unsuited	Unsuited	Unsuited	Poor-Good	Thick	Moderate	Moderate	U	Fair
86	SM or GP	Unsuited	Unsuited	Unsuited	Poor-Good	Thick	Moderate	Moderate	U	Fair
87	SM or GP	Unsuited	Unsuited	Unsuited	Poor-Good	Thick	Moderate	Moderate	U	Fair
88	SM or GP	Unsuited	Unsuited	Unsuited	Poor-Good	Thick	Moderate	Moderate	U	Poor
95	ML or CL	Unsuited	Unsuited	Unsuited to Suited	Poor-Good	Thick	High	Flat	VU	Fair to Good
102	ML, ML-CL	Unsuited	Unsuited	Unsuited	Poor-Unsuited	Thick	Moderate	Steep	MS	Good
103	ML, ML-CL	Unsuited	Unsuited	Unsuited	Poor-Unsuited	Thick	Moderate	Steep	MS	Good
105	ML, ML-CL	Unsuited	Unsuited	Unsuited	Poor-Unsuited	Thick	High	Steep	U	Good
106	ML, ML-CL	Unsuited	Unsuited	Unsuited	Poor-Unsuited	Thick	High	Steep	U	Good
107	ML, ML-CL	Unsuited	Unsuited	Unsuited	Poor-Unsuited	Thick	High	Steep	U	Good
110	ML, ML-CL, CL	Unsuited	Unsuited	Unsuited to Suited	Unsuited	Thick	High	Flat	VU	Fair to Good
111	ML, ML-CL, CL	Unsuited	Unsuited	Unsuited to Suited	Unsuited	Thick	High	Flat	VU	Fair to Good
114	ML, ML-CL, CL	Unsuited	Unsuited	Suited	Unsuited	Thick	High	Flat	VU	Fair to Good
115	ML, ML-CL, CL	Unsuited	Unsuited	Suited	Unsuited	Thick	High	Flat	VU	Fair to Good
119	ML, ML-CL	Unsuited	Unsuited	Unsuited	Poor-Unsuited	Thick	High	Steep	U	Fair
120	ML, ML-CL	Unsuited	Unsuited	Unsuited	Poor-Unsuited	Thick	High	Steep	U	Poor
132	SM or ML	Suited	Unsuited	Unsuited	Poor-Good	Thick	Low	Steep	MS	Fair to Good
133	SM or ML	Suited	Unsuited	Unsuited	Poor-Good	Thick	Low	Steep	MS	Fair to Good
135	SM or ML	Suited	Unsuited	Unsuited	Poor-Good	Thick	Low	Steep	MS	Fair to Good
136g	SM or ML	Unsuited	Unsuited	Unsuited	Poor-Good	Thick	Moderate	Steep	U	Fair to Good
136	SM or ML	Unsuited	Unsuited	Unsuited	Poor-Good	Thick	Moderate	Steep	U	Fair to Good
137	SM or ML	Unsuited	Unsuited	Unsuited	Poor-Good	Thick	Moderate	Steep	U	Fair to Good

Land Type #	(1 Unified Classification	(2 Suitability for Sewage Filter Field	(3 Suitability as a source for Sand & Gravel	(4 Suitability as a source for Clay	(5 Suitability as a source for Road Rock	(6 Estimate of Road Rock Thickness Need	(7 Susceptability to Cutbank Sloughing and Ravelling	(8 Estimated Cut Slope Ratio	(9 Cut Bank Failure Hazard	(10 Suitability for Erosion Control Grass Seeding
138	SM or ML	Unsuited	Unsuited	Unsuited	Poor-Good	Thick	Moderate	Steep	U	Fair to Good
139	SM or ML	Unsuited	Unsuited	Unsuited	Poor-Good	Thick	Moderate	Steep	U	Fair to Good
141g	SM or ML	Unsuited	Unsuited	Unsuited	Poor-Good	Thick	Moderate	Steep	U	Fair to Good
141	SM or ML	Unsuited	Unsuited	Unsuited	Poor-Good	Thick	Moderate	Steep	U	Fair to Good
142	SM or ML	Unsuited	Unsuited	Unsuited	Poor-Good	Thick	Moderate	Steep	U	Fair to Good
143	SM or ML	Unsuited	Unsuited	Unsuited	Poor-Good	Thick	Moderate	Steep	U	Fair to Good
144	SM or ML	Unsuited	Unsuited	Unsuited	Poor-Good	Thick	Moderate	Steep	U	Fair to Good
150	N/A	Unsuited	Unsuited	Unsuited	Unsuited	Thick	Moderate	Steep	MS	Poor
156	SM	Unsuited	Unsuited	Unsuited	Unsuited	Thick	High	Moderate	U	Poor
157	SM	Unsuited	Unsuited	Unsuited	Unsuited	Thick	High	Moderate	U	Poor
158	SM	Unsuited	Unsuited	Unsuited	Unsuited	Thick	High	Moderate	U	Poor
159	SM	Unsuited	Unsuited	Unsuited	Unsuited	Thick	High	Moderate	U	Poor
206	ML	Unsuited	Unsuited	Unsuited	Good	Thick	Low	Very Steep	S	Poor
210	ML	Unsuited	Unsuited	Unsuited	Good	Thick	Low	Very Steep	S	Poor
211	ML	Suited	Unsuited	Unsuited	Good	Thick	Low	Steep	S	Good
212	ML	Suited	Unsuited	Unsuited	Good	Thick	Low	Steep	S	Good
213	ML	Suited	Unsuited	Unsuited	Good	Thick	Low	Steep	S	Good
214	ML	Suited	Unsuited	Unsuited	Good	Thick	Low	Steep	S	Good
215	ML	Suited	Unsuited	Unsuited	Good	Thick	Low	Steep	S	Poor
216	ML	Unsuited	Unsuited	Unsuited	Good	Thick	Moderate	Steep	MS	Good
217	ML	Unsuited	Unsuited	Unsuited	Good	Thick	Moderate	Steep	MS	Good
218	ML	Unsuited	Unsuited	Unsuited	Good	Thick	Moderate	Steep	MS	Good
219	ML	Unsuited	Unsuited	Unsuited	Good	Thick	Moderate	Steep	MS	Good
220	ML	Unsuited	Unsuited	Unsuited	Good	Thick	Moderate	Steep	MS	Poor
252	ML, SM, SP-SM	Unsuited	Unsuited	Unsuited	Unsuited to Good	Thin	Moderate	Moderate	U	Fair to Good
253	ML, SM, SP-SM	Unsuited	Unsuited	Unsuited	Unsuited-Good	Thin	Moderate	Moderate	U	Fair to Good
263	ML, SM, SP-SM	Unsuited	Unsuited	Unsuited	Unsuited-Good	Thin	Moderate	Moderate	U	Fair to Good
271	GM	Unsuited	Unsuited	Unsuited	Fair to Good	Thin	High	Flat	VU	Fair to Poor
298	SM	Unsuited	Unsuited	Unsuited	Fair to Good	Thin	Moderate	Steep	S	Fair
301	SM	Unsuited	Unsuited	Unsuited	Fair-Good	Thin	Moderate	Steep	S	Fair

WENATCHEE NATIONAL FOREST—LABORATORY ANALYSIS
DATA PREPARED BY THE FOREST HYDROLOGY LAB.
A FIELD UNIT OF THE PACIFIC NORTHWEST EXPERIMENT STATION, WENATCHEE, WA.
THE SOILS DEPARTMENT OF OREGON STATE UNIVERSITY

LAND-TYPE NO.	LOCATION	DEPTH	SAND	SILT	CLAY	USDA TEXTURE	SOIL WATER BAR TENSION 0.1	0.33	15	pH 1:1 SOIL/ H^2O	ORGANIC CARBON %	%ORGANIC MATTER (OM)	TOTAL NITROGEN % (N)	meg/100g CATION EXCHANGE CAPACITY (CEC)	EXCHANGEABLE CATIONS meg/100g MAGNESIUM (Mg)	CALCIUM (Ca)	SODIUM (Na)	POTASSIUM (K)	HYDROGEN (H)	FREE IRON (Fe^2O^3) %	PPM AVAIL. PROS (P) Bray #1	PO⁴ ppm ($Na HCO^3$)	AL ppm
10	S35,T23N,R14E (Boulder Cr)	6"	80.0	16.0	4.0	ls																	
10	SE ¼,S4, T26N,R20E (Alluvial Fan)	6"	67.8	24.8	7.4	sl	19.83	15.59	6.76			1.28	.06										
10	NE ¼,S3, T26N,R20E (Fan)	6"	70.4	24.6	5.0	sl	20.92	16.17	6.40			1.15	.05										
11	NE¼,S3, T26N,R20E (Wet Meadow)	6"	63.0	29.0	8.0	sl	39.66	34.19	14.94			4.65	.38										
12	SW ¼,S26, T29N,R18E	0-2	61.0	34.10	4.90	fsl		23.34	7.29	6.4	4.13	7.10	.16	21.24	2.1	9.5	0.14	.82	11.34			82.8	
		2-20	64.33	31.76	3.78	fsl		16.31	4.66	6.6	1.84	3.17	.06	11.36	1.3	5.0	0.04	.53	7.14			35.7	
		20-45	70.76	25.91	3.72	lcos-cosl		12.93	3.02	6.7	.40	0.69	.01	5.76	1.3	2.4	0.03	.39	1.66			7.1	
12	SW ¼,S11, T27N,R19E	0-2	54.75	39.06	5.96	fsl		26.36	6.33	6.3	1.93	3.30	.08	8.4	1.8	3.0	.07	.78	9.78			53.5	
		2-11	75.51	20.23	4.10	lcos-cosl		9.52	2.81	6.6	.91	1.57	.02	5.53	1.8	2.8	.02	.45	3.81			29.2	
		11-42	64.75	29.24	5.81	sl		13.39	3.64	6.7	.48	.82	.03	6.62	1.8	3.7	.03	.74	4.69			43.9	
24	S6,T26N,R16E	0-6"	70.10	27.3	2.6	sl	34.63	18.21	11.86	6.30		6.18	.23	18.56	0.56	6.19	0.20	0.36			16.03		
		19-40"	70.60	25.7	3.7	sl	27.68	13.08	6.13	6.55		2.03	.04	8.28	0.08	0.42	0.12	0.19			8.25		
		49+	72.00	25.6	2.4	sl	15.16	8.03	4.05	6.47		0.98	.08	4.70	0.02	0.20	0.08	0.13			20.73		
25	S23,T26N,R16E	0-2"	68.70	28.00	3.30	sl	36.92	17.31	8.09	6.23		3.71	.21	11.42	0.14	1.26	0.08	0.27			35.83		
		2-9"	65.70	30.80	3.50	sl	45.48	20.01	8.95	6.28		1.92	.04	14.28	0.17	1.18	0.06	0.20			10.03		
		9-16"	64.90	31.60	3.50	sl	45.95	21.26	8.18	6.11		1.10	.20	9.84	0.05	0.42	0.10	0.12			6.74		
		16-21"	72.70	24.90	2.40	ls	21.48	9.93	3.00	6.11		0.42	.12	35.70	0.02	0.48	0.07	0.06			25.24		
		21-36"	78.70	19.80	1.50	ls	14.49	6.65	1.66	6.48		0.17	.01	2.14	0.05	2.35	0.08	0.04			23.44		
		36-72"	77.00	20.40	2.60	ls	13.09	6.88	2.11	6.05		0.32	.01	24.28	0.09	2.37	0.24	0.12			37.12		
25	NW ¼, S7 T23N, R14E	0-3"	64.20	30.80	5.00	sl	17.56	9.75	5.39	4.90		1.33	.02	—	—	—	—	—			5.61		
		3-11"	63.20	33.30	3.50	sl	39.86	22.99	16.70	5.63		3.21	.07	22.84	0.05	0.09	0.11	0.12			11.94		
		11-25"	60.90	32.30	6.80	sl	33.01	21.72	13.79	5.67		3.38	.08	19.98	0.07	0.71	0.19	0.17			14.78		
		25-34"	67.20	27.00	5.80	sl	23.37	13.92	10.25	6.20		1.44	.15	12.42	0.07	0.64	0.12	0.14			14.60		
		34+	81.70	16.60	1.70	ls	13.34	10.32	6.80	6.16		0.96	.02	7.56	0.07	0.19	0.09	0.07			15.63		
28	S26,T24N,R16E	0-7"	74.80	21.70	3.50	ls	23.62	12.57	4.17	6.40		1.85	.01	9.28	0.63	2.63	0.10	0.47			76.66		
		7-14"	78.50	17.40	4.10	ls	15.67	7.64	3.30	6.75		0.74	.12	5.12	0.50	1.52	0.09	0.44			33.92		
		14-26"	79.90	17.30	2.80	ls	14.44	6.98	2.85	6.53		0.41	.02	10.70	0.38	0.72	0.17	0.35			8.81		
		26-42"	79.20	17.60	3.20	ls	15.83	7.08	2.77	6.45		0.50	.02	4.56	0.63	1.24	0.10	0.34			3.26		
		78-102"	77.40	20.50	2.10	ls	8.41	5.42	2.83	6.39		0.27	.03	3.84	1.48	1.66	0.09	0.12			2.99		
28	NE¼,S26, T28N,R19E	0-7	83.7	14.9	1.7	gcols	21.4	13.7	3.2	6.52	.89	1.53	.03	5.92	.24	3.20	.030	2.82	3.02	.22		38.4	0.2
		7-23	87.8	9.0	1.8	cos	8.5	6.0	2.0	6.55	.09	.17	.00	2.32	.11	1.10	.00	1.28	.97	.11		9.4	0.15
		23-42	93.4	5.9	1.4	cos	7.0	4.3	2.1	6.79	.07	.13	.01	2.18	.19	1.56	.00	.86	.72	.16		5.1	0.1
30	S24,T27N,R14E	3-10"	61.20	35.50	3.30	sl	43.31	27.75	16.93	5.59		6.75	.38	24.26	0.03	0.18	0.09	0.11			2.24		
		10-26"	61.00	35.20	3.80	sl	53.13	29.67	16.21	5.79		5.39	.21	25.70	0.04	0.40	0.10	0.12			1.69		
		26-60"	70.20	27.70	2.10	sl	22.26	15.18	9.84	6.57		1.84	.01	14.42	0.22	0.65	0.12	0.13			6.20		
30	SE¼SW¼, S24,T29N,R17E	0-½	62.1	31.0	8.2	vfsl	36.5	29.0		3.86	5.24	9.03	.14	12.25	.23	.51	.13	.10	15.34	.13		16.7	0.5
		½-1	60.8	35.5	8.6	vfsl	40.2	29.6	9.1	4.84	6.78	11.69	.17	37.40	.08	.10	.14	.12	24.34	.15		17.2	14.8
		1-4	63.9	30.0	6.5	vfsl	48.6		14.7	5.09	4.84	8.34	.14	27.22	.06	.02	.14	.06	25.10	.14		10.6	12.0
		4-16	60.4	37.1	6.9	vfsl	51.0	33.4		5.84	1.85	3.18	.06	16.43	.02	.04	.13	.03	14.73	.15		8.6	1.0
		16-40	47.5	46.3	6.2	vfsl	96.5	62.1	17.5	6.03	2.10	3.62	.08	25.08	.02	.02	.14	.06	20.12	.17		7.0	1.2

