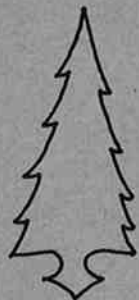


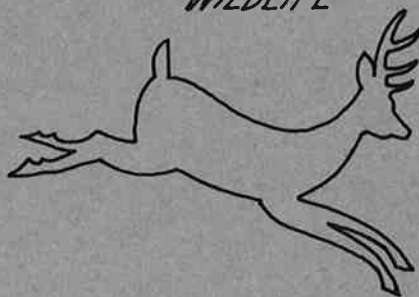
# SOIL RESOURCE

## MT. BAKER NATIONAL FOREST

WOOD



WILDLIFE



FORAGE



RECREATION

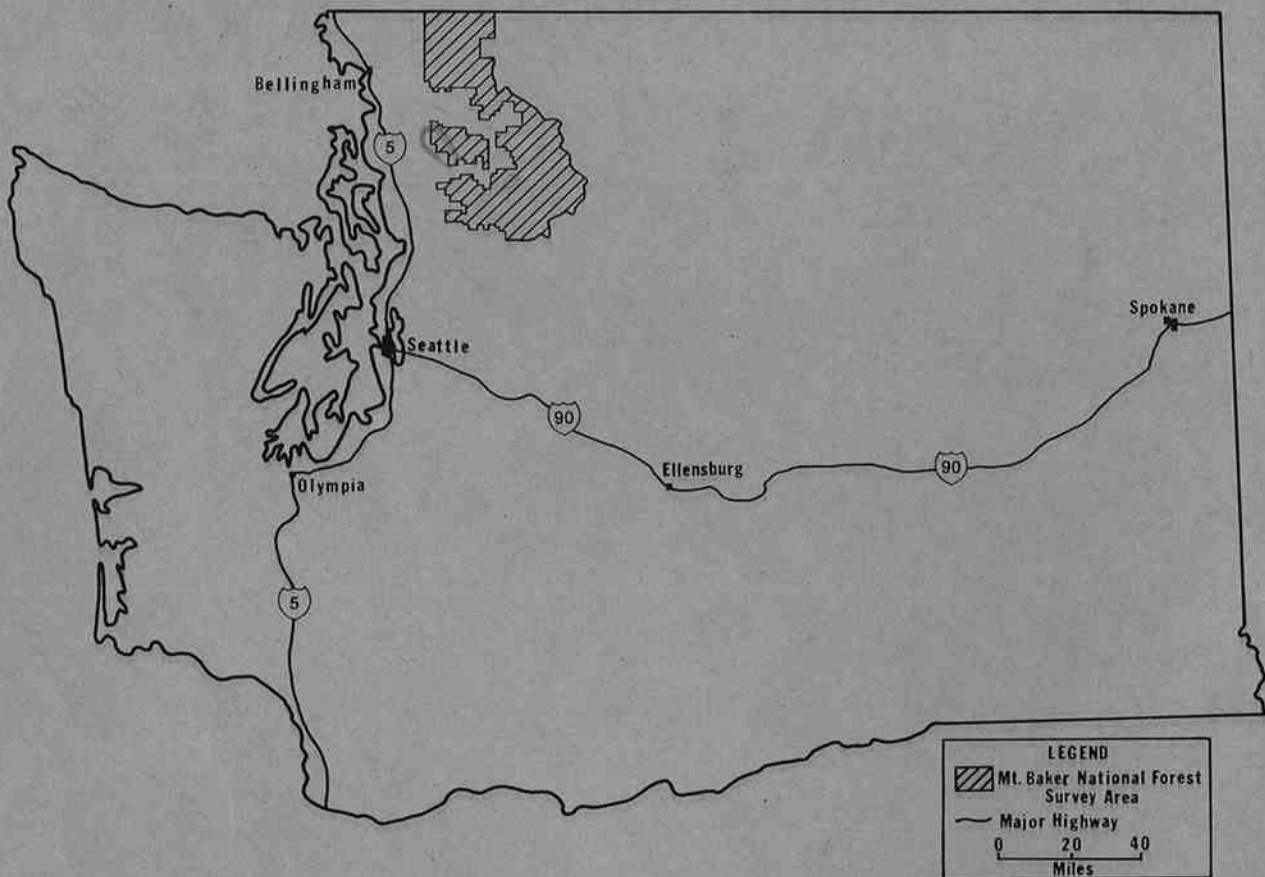


WATER



oliver

Figure 1 LOCATION MAP



This project covers the Mt. Baker National Forest and includes both Forest and other lands within the Forest boundary with the exception of Pasayten Wilderness which is administered by the Okanogan National Forest. The total area mapped is approximately 1,113,400 acres. Of this, approximately 30,775 acres are private and State-owned lands. Counties within the mapping area are Whatcom, Skagit and Snohomish.

MT. BAKER NATIONAL FOREST

SOIL RESOURCE INVENTORY

Pacific Northwest Region

September 1970

Prepared by

Robert V. Snyder and John M. Wade

Soil Scientists

## PREFACE

This Soil Resource Inventory of the Mt. Baker National Forest was made to provide some basic soil, bedrock and landform information for management interpretations. The inventory is part of the Regional soils program developed by the Soil 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 nonrenewable resource. Soil develops at a very slow rate, about one inch every thousand years. This fact necessitates conservation, wise use, and in many instances, preservation of this basic resource in order to produce high-level sustained yields of water, timber, recreation, wildlife, and forage. To accomplish sustained yield of renewable resources, to conserve or preserve the soil resource while making wise use of this resource, it is necessary to have basic soils information and to make sound management interpretations.

This report contains information on climate, soils, geology, landform features, and some management interpretations. Under separate cover is an Atlas of soil maps, showing location and extent of the various soils, Tables of Management Interpretations, Table of Soil Characteristics of Modal Site, Table of Bedrock Characteristics, and Table of Water-Holding Capacities.

Field mapping was conducted from May through October 1969 by Soil Scientists Robert V. Snyder, John M. Wade and George S. Bush, Jr. Supervision was provided by Loren D. Herman.

During the course of the study, valuable assistance, advice and cooperation received from Forest personnel was sincerely appreciated.

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## USE

There are very few land management activities in the Forest Service that are not directly related to the soil resource. Timber harvest, road construction, recreation development and many other activities have an effect on the soil resource to some degree. It is extremely important for the land manager to have a thorough understanding of this effect in order to maintain the quality of the soil resource. It is equally important for the land manager to fully understand the capabilities of the soil resource to effectively and wisely use this basic resource. This report contains basic soil information to assist the land manager in determining the effects of management on the soil and water resource and to evaluate the capabilities of soil for their best use.

This soil resource inventory has defined and mapped soils, landforms and bedrock characteristics at an intensity sufficient to develop resource management policies and basic planning. This report has its primary use at the planning level. The soils information and management interpretations found in this report can provide the necessary soil inputs that when coordinated with other resource functions can be used to support and help establish the policy and management directives necessary to ensure the best land use. Due to the reconnaissance nature of this survey, there is insufficient detail for use in high-intensity, small-area projects. For this, additional onsite study will be required of various technical specialists, including soil scientists.

Listed below are a few examples of how this information can be used. There are many uses for this information. Some are quite simple and apparent; others are not fully understood, and some have not yet been conceived. The real work lies ahead in effectively and fully using this information. In order to do this, the user must be able to interpret accurately the basic soil, landform and bedrock characteristics. For the most part, this must be done by those with full understanding of the interrelationships of these basic earth features:

1. Transportation Planning - this is an area where the soils information has key application. Certain conditions and problems can be met or avoided based on information such as landscape stability, soil depth, soil drainage and/or bedrock type and competency. Routes may be selected that avoid unstable areas, and construction and maintenance costs may be more accurately estimated. Sources of road rock may also be located through use of soil maps. Soils information is available for assistance in road design or cutbank ratios, road rock thickness, compaction, drainage and restrictions on wet weather construction.
2. Recreation Planning for North Cascades - the soils information indicates the various soil suitabilities and limitations that may apply to ski areas, camping areas, trails, roads and other

aspects of recreation development. By knowing the soil suitabilities and limitations the planner is better able to make plans that are consistent with the best use of the land.

3. Multiple Use Plans - The soils information in this report should be incorporated into the multiple use plans. As an example of soils application, the soil areas in this report can provide a map to show the critical soil areas and their associated problems. These problems are discussed in the soil area writeups along with the practices recommended to conserve soil, water and other resource values. This is the kind of information that will support the policy and directives necessary to ensure true multiple use. As an additional example of use, the maps in the Atlas can be colored to illustrate many soil management relationships. For instance, the maps can be colored to show stability, erosion, site index or practically any other interpretation. Still another example of use would be in tying key timber areas to soils and their associated problems.
4. 5-Year Action Plan - This report will provide information on the relative susceptibility of soil and other resource damage from timber harvest, road construction and other timber-related activities. It also provides information on regeneration problems and erosion control requirements.
5. Timber Management Plan - The soils information can suggest direction and support policy for allowable cut determinations, logging systems, slash disposal methods, operating season and deferred cutting areas. With a better understanding of problems and their location, the cut can be planned so that at a given time the majority of cutting is not taking place in critical areas. By spreading out and deferring the more critical areas, more time is available for proper road location and design on these areas. Also, within a few years logging technology may have developed so that harvest methods are compatible with critical soil areas without causing excessive soil and resource damage.
6. Impact Reports - Any report involving the impact of a management activity requires soils input. Whether it is a ski area, recreation or damsite proposal, there are soils factors that must be considered to make the report complete.
7. Land Appraisal and Exchange - Soils information should be used for land appraisal and exchange activities. The value of the land is related to such soil factors as texture, depth, drainage, productivity and stability. Without knowledge of these and other soil factors, how can land value be appraised?