WENATCHEE NATIONAL FOREST—LABORATORY ANALYSIS
DATA PREPARED BY THE FOREST HYDROLOGY LAB.
A FIELD UNIT OF THE PACIFIC NORTHWEST EXPERIMENT STATION, WENATCHEE, WA.
THE SOILS DEPARTMENT OF OREGON STATE UNIVERSITY

LAND-TYPE NO.	LOCATION	DEPTH	SAND	SILT	CLAY	USDA TEXTURE	SOIL WATER BAR TENSION 0.1	0.33	15	pH 1:1 SOIL/ H^2O	ORGANIC CARBON %	% ORGANIC MATTER (OM)	TOTAL NITROGEN % (N)	meq/100g CATION EXCHANGE CAPACITY (CEC)	EXCHANGEABLE CATIONS meq/100g MAGNESIUM (Mg)	CALCIUM (Ca)	SODIUM (Na)	POTASSIUM (K)	HYDROGEN (H)	FREE IRON (Fe^2O^3) %	PPM AVAIL. PROS (P) Bray #1	PO^4 ppm ($Na\ HCO^3$)	AL ppm
37	S31,T28N,R18E	6-18"	55.70	41.30	3.00	sl	56.43	24.23	8.51	6.33		1.84	.20	12.12	0.19	2.66	0.13	0.36			14.95		
		18-34"	55.50	37.70	6.80	sl	72.52	46.77	8.29	6.13		0.36	.02	17.14	0.19	0.28	0.17	0.16			4.83		
		45-49"	53.50	36.70	9.80	sl	27.89	19.38	5.65	6.50		0.88	.03	14.28	0.78	2.93	0.13	0.34			2.31		
		49-55"	58.60	29.70	11.70	sl	27.29	20.31	8.43	6.45		0.48	.03	17.14	1.45	5.22	0.17	0.40			3.82		
		55-120"	57.80	31.10	11.10	sl	24.17	18.31	10.21	6.78		0.66	.02	8.98	0.80	4.91	0.20	0.26			2.03		
40	NE ¼ NW ¼	0-6	71.7	26.8	1.6	gsl	47.2	—	4.3	5.79	1.97	3.39	.07	10.09	.24	2.33	.05	2.87	9.43	.20		27.5	0.4
	S34,T28N,R19E	6-20	80.1	18.8	1.1	ls	46.4	—	4.3	6.22	.63	1.09	.04	7.15	.01	1.74	.02	2.59	6.41	.47		5.3	0.4
		20-47	94.1	4.9	.94	cos	—	—	5.2	6.32	.11	.19	.01	5.90	.01	1.41	.05	2.82	2.83	.13		11.2	0.5
		47-52	89.2	6.6	.94	cos	21.9	13.3	—	6.65	.12	.20	.01	3.08	.02	1.84	.04	2.82	1.01	.12		6.5	0.3
42	SW ¼, SE ¼,	0-2	65.4	27.7	3.0	gfsl	36.3	32.3	3.8	4.35	1.43	2.46	.04	5.19	.07	.25	.08	.09	4.43	.09		17.4	0.2
	S34,T30N,R17E	2-5	78.8	19.5	1.6	ls	35.6	34.0	7.3	5.33	2.54	4.37	.07	18.28	.06	.15	.08	.09	15.85	1.19		22.5	1.1
		5-12	82.1	16.6	1.3	lcos	37.7	20.5	7.4	5.69	1.34	2.31	.05	10.33	.05	.10	.09	.05	10.37	1.08		18.0	0.6
		12-22	89.7	8.7	1.7	cos	26.4	16.8	4.6	5.90	.64	1.11	.03	7.02	.05	.05	.08	.05	6.65	.49		21.2	0.3
		22-30	87.3	11.8	0.8	cos	40.3	—	—	—	1.15	1.99	.03	10.08	.09	.05	.12	.05	8.98	.76		—	0.3
49	SE ¼, S1,	0-2	60.8	34.4	4.8	vfsl	56.7	—	—	5.32	6.94	11.95	.39	19.16	.11	.72	.155	.24	19.88	.93		—	6.4
	T28N,R17E	2-9	63.6	32.8	3.6	vfsl	57.1	35.7	11.3	5.63	1.73	2.99	.25	13.70	.03	.10	.15	.10	16.06	1.19		2.9	0.7
		9-19	70.4	28.3	1.3	sl	67.9	34.1	9.1	5.80	1.90	3.27	.13	12.50	.03	.12	.11	.07	13.06	1.06		2.7	0.15
		19-41	96.2	2.6	0.7	cos	—	—	—	—	.56	.96	.04	4.51	.01	.09	.09	.04	—	.24		22.5	0.25
51	SE¼,NW¼,	½-0	—	—	—	—	—	—	—	—	—	—	.35	15.77	1.28	9.38	1.10	.78	—	—		—	0.3
	S25,T27N,R21E	0-2	82.9	6.7	10.6	lcos	15.6	10.2	3.6	6.93	1.44	2.48	.09	8.80	.49	6.20	.21	.36	.36	.29		23.0	0.3
		2-10	82.4	3.0	14.9	cosl	12.1	8.2	1.5	7.29	.41	.70	.02	4.58	.49	3.46	.21	.15	.15	.19		16.7	0.2
52	NW¼,NE¼,	0-11	62.99	28.62	8.26	fsl		18.24	5.72	6.7	1.88	3.27	.10	10.97	2.3	7.4	.04	.84	5.18			22.9	
	S27,T25N,R20E	11-17	65.16	26.82	7.97	fsl		12.43	4.96	6.8	.78	1.34	.07	7.11	2.1	5.0	.03	.64	5.38			7.1	
		17-38	67.73	25.57	6.69	fsl		9.82	4.03	6.9	.94	1.62	.01	5.93	2.1	4.3	.04	.62	1.47			6.4	
		38-57	66.31	27.05	6.61	fsl		10.37	4.57	6.8	.24	.36	.02	6.42	2.9	6.9	.11	.29	4.11			7.1	
53	NW¼,S29,	0-2	70.21	24.31	5.52	fsl		17.12	5.71	6.4	2.60	4.48	.09	10.57	1.8	5.2	.09	.53	6.45			40.7	
	T26N,R19E	2-11	73.87	20.68	5.40	fsl-lfs		10.58	4.08	6.3	.59	1.01	.02	7.31	1.8	2.9	.05	.72	6.84			24.3	
		11-17	73.01	22.15	4.74	lfs-fsl		9.94	3.81	6.7	1.12	1.93	.02	6.22	2.0	3.9	.07	.49	4.30			7.1	
55	NW¼,SW¼,	0-4	60.60	35.9	2.5	fsl		20.00	6.72	5.8	3.61	6.25	.18	10.47	0.9	2.4	.04	.31	15.65			10.0	
	S5,T27N,R19E	4-15	58.20	39.9	2.1	fsl		20.38	7.35	5.9	4.40	7.42	.00	12.25	0.9	0.2	.03	.21	15.55			4.6	
		15-26	68.30	34.1	1.6	fsl		18.59	7.54	6.0	2.67	4.55	.14	11.26	1.0	0.3	.04	.19	16.53			6.1	
57	NW¼,S5,	1-0	—	—	—	—	—	—	—	4.79	—	—	.42	63.75	5.43	20.08	.39	2.11	—	—		—	0.5
	T26N,R20E	0-3	53.2	28.8	18.0	sl/fsl	27.2	19.9	6.1	6.79	1.88	3.24	.13	12.82	1.61	10.02	.12	.82	3.32	.96		29.0	0.2
		3-10	53.2	24.0	22.8	scl	24.1	18.0	6.1	7.15	.46	.79	.06	13.01	1.64	10.28	.14	.52	.55	.98		46.4	0.3
		10-16	55.5	22.2	22.3	scl	22.3	16.3	6.5	6.79	.41	.70	.02	10.44	3.62	16.44	.22	.22	1.56	1.13		23.3	0.3
		16-22	59.0	14.9	26.1	scl	22.3	—	8.2	6.66	.31	.54	.01	15.87	5.10	23.56	.28	.18	4.23	1.34		16.0	0.2
61	SE¼,S4, T26N,R20E, (Hillside)	6"	54.4	31.6	12.0	sl	20.67	17.86	7.62			1.44	.09										
62	NE¼,SW¼,	2-0	—	—	—	—	—	—	—	5.56	—	—	.32	52.89	6.25	32.70	3.53	2.49	—	—		—	0.2
	S8,T26N,R21E	0-3	64.1	22.9	12.5	gsl	27.0	18.4	5.2	6.59	1.17	2.02	.05	11.17	.89	6.80	.12	.98	3.63	.61		63.8	0.3
		3-15	66.5	21.0	12.5	sl	18.2	14.7	4.7	6.78	.70	1.20	.04	8.67	.99	6.76	.18	.52	2.41	.68		30.7	0.1
		15-42	69.2	18.3	12.5	sl	16.8	12.0	4.4	6.90	.29	.52	.01	8.25	1.19	7.00	.20	.17	1.61	.78		22.2	.25
63	NW¼,S3,	0-6	42.91	46.88	10.10	l		27.67	5.77	6.5	.99	1.73	<.01	9.5	2.0	5.4	.05	.84	5.18			33.6	
	T25N,R20E	6.16	43.32	46.45	10.28	l		23.70	5.27	6.3	.20	0.36	.04	6.5	1.6	5.0	.10	.41	4.24			18.5	
		16-27	63.48	29.18	7.18	sl		14.95	4.01	6.6	.25	.43	<.01	5.93	2.1	4.3	.16	.36	2.64			12.9	
		27-43	67.62	25.14	7.12	sl		13.33	4.35	7.0	.33	.56	.02	6.03	2.0	4.5	.09	.33	2.77			10.3	