8. Multiple Use Survey Reports - Any M.U.S. study can find the basic soils data in this report. However, additional interpretations may be needed for more specific information concerning soils and their behavior.

The following is a list of more specific uses of the report. These uses are adaptable and compatible with the survey data and are well within the scope and intensity of the survey:

- a. Engineering testing - by using the soil maps, more efficient testing can be done. The soil maps can be used to determine which soils are most susceptible to certain engineering problems. These problem soils may need more closely spaced testing than soils in which few problems are anticipated.
- b. Reservoir sites - this survey gives much information that can be used to determine problems that may be encountered for a reservoir site. The soil interpretations will better enable the planner to determine the general suitability of a particular site and the soil stability as it affects reservoir uses.
- c. Hydrologic analysis - the information in the report is sufficient to determine a broad hydrologic analysis and water balance on the Forest, and as a basis for comparisons between larger watersheds.
- d. Multiple discipline teams - under the concept of MDT where a number of specialists coordinate on a management problem through team effort, the soils information will supply essential background information. It will provide the team with the knowledge of basic soils information so they may become more familiar with the uses, limitations and hazards of soils related to resource management.
- e. Timber harvest methods - additional knowledge of factors such as the potential erodibility and landscape stability will enable selection of timber harvest methods that cause minimum damage to soil and other resources.
- f. Timber harvest and road construction operating season - these activities should be scheduled at times when they will cause minimum soil damage. Many soils are subject to damage, such as compaction, erosion, site deterioration by timber harvest activities when overly wet or excessively dry. The best operating season can be established for soil which will result in minimum soil damage.
- g. Erosion control - since there is wide variability in soil texture, depth, structure, permeability, drainage, and topography, wide differences also occur in the ability of the soil to resist erosion. Forest soils are rated as to

their potential erosion class. The land manager can use this information to determine which areas will need special erosion protective measures. These will need to be developed on a site-by-site basis.

- h. Recreational developments - several kinds of information are available in this report to assist in selecting favorable sites for campground development. Among these are soil and landform properties and characteristics, specific ratings of filter drainage field suitability, the relative resistance of soil and vegetation to site deterioration, and indications of special problems which may be encountered.

## SOILS OF THE AREA

The soils and their distribution are complex on the Mt. Baker National Forest due to the wide variation of bedrock types and the history of extensive glaciation. Most of the Forest has been glaciated by alpine or continental glaciers. These glaciers have greatly modified the pre-glacial landscape and have deposited till, outwash and other glacial materials very extensively throughout the Forest. Because of this it is common to find similar soil types on a variety of landforms. For instance, the same soils may occur on steep sideslopes, on ridgetops or in the valleys. Modification has also occurred from the rocks of one type frequently having been transported by glacial action and deposited over bedrock of a different type. This often results in the soils having a different texture than would be expected had they been derived from the underlying bedrock. Also, the glacial till is absent in many ridges and sideslopes, indicating that the glacial till has subsequently been removed by mass wasting or that these slopes were areas of glacial removal rather than deposition. These slopes are now characterized by shallow gravelly soils derived from the local bedrock. Many slopes also exhibit a mixture of shallow residual soils and deep glacial soils, while some dissected slopes are characterized by deep residual soils. Also, some valleys have been influenced by past glacial lakes that have deposited deep lake-laid materials (lacustrine).

Although the soils and their distribution are complex, they generally may be categorized into four broad groups that have similarities in texture, structure, depth and mode of origin. These groups are defined as follows:

### Deep Glacial Soils

These soils are very extensive throughout the Forest. They are comprised of glacial till, morainal and outwash deposits derived from various bedrock types. These soils are characteristically very deep, weakly structured, and well to moderately well drained. Textures are predominantly very gravelly, moderately coarse but many very gravelly, medium to moderately fine textured soils also occur. The glacial soils occur in many of the major valleys and also on many steep sideslopes to 4,500 feet elevation. The valley soils are characterized by very gravelly, weakly compacted subsoils that are often partially stratified. The glacial soils on sideslope positions are more often characterized by weakly to moderately compact till subsoils. This till is generally well graded and lacks the stratification of the valley glacial soils. All the glacial soils are generally highly erosive. Stability is variable and must be related to the individual mapping unit. The mapping units representative of this group are 10, 11, 12, 13, 17, 18, 19, 20, 21, 22, 25, 26, 29, 36, 37 and 38.