LAND-TYPE NO	LOCATION	DEPTH	SAND	SILT	CLAY	USDA TEXTURE	SOIL WATER BAR TENSION 0.1	0.35	15	pH 1:1 SOIL/ H^2O	ORGANIC CARBON %	GANIC MATTER (OM)	TOTAL NITRO-GEN % (N)	meg/100g CATION EXCHANGE CAPACITY (CEC)	EXCHANGEABLE CATIONS meg/100g MAGNE-SIUM (Mg)	CAL-CIUM (Ca)	SO-DIUM (Na)	POTAS-SIUM (K)	HYDRO-GEN (H)	FREE IRON ($Fe^{2}O^{3}$) %	PPM AVAIL. PHOS (P) Bray #1	PO^4 ppm (na HCO^3)	AL ppm
63	S36,T24N,R16E	144"	84.4	13.6	2.0	ls			5.77			1.8											
63	S36,T24N,R16E	6"	84.4	14.0	1.6	ls			6.34			1.9											
63	S36,T24N,R16E	6"	83.4	14.0	2.6	ls			17.96			3.5											
64	NE¼,NW¼, S36,T25N,R19E	¼-2½	51.64	42.5	5.9	fsl-l		29.64	5.14	6.2	1.68	2.88	.06	8.6	1.3	3.3	.11	.75	6.91			7.1	
		2½-13	57.51	37.0	5.4	fsl		18.24	4.92	6.3	1.40	2.45	.06	8.3	1.3	3.3	.07	.84	6.45			4.3	
		13-21	62.00	34.8	3.2	fsl		13.89	4.51	6.1	.89	1.54	.05	7.0	1.3	2.2	.09	.93	4.30			3.6	
		21-40	62.05	34.2	3.6	fsl		13.31	4.12	6.0	.31	0.52	.03	7.0	1.6	2.4	.05	.84	2.74			2.2	
65	S36,T24N,R16E	2"	75.0	22.6	2.4	ls			10.72			2.7											
67	SW¼,NE¼, T26N,R20E	0-3	49.5	41.2	9.4	l	37.8	—	7.8	6.57	1.75	3.02	.07	15.75	1.69	10.28	3.02	10.65	3.89	.63		61.2	0.1
		3-15	51.0	36.7	12.4	l	—	—	4.7	6.43	.74	1.28	.03	13.35	.93	8.64	.19	6.73	2.90	.83		47.2	0.15
		15-35	56.7	30.9	12.3	sl/fsl	63.1	—	8.3	6.52	.39	.68	.06	17.92	1.93	12.14	.19	5.47	2.60	1.04		41.5	0.3
72	NE¼,S6, T26N,R21E	2-0	—	—	—	—	—	—	—	—	—	—	.27	22.02	3.16	11.40	2.10	1.31	—	—		—	0.3
		0-3	47.4	40.6	12.3	gl	45.9	33.3	8.4	6.02	2.45	4.21	.09	14.39	1.48	7.12	.22	1.26	6.23	.44		99.7	0.3
		3-11	50	37.4	12.7	l	37.9	26.2	5.5	6.21	.92	1.58	.03	7.81	.89	4.26	.96	1.17	3.57	.33		73.3	0.2
		11-32	54.16	35.5	12.4	sl	34.4	21.7	10.0	7.00	.49	.85	.02	8.03	.99	4.34	.15	1.12	1.83	.35		49.3	0.5
		32-50	61	28.3	10.7	cosl	40.5	24.6	5.0	8.47	.30	.52	.02	9.97	3.29	12.06	.72	.82	.49	.42		58.2	0.3
		50-64	67.5	21.9	10.6	sl	26.7	16.8	4.4	8.86	.02	.04	.02	7.66	2.70	11.80	1.27	.30	—	.40		13.3	0.5
72	SE¼,SW¼,S13, T27N,R20E	1-0	—	—	—	—	—	—	—	—		—	.26	22.75	.76	11.16	.38	.81	—	—		—	0.3
		0-5	46.3	42.6	11.1	gl	51.9	—	—	6.25	1.96	3.25	.06	10.51	.23	5.36	.14	.52	5.97	.39		80.4	0.3
		5-19	62.3	27.3	10.4	sl	31.1	15.3	3.5	6.53	.73	1.26	.03	7.86	.18	3.04	.16	.43	3.93	.47		37.5	0.3
		19-36	66.5	24.1	9.4	cosl	17.3	11.1	3.6	6.71	.14	.24	.01	5.57	.48	5.08	.16	.26	1.68	.66		11.5	0.5
73	NW¼,S29, T25N,R20E	0-8	49.6	44.9	6.6	fsl		29.9	7.00	6.6	1.65	2.85	.07	12.55	2.1	4.5	.04	1.23	10.66			70.0	
		8-18	50.8	43.1	6.0	fsl		20.9	5.57	6.5	.63	1.08	.04	13.63	1.6	3.1	.03	1.21	9.78			33.3	
		18-29	55.4	38.0	6.5	fsl-l		15.0	3.75	6.8	.32	.56	.02	7.21	1.6	4.5	.03	.49	3.23			8.6	
		29-44	58.7	34.6	6.6	fsl		15.9	4.31	6.8	.36	.62	.00	6.52	2.1	5.4	.04	.36	2.25			5.7	
75	NE¼,SW¼, S1,T28N,R17E	0-1¾	52.7	41.2	6.1	vfsl	—	—	—	—	18.95	32.68	.76	60.21	.56	1.57	.34	.70	—	4.21		25.0	1.1
		1¾-2	78.2	20.8	1.1	lfs	40.5	28.5	15.0	4.47	4.49	7.74	.15	12.66	.27	1.11	.18	.17	13.17	1.66		26.3	0
		2-5	64.8	32.5	2.7	vfsl	50.9	33.9	—	5.82	2.45	4.22	.09	19.82	.02	.02	.14	.06	11.98	1.44		7.2	0.5
		5-12	61.4	36.7	1.9	vfsl	60.6	38.4	2.0	6.01	1.97	3.40	.10	14.80	.01	.01	.14	.04	14.14	1.54		8.3	0.7
		12-19	65.6	33.4	1.0	cosl	73.9	49.0	11.4	5.89	2.05	3.53	.08	17.82	.01	.04	.15	.05	15.66	1.40		7.6	0.5
		19-41	87.4	9.8	0.2	cos	—	—	—	—	.67	1.49	.06	9.43	.01	.07	.16	.05	9.87	.38		30.4	0.3
77	SE¼,NW¼, S19,T27N,R21E	2-0	—	—	—	—	—	—	—	5.25	—	—	.33	52.11	4.28	28.36	.41	2.58	—	—		—	0.3
		0-4	52.3	33.8	13.9	sl/fsl	47.5	31.5	7.5	6.39	2.12	3.56	.09	13.90	.99	8.80	.15	.93	6.72	.46		97.3	0.2
		4-15	54.1	33.0	12.9	sl/fsl	27.7	25.0	6.5	6.31	.93	1.61	.05	8.76	.49	5.26	.15	.43	4.37	.38		58.5	0.2
		15-26	68.3	22.0	9.7	sl	32.3	15.8	4.3	6.42	.31	.53	.02	6.52	.59	3.52	.20	.26	3.04	.47		37.8	0.3
		26-44	65.9	20.6	13.5	sl	27.5	14.9	3.3	7.14	.25	.43	.02	5.54	.82	3.60	.39	.26	.78	.37		18.0	0.3
		44-55	69.2	21.0	9.8	sl	26.4	14.0	3.6	6.99	.22	.38	.02	5.25	.82	2.54	.34	.34	.78	.46		11.2	0.2
78	NW¼,SW¼, S16,T25N,R20E	0-2	54.5	38.8	5.46	fsl		25.3	5.84	6.6	2.5	4.3	.12	12.65	2.5	6.2	2.5	1.2	4.9			31.0	
		2-7	66.2	29.3	4.41	fsl		11.4	3.9	6.3	1.1	1.8	.03	8.69	2.1	4.1	2.1	.7	6.0			31.4	
		7-17	69.3	25.7	4.96	fsl		15.9	3.9	6.7	.3	.6	.02	5.95	2.5	5.4	2.5	.4	3.8			11.8	
79	NE¼,S31, T29N,R19E	0-2	69.5	29.1	1.5	fsl	45.2	—	—	5.71	1.82	3.14	.06	6.04	—	—	.07	1.47	6.17	.22		20.9	—
		2-16	76.6	22.7	.7	lcos	—	—	6.8	6.03	.96	1.66	.03	5.66	.21	1.36	.00	1.16	4.55	.42		9.6	0.3
		16-25	—	—	—	vgrs	—	—	6.1	6.15	—	—	—	3.78	.03	.54	.00	.30	3.10	—		—	0.3
		25-30	88.4	10.9	.8	cos	24.1	17.1	3.6	5.92	.26	.45	.01	3.76	.06	.61	.02	.33	3.29	.17		3.6	0.1
		30.45	98.2	.6	.2	cos	—	—	—	5.93	.06	.10	.01	1.77	.04	.15	.00	.32	.77	.01		10.5	0.1
87	NW¼,SE¼, S3,T22N,R13E	0-4	51.70	37.50	10.80	l	40.89	27.75	18.42	4.35		9.87	.30	25.70	0.43	2.35	0.16	0.14			5.03		
		4-8	49.20	39.30	11.50	l	41.51	30.59	21.87	5.25		10.72	.30	48.54	0.68	6.73	0.15	0.20			2.79		
		8-14	49.20	41.00	9.80	l	46.32	33.46	25.92	5.73		10.82	.03	57.12	0.48	5.69	0.10	0.12			3.33		
		14-21	48.20	38.00	13.80	l	32.22	25.38	12.18	5.96		3.03	.15	11.42	0.21	0.82	0.09	0.05			4.22		
95	S25,T19N,R15E (Rd #1905)	12	67.4	18.6	14.0	sl																	
103	SE¼,S19, T21N,R17E	13-14	48.70	36.00	15.30	l	32.20	24.93	13.84	6.12	1.36	.04		22.84	1.89	11.97	0.10	0.77		—			
		14-25	—	—	—	—	—	—	—	—	0.52	.03		—	—	—	—	—		—			
		25-42	37.70	39.50	22.80	l	39.41	31.15	18.52	6.66	0.39	.04		37.12	3.99	20.49	0.17	0.89		5.32			
		42-50	41.20	44.00	14.80	l	36.37	28.26	17.31	6.87	0.17	.02		32.84	4.69	22.13	0.22	0.98		6.41			
		50-58	39.70	39.30	21.00	l	36.16	28.71	17.10	6.26	0.32	.02		12.12	4.49	22.66	0.16	0.89		6.81			
		58-70	39.10	46.10	14.80	l	36.09	27.23	17.29	6.72	0.23	.02		35.70	4.76	18.84	0.15	0.70		10.78			

WENATCHEE NATIONAL FOREST—LABORATORY ANALYSIS
DATA PREPARED BY THE FOREST HYDROLOGY LAB.
A FIELD UNIT OF THE PACIFIC NORTHWEST EXPERIMENT STATION, WENATCHEE, WA.
THE SOILS DEPARTMENT OF OREGON STATE UNIVERSITY

LAND-TYPE NO.	LOCATION	DEPTH	SAND	SILT	CLAY	USDA TEXTURE	SOIL WATER BAR TENSION 0.1	0.33	15	pH 1:1 SOIL/ H^2O	ORGANIC CARBON %	% ORGANIC MATTER (OM)	TOTAL NITROGEN % (N)	meq/100g CATION EXCHANGE CAPACITY (CEC)	EXCHANGEABLE CATIONS meq/100g MAGNESIUM (Mg)	CALCIUM (Ca)	SODIUM (Na)	POTASSIUM (K)	HYDROGEN (H)	FREE IRON (Fe^2O^3) %	PPM AVAIL. PHOS (P) Bray #1	PO⁴ ppm ($NaHCO^3$)	AL ppm
110	S34,T18N,R15E (Manastash Lk)	24	21.8	24.2	54.0	c																	
110	S34,T18N,R15E (Manastash Lk)	24	25.8	32.0	42.2	c															43.95		
110	NW¼,S36, T18N,R15E	¾-11	50.20	44.30	5.50	sl	53.74	28.38	17.22	6.3		2.05	.05	—	—	—	—	—			83.00		
		11-19	72.20	21.60	6.20	sl	23.75	15.04	5.53	6.35		0.78	.03	12.48	0.70	4.36	0.52	1.74			9.21		
		19-28	52.60	36.10	11.30	sl	39.33	28.13	17.62	6.20		1.89	.05	12.12	0.71	3.78	0.11	1.64			4.31		
		29-35	22.70	48.00	29.30	cl	47.70	37.72	21.47	6.10		0.38	.02	25.70	3.23	11.57	0.30	0.79			2.93		
		35-48	25.20	56.50	18.30	sil	44.27	31.71	12.69	5.95		1.42	.04	15.70	2.22	6.49	0.16	0.48			3.12		
		6'Rd Cut	25.70	20.80	53.50	c	—	—	—	5.50		1.15	.03	55.68	5.58	18.50	0.37	0.99					
136	S34,T22N,R19E	Surface	88.2	9.5	2.3	s	22.0	7.5	5.7			1.26											
		12	—	—	—	—	17.9	8.3	6.2			—											
		24	—	—	—		15.3	5.3	4.0			—											
136	S17,T22N,R19E	Surface	81.5	14.7	3.7	ls	26.7	14.9	12.0			3.05											
		—	—	—	—	—	20.2	6.6	4.9			—											
		—	—	—	—	—	16.1	6.6	5.1			—											
137	S22,T22N,R19E	Surface	—	—	—	—	20.2	—	8.8														
		6	60.8	24.4	14.8	sl	19.9	19.9	8.9														
		12	61.2	24.0	14.8	sl	22.6	18.5	9.4														
		18	65.2	14.4	20.4	scl	24.4	16.5	10.4														
		24	65.2	20.4	14.4	sl	23.3	16.1	9.3														
		30	—	—	—	—	25.0	18.3	—														
		36	67.2	22.4	10.4	sl	25.7	17.0	7.5														
		42	—	—	—	—	27.2	15.2	—														
		48	76.8	14.8	8.4	sl	26.7	15.7	7.7														
		60	52.8	38.2	9.0	sl	—	—	11.3														
137	S22,T22N,R19E	Surface	—	—	—	—	21.9	15.7	6.8														
		6	64.8	22.8	12.4	sl	19.1	14.1	6.7														
		12	65.2	22.0	12.8	sl	19.3	14.5	6.7														
		18	57.2	28.0	14.8	sl	18.7	14.4	6.8														
		24	59.2	26.0	14.8	sl	18.6	14.4	7.2														
		30	—	—	—	—	18.2	13.3	7.0														
		36	65.2	24.4	10.4	sl	18.1	13.2	6.7														
		42	—	—	—	—	19.8	13.1	6.2														
		48	69.2	22.4	8.4	sl	20.3	14.0	6.7														
		60	67.6	24.0	8.4	sl	—	—	8.5														
137	S36,T23N,R17E	0-2	40.50	46.30	13.20	l	—	—	—	6.27		1.12	.05	25.70	1.93	7.53	0.18	1.51			12.29		
		2-6	73.20	20.80	6.00	sl	20.80	12.94	5.02	6.20		1.70	.05	11.42	0.64	3.54	0.10	1.45			98.49		
		6-20	73.40	20.40	6.20	sl	16.28	10.35	4.58	6.51		0.69	.02	8.56	0.55	1.99	0.10	0.65			28.32		
		20-30	64.20	28.00	13.80	sl	18.56	12.19	5.80	6.77		2.42	.08	10.12	1.17	7.81	0.14	0.44			5.53		
138	NW¼,S4, T21N,R18E	2-6	62.20	31.70	6.10	sl	35.63	21.79	9.65	6.38		2.86	.06	13.28	0.52	3.75	0.07	0.88			124.43		
		6-16	65.20	28.50	6.30	sl	25.54	16.00	7.88	6.15		2.02	.05	13.56	0.85	3.77	0.08	0.68			100.54		
		16-24	68.00	25.70	6.30	sl	18.63	13.01	7.06	6.60		0.56	.04	15.70	0.02	7.01	0.09	0.54			7.51		
		24-32	73.70	22.00	4.30	sl	13.45	9.65	5.79	5.95		0.59	.02	9.28	0.92	5.98	0.08	0.41			6.95		
147	NW¼,S36, T23N,½17E	0-2	59.20	34.0	6.80	sl	—	—	—	6.08		1.77	.01	13.84	1.11	3.51	0.13	1.02			21.96		
		2-9	60.90	31.0	8.10	sl	—	—	—	5.65		2.05	.03	15.70	1.09	4.98	0.09	0.62			14.81		
		9-22	—	—	—	—	—	—	—	6.51		0.69	.03	14.28	1.51	5.79	0.16	0.54			—		

LAND-TYPE NO.	LOCATION	DEPTH	SAND	SILT	CLAY	USDA TEXTURE	SOIL WATER BAR TENSION 0.1	0.33	15	pH 1:1 SOIL/ H^2O	ORGANIC CARBON %	% ORGANIC MATTER (OM)	TOTAL NITROGEN % (N)	meg/100g CATION EXCHANGE CAPACITY (CEC)	EXCHANGEABLE CATIONS meg/100g MAGNESIUM (Mg)	CALCIUM (Ca)	SODIUM (Na)	POTASSIUM (K)	HYDROGEN (H)	FREE IRON (Fe^2O^3) %	PPM AVAIL. PROS (p) Bray #1	PO^4 ppm ($NaHCO^3$)	AL ppm
157	NW¼,S22, T23N,R17E	0-4	36.70	46.00	17.30	l	31.56	25.46	8.35	6.06		2.06	.09	14.28	0.94	6.21	0.13	0.90			24.99		
		4-7	38.00	45.20	16.80	l	29.59	23.55	7.10	—		3.87	.04	17.14	0.99	3.93	0.10	0.86			—		
		7-13	36.50	45.70	17.80	l	26.67	20.22	7.57	6.29		0.86	.01	7.84	2.29	4.80	0.11	0.65			2.87		
		13-38	34.20	46.00	19.80	l	30.61	22.74	9.86	6.39		0.65	.02	15.70	3.84	6.02	0.10	0.60			2.24		
		38-54	28.70	50.50	20.80	sil	35.05	26.53	13.53	6.49		—	—	17.14	4.26	6.96	0.17	0.38			—		
		65-65	33.20	56.00	10.80	sil	31.61	21.88	10.80	6.62		1.18	.03	39.98	6.10	1.24	0.10	0.42			0.00		
157	NW¼,S22, T23N,R17E																						
	Cut Bank																						
	Red Material	30	35.00	44.20	20.80	l	40.82	31.63	18.15	6.52		0.26	.03	17.14	3.35	8.15	0.10	0.38			2.95		
	Gray Material	36	56.20	33.00	10.80	sl	29.59	22.95	9.38	5.62		1.36	.03	9.98	1.32	2.89	0.07	0.53			8.11		
206	S13,T21N,R18E (Table Mt Burn)	6	41.0	28.8	30.2	cl																	
218	S25,T21N,R18E	12	10.4	55.5	34.6	sicl																	
263	SW¼,NE¼,	0-2	62.1	33.6	4.4	vfsl	64.9	32.8	14.4	5.41	7.92	13.66	.46	18.91	.28	2.33	.13	.33	18.56	.70		—	3.55
	S28,T31N,R17E	2-7	57.7	38.3	4.0	vfsl	53.9	30.6	—	5.23	6.58	11.35	.46	21.70	.07	.96	.17	.20	18.31	.78		20.1	3.65
		7-19	59.2	36.9	3.9	vfsl	57.1	13.3	—	5.48	5.36	9.22	.39	20.36	.05	.51	.09	.11	20.33	.91		19.4	2.7
		19-39	56.6	39.6	4.1	vfsl	64.0	16.6	12.5	5.58	3.75	6.47	.30	17.84	.03	.51	.12	.05	18.73	.82		15.4	1.75
	pyroclastic Red Top Area											0.25	.02										

WENATCHEE NATIONAL FOREST—LABORATORY ANALYSIS

DATA PREPARED BY THE FOREST HYDROLOGY LAB. A FIELD UNIT OF THE PACIFIC NORTHWEST EXPERIMENT STATION, WENATCHEE, WA. THE SOILS DEPARTMENT OF OREGON STATE UNIVERSITY

LAND-TYPE NO.	LOCATION	DEPTH	PERCENT SAND	PERCENT SILT	PERCENT CLAY	USDA TEXTURE	BULK DENSITY (BD)	POROSITY	SATU-RATION
51	SE¼,NW¼, S25,T27N,R21E	2-10	82.4	3.0	14.9	cosl	1.56		
57	NW¼,S5, T26N,R20E	10-16	55.5	22.2	22.3	scl	1.38		
62	NE¼,SW¼, S6,T26N,R21E	15-42	69.2	18.3	12.5	sl	1.47		
72	NE¼,S6, T26N,R21E	32-50	61	28.3	10.7	cosl	0.93		
77	SE¼,NW¼, S19,T27N,R21E	15-26	68.3	22.0	9.7	sl	1.08		
136	S34,T22N,R19E	Surface	88.2	9.5	2.3	s	1.31	50.65	31.9
		12	—	—	—	—	1.61	45.10	20.5
		24	—	—	—	—	1.43	45.16	24.4
136	S17,T22N,R19E	Surface	81.5	14.7	3.7	ls	1.32	48.31	35.1
		—	—	—	—	—	1.24	47.93	29.8
		—	—	—	—	—	1.45	45.88	23.7
137	S22,T22N,R19E	Surface	—	—	—	—			42.6
		6	60.8	24.4	14.8	sl			48.8
		12	61.2	24.0	14.8	sl			54.0
		18	65.2	14.4	20.4	scl			53.6
		24	65.2	20.4	14.4	sl			49.9
		30	—	—	—	—			50.0
		36	67.2	22.4	10.4	sl			48.9
		42	—	—	—	—			54.0
		48	76.8	14.8	8.4	sl			42.3
		60	52.8	38.2	9.0	sl			49.7

LAND-TYPE NO.	LOCATION	DEPTH	PERCENT SAND	PERCENT SILT	PERCENT CLAY	USDA TEXTURE	BULK DENSITY (BD)	POROSITY	SATU-RATION
137	S22,T22N,R19E	Surface	—	—	—	—			47.7
		6	64.8	22.8	12.4	sl			42.6
		12	65.2	22.0	12.8	sl			44.9
		18	57.2	28.0	14.8	sl			42.9
		24	59.2	26.0	14.8	sl			44.5
		30	—	—	—	—			44.1
		36	65.2	24.4	10.4	sl			41.2
		42	—	—	—	—			40.7
		48	69.2	22.4	8.4	sl			43.1
		60	67.6	24.0	8.4	sl			44.3

TIMBER SITE INDEX DATA
Information taken from some T.S.I. plot sheets
and
from some soil description plot sheets

LAND-TYPE NUMBER	LOCATION	ELEVATION	ASPECT	PLOT #1 SPECIES	PLOT #1 INDEX	PLOT #2 SPECIES	PLOT #2 INDEX	PLOT #3 SPECIES	PLOT #3 INDEX	PLOT #4 SPECIES	PLOT #4 INDEX
10	Sec. 28, T.19N., R.14E.	4325	NW	WF	93	WF	94	DF	90		
15	Sec. 22, T.21N., R.12E.	2100	—	—	—	—	—	DF	90		
24	Sec. 6, T.26N., R.16E.	2740	S	WF	92	DF	90	WF	100		
25	Sec. 7, T.23N., R.14E.		E	WH	110	DF	108	—	—		
25	Sec. 23, T.26N., R.16E.	3680	NW	WP	115	DF	120	LP	106		
25	Sec, 14, T.24N., R.15E.	3570	W	WF	60	—	—	—	—		
25	Sec. 5, T.30N., R.20E.	5600	E	A	52	—	—	—	—		
25	Sec. 31, T.31N., R.20E.	6460	SE	A	88	SAF	94	—	—		
25	Sec. 4, T.30N., R.20E.	6140	NE	A	78						
25	Sec. 8, T.30N., R.20E.	4560	W	DF	96	LP	91	A	81		
25	Sec. 20, T.21N., R.13E.	2475	N	A	90	A	90	A	130		
28	Sec. 13, T.21N., R.19E.	3260	NW	DF	101	PP	80				
28	Sec. 26, T.26N., R.16E.	3920	SW	PP	104	PP	124				
30	Sec. 22, T.21N., R.13E.	3000	W	—	—	A	70	A	70		
30	Sec. 36, T.20N., R.12E.	3400	N	WH	110	DF	100	—	—		
30	Sec. 24, T.21N., R.12E.	2600	N	DF	80	WH	120	WH	103		
30	Sec. 8, T.19N., R.13E.	3700	E	WH	204	WH	200	WH	220		
30	Sec. 24, T.27N., R.14E.	3760	S	A	148	A	132	WH	165		
37	Sec. 31, T.28N., R.18E.	3380	NW	DF	100	WF	101	DF	121		
40	Sec. 8, T.27N., R.21E.	1780	E	PP	60	PP	68	PP	63	DF	74
40	Sec. 21, T.30N., R.20E.	4420	W	PP	74	DF	74	PP	90		
41	Sec. 36, T.30N., R.21E.	5260	SE	DF	99	LP	104				
51	Sec. 3, T.28N., R.22E.	3840	S	PP	38						
51	Sec. 2, T.25N., R.20E.	3000	SE	PP	64						
52	Sec. 3, T.28N., R.22E.		NW	DF	60	PP	78				
57	Sec. 10, T.28N., R.22E.	2850	SE	PP	68						
61	Sec. 3, T.20N., R.22E.	4000	S	PP	61						
61	Sec. 2, T.25N., R.20E.	2900	E	PP	54						
61	Sec. 2, T.25N., R.20E.	3000	SE	PP	57						
62	Sec. 35, T.26N., R.20E.	2500	N	DF	69						
62	Sec. 2, T.25N., R.20E.	2800	N	DF	74						
62	Sec. 8, T.26N., R.21E.	1970	N	DF	63						

LAND-TYPE NUMBER	LOCATION	ELEVATION	ASPECT	PLOT #1 SPECIES	PLOT #1 INDEX	PLOT #2 SPECIES	PLOT #2 INDEX	PLOT #3 SPECIES	PLOT #3 INDEX	PLOT #4 SPECIES	PLOT #4 INDEX
62	Sec. 29, T.27N., R.21E.	2200	NW	DF	81						
62	Sec. 10, T.28N., R.22E.	3000	NW	DF	60						
62	Sec. 11, T.28N., R.22E.		W	PP	77						
62	Sec. 34, T.25N., R.20E.	3460	N	DF	79						
63	Sec. 6, T.19N., R.14E.	3720	W	DF	70	WL	88	WP	132		
63	Sec. 26, T.19N., R.14E.	4975	SW	DF	73	DF	83	DF	100		
64	Sec. 12, T.18N., R.14E.	5500	N	LP	75	LP	72	DF	85		
64	Sec. 14, T.19N., R.14E.	3600	SW	DF	69	DF	76	DF	87		
65	Sec. 4, T.18N., ½.14E.	5400	NE	MH	55	MH	72	—	—	—	—
69	Sec. 30, T.19N., R.14E.	4640	S	ES	84	DF	80	A	111		
72	Sec. 14, T.28N., R.22E.	3500	NE	DF	55						
72	Sec. 2, T.28N., R.22E.	3700	NW	PP	69						
73	Sec. 22, T.30N., R.21E.	5800	S	LP	63						
77	Sec. 12, T.28N., R.22E.	3400	NW	DF	66						
77	Sec. 21, T.30N., R.20E.	5000	SE	PP	72	DF	65				
78	Sec. 27, T.30N., R.20E.	4040	W	LP	60	DF	75	PP	68		
78	Sec. 34, T.29N., R.22E.	4700	N	LP	74						
78	Sec. 14, T.29N., R.21E.	4660	NW	LP	70	DF	71				
78	Sec. 3, T.22N., R.13E.		N	A	105	A	96	WH	85		
85	Sec. 14, T.25N., R.20E.	1300	N	DF	60						
85	Sec. 14, T.25N., R.20E.	1450	N	DF	65						
85	Sec. 25, T.19N., R.15E.	3130	NE	DF	92	PP	92				
86	Sec. 20, T.19N., R.15E.	4000	S	DF	95	DF	77	DF	85		
86	Sec. 25, T.19N., R.15E.	2870	N	DF	106						
87	Sec. 2, T.26N., R.18E.	4740	W	DF	104	WF	98	LP	90		
95	Sec. 22, T.19N., R.15E.	4300	NE	—	—	DF	64	DF	66		
102	Sec. 24, T.21N., R.19E.	3760	E	PP	61						
102	Sec. 22, T.18N., R.15E.	4400	N	DF	100	DF	90	DF	89		
103	Sec. 19, T.21N., R.17E.	4240	E	WF	95	WF	110				
106	Sec. 17, T.21N., R.15E.	2850	SE	PP	50	A	70	A	50		
107	Sec. 10, T.21N., R.12E.	3300	W	A	80	A	70	A	70		
107	Sec. 2, T.18N., R.14E.	5400	N	LP	57	MH	70	MH	80		
107	Sec. 10, T.19N., R.13E.	3300	S	MH	98	MH	52	MH	98		
107	Sec. 21, T.21N., R.18E.	5100	NW	A	84	A	70	A	66		
107	Sec. 30, T.21N., R.14E.	3200	E	A	67	WF	20	—	—		
110	Sec. 11, T.21N., R.18E.	4700	N	LP	27	A	68	LP	46		
110	Sec. 36, T.18N., R.15E.		NE	DF	88	DF	90				

TIMBER SITE INDEX DATA

Information taken from some T.S.I. plot sheets
and
from some soil description plot sheets

LAND-TYPE NUMBER	LOCATION	ELEVATION	ASPECT	PLOT #1 SPECIES	PLOT #1 INDEX	PLOT #2 SPECIES	PLOT #2 INDEX	PLOT #3 SPECIES	PLOT #3 INDEX	PLOT #4 SPECIES	PLOT #4 INDEX
111	Sec. 25, T.21N., R.16E.	4180	W	WF	65	A	115	A	120		
111	Sec. 34, T.18N., R.15E.	5200	N	LP	59	LP	58	LP	73		
119	Sec. 12, T.21N., R.11E.	4100	NE	WH	110	NF	50	NF	40		
133	Sec. 2, T.23N., R.17E.		E	WF	118	DF	102				
135	Sec. 20, T.21N., R.19E.	5600	NW	LP	30	LP	40	LP	30		
135	Sec. 12, T.21N., R.18E.	5900	NW	LP	30	LP	30	LP	30		
136	Sec. 11, T.21N., R.17E.	3000	SE	PP	85	PP	75	PP	90		
137	Sec. 13, T.20N., R.17E.	3100	N	DF	73	DF	85	DF	115		
137	Sec. 22, T.21N., R.17E.	2700	E	PP	80	PP	90	PP	85		
137	Sec. 26, T.21N., R.17E.	3600	NW	—	—	PP	50	PP	60		
137	Sec. 30, T.21N., R.18E.	3800	W	PP	69	PP	90	PP	70		
137	Sec. 10, T.21N., R.19E.	4912	W	PP	59						
138	Sec. 4, T.21N., R.18E.	4330	N	WL	90	DF	104	DF	118	LP	98
138	Sec. 2, T.21N., R.19E.	3840	NE	DF	88	DF	72	WL	96		
138	Sec. 2, T.23N., R.17E.		E	WF	81	DF	102				
138	Sec. 5, T.21N., R.19E.	4100	NE	PP	50	A	109	—	—		
138	Sec. 8, T.21N., R.19E.	4300	NE	PP	55	A	60	LP	40		
138	Sec. 10, T.21N., R.19E.	3800	NE	A	70	WF	50	PP	58		
138	Sec. 2, T.21N., R.17E.	4400	N	A	70	A	80	A	80		
138	Sec. 20, T.21N., R.17E.	3800	E	A	69	PP	65	PP	56		
138	Sec. 6, T.21N., R.18E.	3200	N	A	50	A	65	PP	60		
138	Sec. 4, T.21N., R.18E.	3800	S	A	85	PP	57	PP	70		
138	Sec. 2, T.21N., R.18E.	4200	N	A	88	A	69	WF	56		
138	Sec. 22, T.21N., R.14E.	3570	S	PP	66	PP	80	PP	80		
138	Sec. 24, T.21N., R.14E.	4300	S	A	77	PP	40	PP	80		
138	Sec. 8, T.21N., R.17E.	4900	NE	A	80	A	70	A	100		
138	Sec. 23, T.21N., R.17E.	3800	S	PP	59	PP	45	PP	45		
138	Sec. 5, T.18N., R.15E.	4000	W	DF	54	—	—	—	—		
139	Sec. 10, T.18N., R.15E.	4800	N	DF	78	DF	65	DF	52		
139	Sec. 6, T.21N., R.19E.	4500	NE	A	84	A	76	LP	30		
139	Sec. 14, T.20N., R.12E.	3300	SW	DF	80	DF	90	DF	80		
139	Sec. 12, T.21N., R.14E.	3600	N	A	80			A	80		

LAND-TYPE NUMBER	LOCATION	ELEVATION	ASPECT	PLOT #1 SPECIES	PLOT #1 INDEX	PLOT #2 SPECIES	PLOT #2 INDEX	PLOT #3 SPECIES	PLOT #3 INDEX	PLOT #4 SPECIES	PLOT #4 INDEX
139	Sec. 10, T.21N., R.14E.	3900	N	A	90	A	61	—	—		
139	Sec. 10, T.21N., R.15E.	3350	N	A	100	A	70	A	100		
139	Sec. 34, T.20N., R.13E.		NW	WH	48						
143	Sec. 16, T.19N., R.14E.	5300	N	DF	70	DF	72	MH	73		
212	Sec. 28, T.19N., R.15E.	2800	W	PP	63	PP	73	PP	104		
213	Sec. 2, T.18N., R.15E.	4600	N	DF	97	DF	92	DF	71		
213	Sec. 34, T.20N., R.18E.	4500	S	PP	60	DF	70	DF	70		
213	Sec. 26, T.19N., R.15E.	3500	NE	DF	104	WF	72	WL	105		
213	Sec. 2, T.18N., R.15E.	4790	N	WF	94	DF	90				
214	Sec. 25, T.20N., R.18E.	5000	E	DF	70	DF	80	—	—		
214	Sec. 24, T.21N., R.11E.	3860	SE	DF	92						
214	Sec. 28, T.20N., R.18E.	5000	W	DF	70	DF	80	DF	80		
214	Sec. 24, T.19N., R.15E.	3900	N	DF	98	DF	89	DF	89		
215	Sec. 1, T.20N., R.18E.	5100	N	LP	30	DF	70	LP	40		
215	Sec. 3, T.20N., R.18E.	6200	NW	—	—	ES	40	ES	50		
215	Sec. 15, T.20N., R.18E.	5700	—	ES	50	LP	40	ES	50		
215	Sec. 13, T.20N., R.18E.	5700	N	SAF	20	ES	30	SAF	20		
215	Sec. 27, T.20N., R.18E.	5400	—	LP	40	LP	40	—	—		
215	Sec. 22, T.21N., R.18E.	6000	S	LP	35	LP	40	LP	30		
215	Sec. 27, T.21N., R.18E.	5400	S	LP	36	LP	36	LP	45		
215	Sec. 22, T.21N., R.18E.	6000	S	LP	35	LP	40	LP	30		
215	Sec. 27, T.21N., R.18E.	5400	S	LP	36	LP	36	LP	45		
217	Sec. 5, T.20N., R.17E.	3900	SW	DF	77	DF	83	DF	100		
217	Sec. 33, T.20N., R.18E.	4000	S	PP	60	—	—	—	—		
217	Sec. 12, T.21N., R.19E.	4200	SW	PP	59	PP	125	PP	80		
218	Sec. 13, T.21N., R.16E.	4300	W	WF	70	A	70	A	62		
218	Sec. 25, T.20N., R.17E.	3025	N	PP	60	DF	100	DF	50		
218	Sec. 18, T.20N., R.18E.	4200	W	DF	100	DF	70	DF	60		
218	Sec. 8, T.18N., R.15E.	4800	S	DF	82	DF	100	—	—		
219	Sec. 4, T.20N., R.18E.	5600	NE	—	—	—	—	SAF	30		
220	Sec. 22, T. 21N.,R.19E.	6000	SW	—	—	WL	50	WL	35		
220	Sec. 24, T.21N., R.18E.	5600	SW	WL	55	ES	50	SAF	50		
220	Sec. 32, T.18N., R.15E.	5800	N	LP	34	LP	71	—	—		
263	Sec. 4, T.20N., R.20E.	5100	NE	LP	40	LP	70	LP	40		
298	Sec. 26, T.21N., R.13E.	3820	S	A	110	A	80	—	—		
298	Sec. 12, T.21N., R.12E.		SE	A	100	DF	100	—	—		
301	Sec. 6, T.20N., R.14E.	3600	E	DF	100	DF	70	DF	70		

ESTIMATED TIMBER SITE INDEX VALUES

Landtype Number	PP	DF	LP	A	SAF
10	90 ±10	90 ±10	—	—	—
11	95 ±15	95 ±15	—	—	—
12	90 ±15	90 ±15	—	—	—
13	95 ±15	95 ±15	—	—	—
14	90 ±20	90 ±20	—	—	—
15	95 ±20	90 ±20	95 ±20	—	—
24	70 ±10	105 ±10	90 ±10	—	—
25	—	110 ±5	95 ±5	90 ±5	—
27	90 ±15	—	—	—	—
28	100 ±10	95 ±10	—	—	—
29	70 ±15	105 ±15	90 ±10	—	—
30	—	110 ±10	95 ±10	105 ±10	—
31	—	—	—	—	40 ±20
32	90 ±15	95 ±15	—	—	—
33	70 ±15	105 ±15	90 ±15	—	—
34	—	110 ±15	95 ±15	105 ±10	—
35	90 ±15	—	—	—	—
36	100 ±15	95 ±15	—	—	—
37	80 ±15	100 ±15	90 ±15	—	—
38	—	110 ±15	95 ±15	105 ±15	—
40	100 ±20	95 ±20	—	—	—
41	80 ±15	100 ±10	90 ±10	—	—
42	—	110 ±15	95 ±15	105 ±15	—
48	—	110 ±15	95 ±15	105 ±15	—
49	—	—	—	—	40 ±20
50	N/A	N/A	N/A	N/A	N/A
51	55 ±10	—	—	—	—
52	55 ±10	45 ±10	—	—	—
53	50 ±10	55± 15	65 ±15	—	—
55	—	—	—	—	40 ± 20
57	80 ±15	70± 15	—	—	—
59	—	80 ±15	95 ±15	110 ±10	—
61g	N/A	N/A	N/A	N/A	N/A
61	75 ±10	—	—	—	—
62	80 ±10	70 ±10	—	—	—
63	60 ±15	80 ±10	70 ±15	—	—
64	—	80 ±10	75 ±10	90 ±20	—
65	—	—	—	—	40 ±20
66g	N/A	N/A	N/A	N/A	N/A
66	60 ±15	—	—	—	—
67	80 ±10	70 ±10	—	—	—
68	60 ±15	80 ±10	70 ±10	—	—
69	—	80 ±10	75 ±10	90 ±20	—
70	—	—	—	—	40 ±20
71	90 ±20	—	—	—	—
72	95 ±20	95 ±20	—	—	—
73	70 ±20	110 ±20	90 ±20	—	—
75		—	—	—	40 ±20
76	90 ±20	—	—	—	—

ESTIMATED TIMBER SITE INDEX VALUES

Landtype Number	PP	DF	LP	A	SAF
77	95 ± 20	95 ± 20	—	—	—
78	70 ± 20	100 ± 20	90 ± 20	—	—
79	—	110 ± 20	95 ± 20	105 ± 20	—
85	90 ± 20	70 ± 20	—	—	—
86	60 ± 20	90 ± 20	70 ± 20	—	—
87	—	100 ± 20	90 ± 20	80 ± 20	—
88	—	—	—	—	35 ± 20
95	—	70 ± 15	75 ± 20	90 ± 20	—
102	60 ± 10	95 ± 10	85 ± 10	—	—
103	—	100 ± 10	90 ± 10	80 ± 15	—
105	95 ± 15	90 ± 10	—	—	—
106	55 ± 15	95 ± 10	85 ± 10	—	—
107	—	100 ± 20	90 ± 15	80 ± 15	—
110	55 ± 15	95 ± 10	85 ± 20	—	—
111	—	100 ± 15	90 ± 20	115 ± 10	—
114	55 ± 15	95 ± 15	85 ± 15	—	—
115	—	100 ± 15	90 ± 20	115 ± 10	—
119	—	110 ± 15	95 ± 15	110 ± 10	—
120	—	—	—	—	40 ± 20
132	95 ± 10	90 ± 10	—	—	—
133	80 ± 10	100 ± 10	90 ± 15	—	—
135	—	—	—	—	40 ± 20
136g	N/A	N/A	N/A	N/A	N/A
136	90 ± 10	—	—	—	—
137	95 ± 10	90 ± 10	—	—	—
138	75 ± 15	100 ± 10	90 ± 15	—	—
139	—	110 ± 15	85 ± 15	100 ± 20	—
141g	N/A	N/A	N/A	N/A	N/A
141	90 ± 15	—	—	—	—
142	95 ± 15	90 ± 15	—	—	—
143	65 ± 15	75 ± 10	80 ± 15	—	—
144	—	100 ± 15	95 ± 15	100 ± 15	—
150	N/A	N/A	N/A	N/A	N/A
156	75 ± 15	65 ± 15	—	—	—
157	60 ± 15	70 ± 10	65 ± 10	—	—
158	—	75 ± 10	70 ± 10	85 ± 10	—
159	—	—	—	—	40 ± 20
206	—	—	—	—	40 ± 20
210	—	—	—	—	40 ± 20
211	80 ± 20	—	—	—	—
212	80 ± 20	90 ± 15	—	—	—
213	60 ± 10	85 ± 10	80 ± 10	—	—
214	—	90 ± 10	85 ± 10	100 ± 10	—
215	—	—	—	—	50 ± 15
216	85 ± 10	—	—	—	—
217	80 ± 15	90 ± 15	—	—	—
218	60 ± 10	80 ± 15	80 ± 15	—	—
219	—	90 ± 15	85 ± 15	100 ± 10	—
220	—	—	—	—	50 ± 10
252	80 ± 15	90 ± 10	—	—	—

ESTIMATED TIMBER SITE INDEX VALUES

Landtype Number	PP	DF	LP	A	SAF
253	50 ± 20	60 ± 15	60 ± 10	—	—
263	—	65 ± 15	60 ± 10	—	—
271	70 ± 20	100 ± 20	90 ± 20	—	—
298	—	95 ± 10	85 ± 15	95 ± 15	—
301	60 ± 20	80 ± 20	70 ± 20	—	—

ESTIMATED CLASSIFICATION OF S.R.I. LANDTYPES

Landtype Number	Classification
2	sandy—skeletal, mixed, mesic family of Typic Ustorthents
3	coarse—loamy, mixed, mesic family of Typic Humaquepts, or coarse—loam, mixed, mesic family of Histic Humaquepts, or clastic, Euic family of Fluvaquentic Borofibrists
4	coarse—loamy, mixed family of Aquic Cryumbrepts
5	N/A
6	N/A
7	N/A
8	N/A
9	N/A
10	loamy—skeletal, mixed, mesic family of Typic Xerofluvents
11	loamy—skeletal, mixed, mesic family of Aquic Xerofluvents
12	medial—skeletal, mesic family of Typic Xerofluvents
13	medial—skeletal, mesic family of Aquic Xerofluvents
14	coarse—loamy over fragmental, mixed, mesic family of Dystric Xerochrepts
15	coarse—loamy over fragmental, mixed, mesic family of Udic Ustochrepts
24	coarse—loamy, mixed, frigid family of Udic Ustochrepts
25	coarse—loamy, mixed family of Dystric Cryochrepts, or coarse—loamy, mixed family of Entic Cryorthods
27	coarse—loamy, mixed, mesic family of Dystric Xerochrepts
28	coarse—loamy, mixed, frigid family of Dystric Xerochrepts
29	coarse—loamy, mixed, frigid family of Udic Ustochrepts
30	coarse—loamy, mixed family of Dystric Cryochrepts, or coarse—loamy, mixed family of Entic Cryorthods
31	coarse—loamy, mixed family of Entic Cryorthods, or coarse—loamy, mixed family of Typic Cryumbrepts
32	coarse—loamy, mixed, frigid family of Dystric Xerochrepts
33	coarse—loamy, mixed family of Udic Ustochrepts
34	coarse—loamy, mixed family of Dystric Cryochrepts, or coarse—loamy, mixed family of Entic Cryorthods
35	cindery, mesic family of Mollic Vitrandepts
36	cindery, frigid family of Typic Vitrandepts
37	cindery family of Andic Ustochrepts
38	cindery family of Entic Cryandepts, or cindery family of Entic Cryorthods
40	cindery, frigid family of Typic Vitrandepts
41	cindery, frigid family of Andic Ustochrepts
42	cindery family of Entic Cryandepts, or cindery family of Entic Cryorthods

Landtype Number	Classification
48	cindery family of Entic Cryandepts, or cindery family of Entir Cryorthods
49	cindery family of Entic Cryorthods, or cindery family of Andeptic Cryumbrepts
50	N/A
51	coarse—loamy, mixed, nonacid, mesic family of Dystric Lithic Xerochrepts
52	coarse—loamy, mixed, frigid family of Dystric Lithic Xerochrepts
53	coarse—loamy, mixed, frigid family of Lithic Ustochrepts
55	coarse—loamy, mixed family of Lithic Cryumbrepts
57	coarse—loamy, mixed, frigid family of Dystric Xerochrepts
59	coarse—loamy, mixed family of Dystric Cryochrepts, or coarse—loamy, mixed family of Entic Cryorthods
61g	coarse—loamy, mixed, mesic family of Ultic Haploxerolls, or fine—loamy, mixed, mesic family of Ultic Argixerolls
61	coarse—loamy, mixed, mesic family of Dystric Xerochrepts, or fine—loamy, mixed, mesic family of Ultic Haplustalfs
62	coarse—loamy, mixed, frigid family of Dystric Xerochrepts
63	coarse—loamy, mixed, frigid family of Udic Ustochrepts
64	coarse—loamy, mixed family of Dystric Cryochrepts, or coarse—loamy, mixed family of Entic Cryorthods
65	coarse—loamy, mixed family of Entic Cryorthods, or coarse—loamy, mixed family of Typic Cryumbrepts
66g	coarse—loamy, mixed, mesic family of Ultic Haploxerolls
66	coarse—loamy, mixed, mesic family of Dystric Xerochrepts
67	coarse—loamy, mixed, frigid family of Dystric Xerochrepts
68	coarse—loamy, mixed, frigid family of Udic Ustochrepts
69	coarse—loamy, mixed family of Dystric Cryochrepts, or coarse—loamy, mixed family of Entic Cryorthods
70	coarse—loamy, mixed family of Entic Cryorthods, or coarse—loamy, mixed family of Typic Cryumbrepts
71	cindery, mesic family of Mollic Vitrandepts
72	cindery, frigid family of Typic Vitrandepts
73	cindery, frigid family of Andic Ustochrepts
75	cindery family of Entic Cryorthods, or cindery family of Umbric Vitrandepts
76	cindery, mesic family of Mollic Vitrandepts
77	cindery, frigid family of Typic Vitrandepts
78	cindery, frigid family of Andic Ustochrepts
79	cindery family of Entic Cryandepts, or cindery family of Entic Cryorthods

Landtype Number	Classification
85	coarse—loamy, micaceous, frigid family of Dystric Xerochrepts
86	coarse—loamy, micaceous, frigid family of Udic Ustochrepts
87	coarse—loamy, micaceous family of Dystric Cryochrepts, or coarse—loamy, micaceous family of Entic Cryorthods
88	coarse—loamy, micaceous family of Entic Cryorthods, or coarse—loamy, micaceous family of Typic Cryumbrepts
95	fine—loamy, micaceous family of Dystric Cryochrepts, or fine—loamy, micaceous family of Entic Cryorthods
102	fine—loamy, mixed, frigid family of Udic Ustochrepts
103	fine—loamy, mixed family of Dystric Cryochrepts, or fine—loamy, mixed family of Entic Cryorthods
105	fine—loamy, mixed, frigid family of Dystric Xerochrepts
106	fine—loamy, mixed, frigid family of Udic Ustochrepts
107	fine—loamy, mixed family of Dystric Cryochrepts, or fine—loamy, mixed family of Entic Cryorthods
110	fine, mixed, frigid family of Typic Dystrochrepts
111	fine, mixed family of Dystric Cryochrepts
114	fine, mixed, frigid family of Typic Dystrochrepts
115	fine, mixed family of Dystric Cryochrepts
119	fine—loamy, mixed family of Dystric Cryochrepts, or fine—loamy, mixed family of Entic Cryorthods
120	fine—loamy, mixed family of Entic Cryorthods, or fine—loamy, mixed family of Typic Cryumbrepts
132	coarse—loamy, mixed, frigid family of Dystric Xerochrepts
133	coarse—loamy, mixed, frigid family of Udic Ustochrepts
135	coarse—loamy, mixed family of Entic Cryorthods, or coarse—loamy, mixed family of Typic Cryumbrepts
136g	coarse—loamy, mixed, mesic family of Ultic Haploxerolls
136	coarse—loamy, mixed, mesic family of Dystric Xerochrepts
137	coarse—loamy, mixed, frigid family of Dystric Xerochrepts
138	coarse—loamy, mixed, frigid family of Udic Ustochrepts
139	coarse—loamy, mixed family of Dystric Cryochrepts, or coarse—loamy, mixed family of Entic Cryorthods
141g	coarse—loamy, mixed, mesic family of Ultic Haploxerolls
141	coarse—loamy, mixed, mesic family of Dystric Xerochrepts
142	coarse—loamy, mixed, frigid family of of Dystric Xerochrepts
143	coarse—loamy, mixed, frigid family of Udic Ustochrepts
144	coarse—loamy, mixed family of Dystric Cryochrepts, or coarse—loamy, mixed family of Entic Cryorthods
150	N/A

Landtype Number	Classification
156	coarse—loamy, serpentinitic, frigid family of Dystric Xerochrepts, or fine—loamy, serpentinitic, frigid family of Dystric Xerochrepts
157	coarse—loamy, serpentinitic, frigid family of Udic Ustochrepts, or fine—loamy, serpentinitic, frigid family of Udic Ustochrepts
158	coarse—loamy, serpentinitic family of Dystric Cryochrepts, or fine—loamy, serpentinitic family of Dystric Cryochrepts
159	coarse—loamy, serpentinitic family of Entic Cryorthods, or coarse—loamy, serpentinitic family of Typic Cryumbrepts
206	fine—loamy, mixed family of Lithic Cryochrepts, or fine—loamy, mixed family of Lithic Cryumbrepts
210	fine—loamy, mixed family of Lithic Cryochrepts, or fine—loamy, mixed family of Lithic Cryumbrepts
211	fine—loamy, mixed, mesic family of Dystric Xerochrepts
212	fine—loamy, mixed, frigid family of Dystric Xerochrepts
213	fine—loamy, mixed, frigid family of Udic Ustochrepts
214	fine—loamy, mixed family of Dystric Cryochrepts, or fine—loamy, mixed family of Entic Cryorthods
215	fine—loamy, mixed family of Entic Cryorthods, or fine—loamy, mixed family of Typic Cryumbrepts
216	fine—loamy, mixed, mesic family of Dystric Xerochrepts
217	fine—loamy, mixed, frigid family of Dystric Xerochrepts
218	fine—loamy, mixed, frigid family of Udic Ustochrepts
219	fine—loamy, mixed family of Dystric Cryochrepts, or fine—loamy, mixed family of Entic Cryorthods
220	fine—loamy, mixed family of Dystric Cryochrepts, or fine—loamy, mixed family of Entic Cryorthods
252	loamy—skeletal, mixed, frigid family of Dystric Xerochrepts
253	loamy—skeletal, mixed, frigid family of Udic Ustochrepts
263	loamy—skeletal, mixed family of Dystric Cryochrepts
271	cindery, frigid family of Andic Ustochrepts
298	coarse—loamy, mixed family of Dystric Cryochrepts, or coarse—loamy, mixed family of Entic Cryorthods
301	coarse—loamy, mixed, frigid family of Udic Ustochrepts

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GLOSSARY

ALLUVIUM—A general term for all detrital material deposited or in transit by streams, including gravel, sand, silt, clay, and all variations and mixtures of these. Unless otherwise noted, alluvium is unconsolidated.

ALPINE MEADOW SOILS—A great soil group of the intrazonal order, comprised of dark soils of grassy meadows at altitudes above the timberline.

ANDESITE—A dark gray to black, dense, fine-grained extrusive igneous rock. Very similar to basalt.

ANGLE OF REPOSE—Angle between the horizontal and the maximum slope that a soil assumes through natural processes.

ARGILLITE—An extremely hard, fine-grained, gray to black sedimentary rock composed primarily of clay minerals. It is distinguished from shale and slate by its lack of cleavage plans parallel to stratification. It typically breaks up into small pencil-like fragments.

ARKOSIC SANDSTONE—Sandstone that is low in quartz and high in clay bearing minerals.

ASH, VOLCANIC—Uncemented pyroclastic material consisting of fragments mostly under 4 mm. in diameter. Coarse ash is from ¼ to 4 mm. in grain size; fine ash is below ¼ mm. without a qualifying adjective, the term should be applied only to essential ejecta.

AVAILABLE WATER—The portion of water in a soil that can be absorbed by plant roots, usually considered to be that water held in the soil against a tension of up to approximately 15 bars.

AVAILABLE WATER HOLDING CAPACITY—The capacity to store water available for use by plants, usually expressed in linear depths of water per unit depth of soil. Commonly defined as the difference between the percentage of soil water at field capacity and the percentage at wilting point. This difference multiplied by the bulk density and divided by 100 gives a value in surface inches of water per inch depth of soil.

BASALT—A very dark to black, dense, fine-grained extrusive igneous rock. Very similar to andesite.

BASALTIC BRECCIA—A highly-fractured marine basalt with inclusions of angular fragments of other previously formed rocks.

BASE FLOW—Sustained or fair weather runoff. It is composed of groundwater runoff and delayed subsurface runoff.

BEDROCK—The more or less solid rock in place either on or beneath the surface of the earth. It may be soft or hard and have a smooth or irregular surface.

BRECCIA—A rock composed of coarse angular fragments cemented together.

CLASSIFICATION—The systematic arrangement of soils into groups or categories on the basis of their characteristics. Broad groupings are made on the basis of general characteristics and subdivisions on the basis of more detailed differences in specific properties. In the United States the following system has been used since 1938 with additional great soil groups added in 1949 (from Soil Survey Staff, SCS, USDA, 1960, Soil classification: A comprehensive system—7th Approximation. P. 9. U.S. Govt. Printing Office, Washington). On Jan. 1, 1965, a new USDA soil classification system (soil taxonomy) was adopted for use in publications by the National Cooperative Soil Survey.

CLAY—A soil separate less than .002 millimeters in diameter. As a soil textural class, less than 45 percent sand, and less than 40 percent silt.

COARSE FRAGMENTS—Rock or mineral particles greater than 2.0 millimeters in diameter. See Table for the names used for coarse fragments in soils.

Fragments		Descriptive terms applied to fragments that have:		
Shape	Material	Diameters less than 3 inches	Diameters from 3 to 10 inches	Diameters more than 10 inches
rounded or sub-rounded	all kinds of rock	pebble	cobblestone	stone[1]
irregular and angular	chert	chert fragment	coarse chert fragment	stone[1]
	other than chert	angular pebble	angular cobblestone	stone[1]
		Lengths up to 6 inches	Lengths from 6 to 15 inches	Lengths over 15 inches
thin and flat	limestone, sandstone, or schist	fragment	flagstone	stone
	slate	slate fragment	flagstone	stone
	shale	shale fragment	flagstone	stone

[1] Bouldery is sometimes used when stones are larger than 24 inches.

COARSE TEXTURE—The texture exhibited by sands, loamy sands, and sandy loams except very fine sandy loam. A soil containing large quantities of these textural classes (United States usage).

COLLUVIUM—Soil material or rock fragments moved downslope by gravitational force in the form of soil creep, slides, and local wash.

COLOR—See Munsell color system.

COMPACTION—The packing together of soil particles by forces exerted at the soil surface resulting in increased soil density.

COMPLEX—An association in which two soil units or a soil unit and a miscellaneous landtype are so intricately mixed that it is not practical to show them separately at the scale of mapping used.

CONGLOMERATE—(i) The resistence of a material to deformation or rupture. (ii) The degree of cohesion or adhesion of the soil mass. Terms used for describing consistency at various soil moisture contents are:

Wet Soil—nonsticky, slightly sticky, sticky, very sticky, nonplastic, slightly plastic, plastic, and very plastic.

Moist Soil—loose, very friable, friable, firm, very firm, and extremely firm.

Dry Soil—loose, soft, slightly hard, hard, very hard, and extremely hard.

CREEP—Slow mass movement of soil and soil material down relatively steep slopes primarily under the influence of gravity, but facilitated by saturation with water and by alternate freezing and thawing.

DEPTH, EFFECTIVE SOIL—The depth of soil material that plant roots can penetrate readily to obtain water and plant nutrients. It is the depth to a layer that differs sufficiently from the overlying material in physical or chemical properties to prevent or seriously retard the growth of roots.

DUFF—The more or less firm organic layer on top of mineral soil, consisting of fallen vegetative matter in the process of decomposition, including everything from pure humus below to the litter on the surface. Duff is a general, nonspecific term.

EROSION—1. The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep. 2. Detachment and movement of soil or rock fragments by water, wind, ice, or gravity. The following terms are used to describe different types of water erosion:

accelerated erosion—Erosion much more rapid than normal, natural, or geologic erosion, primarily as a result of the influence of the activities of man or, in some cases, of other animals or natural catastrophes that expose base surfaces, for example, fires.

geological erosion—The normal or natural erosion caused by geological processes acting over long periods and resulting in the wearing away of mountains, the building up of floodplains, coastal plains, etc. Syn. natural erosion.

gully erosion—The erosion process whereby water accumulates in narrow channels and, over short periods, removes the soil from this narrow area to considerable depths, ranging from 1 to 2 feet to as much as 75 to 100 feet.

natural erosion—Wearing away of the earth's surface by water, ice, or other natural agents under natural environmental conditions of climate, vegetation, etc., undisturbed by man. Syn. geological erosion.

normal erosion—The gradual erosion of land used by man which does not greatly exceed natural erosion.

rill erosion—An erosion process in which numerous small channels only several inches deep are formed; occurs mainly on recently cultivated soils.

sheet erosion—The removal of a fairly uniform layer of soil from the land surface by runoff water.

splash erosion—The spattering of small soil particles caused by the impact of raindrops on wet soils. The loosened and spattered particles may or may not be subsequently removed by surface runoff.

EXTRUSIVE BEDROCK—This applies to those igneous rocks derived from volcanic lavas that cooled on the surface of the earth. This lava cools rapidly and forms fine-textured rocks such as basalt and andesite.

FELDSPATHIC SANDSTONES—Sandstone that is high in quartz and low in clay-producing minerals.

FINE TEXTURE—Consisting of or containing large quantities of the fine fractions, particularly of silt and clay. (Includes all clay loams and clays; that is, clay loam, sandy clay loam, silty clay loam, sandy clay, silty clay, and clay textural classes. Sometimes subdivided into clayey texture and moderately fine texture.)

FRIABLE—Easy to break, crumble, or crush.

GEOMORPHOLOGY—The study of landforms as they relate to geologic composition and history.

GLACIAL DRIFT—Rock debris that has been transported by glaciers and deposited, either directly from the ice or from the meltwater. The debris may or may not be heterogeneous.

GLACIAL TILL—See till.

GLACIATED VALLEY—U-shaped valley formerly occupied by a glacier.

GLACIOFLUVIAL DEPOSITS—Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and may occur in the form of outwash plains, deltas, kames, eskers, and kame terraces.

GLACIOLACUSTRINE DEPOSITS—Soil materials transported by glaciers and deposited by glacial meltwater in glacial lakes, ranging from fine sand and small gravel near the lakeshores, to fine silts and clay in the lake bottom.

GRAYWACKE—A loose and general term for sandstone containing significant quantities of clay materials.

HUMMOCKY—Hilly, uneven landscape resulting from deep-seated soil movement, usually of a rotational nature.

INCLUSION—Soil type found within a mapping unit that is not extensive enough to be mapped separately or as part of a complex.

INFILTRATION—The flow of a liquid into a substance through pores or other openings, connoting flow into a soil in contradistinction to the word percolation which connotes flow through a porous substance.

INTRUSIVE BEDROCK—This applies to those rocks derived from magmas that have been injected into older rocks at depth without reaching the surface. These magmas are slow-cooling and form coarse-textured rocks, such as granite.

LACUSTRINE DEPOSIT—Material deposited in lake water and later exposed either by lowering of the water level or by the elevation of the land.

LANDFORM—Structural configuration of the topography as a result of past and present geological activity.

LAND TYPE—See Soil Association.

MAPPING UNIT—Any delineated area shown on a soil map that is identified by a number. A mapping unit may be a soil unit, a miscellaneous landtype, or a complex.

MASSIVE—Soil structure or bedrock condition in which there is no observable aggregation or no definite orderly arrangement of natural lines of weakness.

MASS MOVEMENT—All movement of soil and bedrock materials occurring below the soil surface such as landslips, landflows, rock slides, slumps, etc.

MEDIUM TEXTURE—Intermediate between fine-textured and coarse-textured (soils). (It includes the following textural classes: very fine sandy loam, loam, silt loam, and silt.)

MISCELLANEOUS LANDTYPE—A mapping unit for areas of land that have little or no natural soil, or have properties that are too variable and unpredictable for classification.

MODERATELY-COARSE TEXTURE—Consisting predominantly of coarse particles. (In soil textural classification, it includes all the sandy loams except the very fine sandy loam.)

MODERATELY-FINE TEXTURE—Consisting predominantly of intermediate-size (soil) particles or with relatively small amounts of fine or coarse particles. (In soil textural classification, it includes clay loam, sandy clay loam, and silty clay loam.)

MOISTURE TENSION—The equivalent negative pressure in the soil water. It is equal to the equivalent pressure that must be applied to the soil water to bring it to hydraulic equilibrium, through a porous permeable wall or membrane, with a pool of water of the same compositions. The pressures used and the corresponding percentages most commonly determined are:

fifteen-bar percentage—The percentage of water contained in a soil that has been saturated, subjected to, and is in equilibrium with, and applied pressure of 15 bars. (Pressure applied in a pressure membrane or ceramic pressure plate apparatus. Usually expressed as a weight percentage but may be expressed as a volume percentage. Approximately the same as the fifteen-atmosphere percentage.)

one-third bar percentage—The percentage of water contained in a soil that has been saturated, subjected to, and is in equilibrium with, an applied pressure of 1/3 bar. (Pressure applied in a ceramic plate apparatus. Usually expressed as a weight percentage. Approximately the same as one-third atmosphere percentage. Also, for medium to coarse-textured soils approximately numerically equal to moisture equivalent.)

MUDSTONE—Soft, fine-grained, gray to black sedimentary rock composed primarily of clay minerals. It lacks cleavage planes parallel to stratification and typically breaks into small block-like fragments.

MUNSELL COLOR SYSTEM—A color designation system that specifies the relative degrees of the three simple variables of color: hue, value, and chroma. For example: 10YR 6/4 is a color (of soil) with a hue = 10 YR, value = 6, and chroma = 4. These notations can be translated into several different systems of color names as desired.

OUTWASH—Glacial material swept out, sorted and deposited by water that originated from the melting of glacial ice.

PARENT MATERIAL—The unconsolidated and more or less chemically weathered mineral or organic matter from which the solum of soils is developed by pedogenic processes.

PEAK FLOW (PEAK RUNOFF)—The greatest water discharge for any single runoff period.

PERCOLATION, SOIL WATER—The downward movement of water through soil, especially the downward flow of water in saturated or nearly saturated soil at hydraulic gradients of the order of 1.0 or less.

PERMEABILITY, SOIL—(i) The ease with which gases, liquids, or plant roots penetrate or pass through a bulk mass of soil or a layer of soil. Since different soil horizons vary in permeability, the particular horizon under question should be designated. (ii) The property of a porous medium itself that relates to the ease with which gases, liquids, or other substances can pass through it. Previously, frequently considered the "k" in Darcy's law. The "K" in intrinsic permeability.

pH, SOIL—The negative logarithm of the hydrogen-ion activity of a soil. The degree of acidity (or alkalinity) or a soil as determined by means of a glass, quinhydrone, or other suitable electrode or indicator at a specified moisture content or soil-water ratio, and expressed in terms of the pH scale.

PIPING—Removal of soil material through subsurface flow channels or "pipes" developed by seepage water.

PLASTIC SOIL—A soil capable of being molded or deformed continuously and permanently, by relatively moderate pressure, into various shapes.

POROSITY—The volume percentage of the total bulk not occupied by solid particles.

PUMICE—An excessively cellular, light-colored, volcanic ejecta. A sort of volcanic froth. It is very light and will float on water.

PYROCLASTIC—A general term applied to rocks formed from volcanic material that has been explosively or aerially ejected from a volcanic vent.

REACTION, SOIL—The degree of acidity of alkalinity of a soil, usually expressed as a pH value. Descriptive terms commonly associated with certain ranges in pH are: extremely acid, <4.5; very strongly acid, 4.5-5.0; strongly acid, 5.1-5.5; moderately acid, 5.6-6.0 slightly acid, 6.1-6.5; neutral, 6.6-7.3; slightly alkaline, 7.4-7.8; moderately alkaline, 7.9-8.4; strongly alkaline, 8.5-9.0; and very strongly alkaline, >9.1.

RESIDUUM—Soil material formed by rock weathering in place.

RIVERWASH—Barren alluvial land, usually coarse-textured, exposed along streams at low water and subject to shifting during normal high water. A miscellaneous land type.

RUNOFF—That part of the precipitation which appears in surface streams of either perennial or intermittent form.

SAND—A soil separate between .05 and 2.0 mm in diameter.

SANDSTONE—A hard rock composed primarily of cemented sandsize grains.

SEDIMENTARY ROCK—Rock formed by deposition of soil and rock particles by water, ice or wind that later solidifies through cementation, ionic exchange or compression.

SHALE—Fine-grained rock, softer than slate, consisting of clay minerals and silt, which characteristically splits readily along closely-spaced planes, parallel to stratification.

SILT—A soil separate consisting of particles between 0.002 and 0.05 millimeters in diameter.

SILTSTONE—A sedimentary rock consisting primarily of silt-size particles.

SLATE—Rock formed by the metamorphism of shale. Slate is very fine-grained and exceptionally well-foliated. Because of its excellent foliation, it splits into thin sheets parallel to stratification.

SLUMP—A deep-seated, slow-moving, rotational failure occurring in plastic materials, resulting in vertical and lateral displacement.

SOIL—(1) The unconsolidated mineral material on the immediate surface of the earth that serves as a natural medium for the growth of land plants. (ii) The unconsolidated mineral matter on the surface of the earth that has been subjected to and influenced by genetic and environmental factors of: parent material, climate, (including moisture and temperature effects), macro and microorganisms, and topography, all acting over a period of time and producing a product—soil—that differs from the material from which it is derived in many physical, chemical, biological and morpholigical properties, and characteristics.

SOIL ASSOCIATION—(i) A group of defined and named taxonomic soil units occurring together in an individual and characteristic pattern over a geographic region, comparable to plant associations in many ways. (Sometimes called "natural land type.") (ii) A mapping unit used in general soil maps, in which two or more defined taxonomic units occurring together in a characteristic pattern are combined because the scale of the map or the purpose for which it is being made does not require delineation of the individual soils.

SOIL CREEP—Slow mass movement of soil material downslope primarily under the influence of gravity, but facilitated by saturation with water and/or by alternating freezing and thawing.

SOIL SEPARATES—Mineral particles, < 2.0 mm in equivalent diameter, ranging between specified size limits. The names and size limits of separates recognized in the United States are: very coarse sand, 2.0 to 1.0 mm; coarse sand, 1.0 to 0.5 mm; medium sand, 0.5 to 0.25 mm; fine sand, 0.25 to 0.10 mm; very fine sand, 0.10 to 0.05 mm; silt, 0.05 to 0.002 mm; and clay, $<$ 0.002 mm.

SOIL TEXTURE—The relative proportions of the various soil separates in a soil as described by the classes of soil texture shown in Figure 1. The textural classes may be modified by the addition of suitable adjectives when coarse fragments are present in substantial amounts; for example, "stony silt loam", or "silt loam, stony phase." (For other modifications see coarse fragments.) The sand, loamy sand, and sandy loam are further subdivided on the basis of the proportions of the various sand separates present.

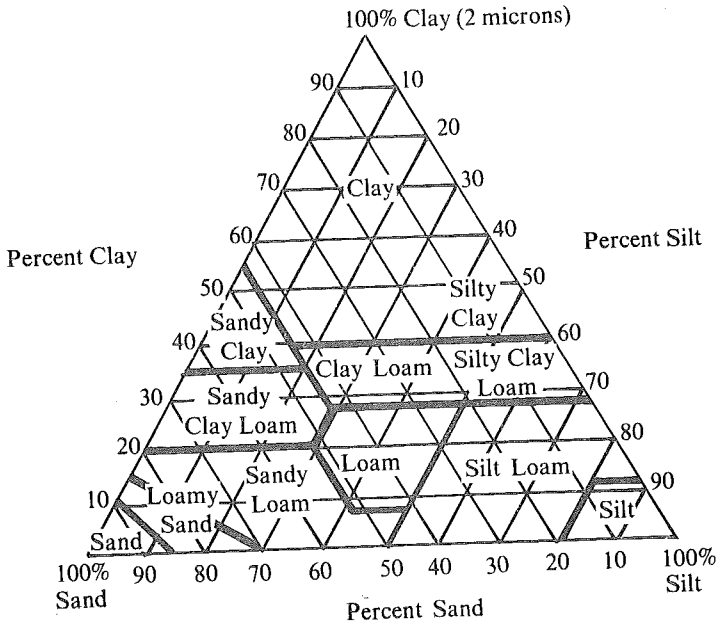


FIGURE 1—Graph showing the percentages of sand, silt, and clay in the soil classes.

SPOT SYMBOLS—Symbols used on soil maps to represent and landscape factors too small to delineate.

SUBSOIL—The B horizons of soils with distinct profiles. In soils with weak profile development, the subsoil can be defined as the soil below the plowed soil (or its equivalent of surface soil), in which roots normally grow. Although a common term, it cannot be defined accurately. It has been carried over from early days when "soil" was conceived only as the plowed soil and that under it as the "subsoil".

SUBSTRATUM—Any layer lying beneath the soil solum, either conforming (C or R) or unconforming.

SURFACE SOIL—The uppermost part of the soil ordinarily moved in tillage or its equivalent in uncultivated soils, ranging in depth from about 5 to 8 inches. Frequently designated as the "plow layer", the "Ap layer", or the "Ap horizon".

TILL—Glacial materials deposited directly by ice with little or no transportation by water. It is generally an unconsolidated, unstratified compact mixture of clay, silt, sand, gravel and boulders.

TOESLOPE—Portions of a slope that is transitioned between the valley floor and the upper slope.

TOPOGRAPHY—The relief features or surface configuration of an area.

TOPSOIL—1. Earthy material used as top-dressing for house lots, grounds for large buildings, gardens, road cuts, or similar areas. It has favorable characteristics for production of desired kinds of vegetation or can be made favorable. 2. The surface plow layer of a soil. Syn. surface soil. 3. The original or present A horizon, varying widely among different kinds of soil. Applied to soils in the field, the term has no precise meaning unless defined as to depth or productivity in relation to a specific kind of soil.

UNIFIED SOIL CLASSIFICATION SYSTEM (ENGINEERING)—A classification system based on the identification of soils according to their particle size, gradation, plasticity index, and liquid limit. (See chart on next page)

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	TYPICAL NAMES
Coarse-grained soils (More than half of material is larger than No. 200 sieve size)	Gravels—(More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
		Gravel with fines (Appreciable amount of fines)	GM* d/u	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravel, gravel-sand-clay mixtures
	Sands—(More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines
			SP	Poorly graded sands, gravelly sands, little or no fines
		Sands with fines (Appreciable amount	SM* d/u	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
Fine-grained soils (More than half of material if smaller than No. 200 sieve)	Silts and Clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
	Highly organic soils		PT	Peat and other highly organic soils

UNIVERSAL SOIL LOSS EQUATION—An equation used for the design of water erosion control systems: A = RKLSPC wherein A = average annual soil loss in tons per acre per year; R = rainfall factor; K = soil erodibility factor; L = length of slope; S = percent of slope; P = conservation practice factor; and C = cropping and management factor. (T = soil loss tolerance value that has been assigned each soil, expressed T/A/Year).

U-SHAPED VALLEY—Descriptive phrase of the cross-profile of a valley which has been carved out by glacial movement.

V-SHAPED VALLEY—A descriptive phrase of the cross-profile of a valley which has been cut by stream action.

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