### Deep Glacial Lake-Deposited Soils (Lacustrine)

These soils occur in valley bottom and valley toeslopes that have been influenced by Pleistocene glacial lakes. These soils are characteristically very deep, moderately fine to fine textured and are moderately well to imperfectly drained. Some of the soils in this group have layers of gravelly coarse textured till interbedded with the nongravelly fine textured materials. As a group, these soils are generally unstable. Mapping units representative of this group are 30, 31, 32, 33, 34, and 35.

### Deep Residual Soils

These soils are characteristically deep, weakly structured, well to moderately well drained, and gravelly moderately fine textured. They are derived from intensely weathered bedrock. These soils are unstable and occur on steep, dissected midslope and toeslope positions. Mapping Units 56, 66, 78, 79, and 83 are representative of these soils.

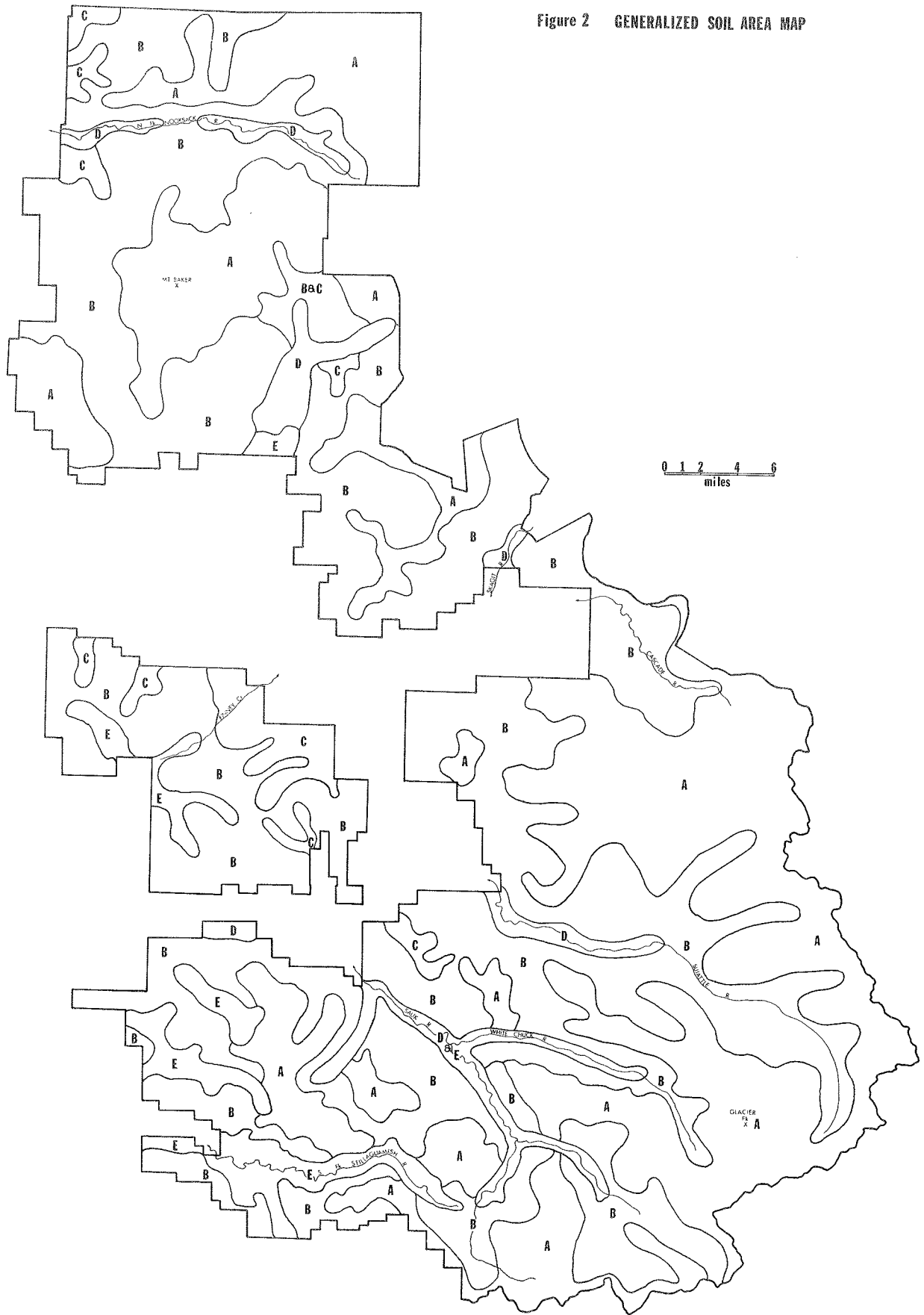
### Shallow Residual Soils

These soils characteristically exhibit little morphological development, are generally shallow, weakly structured, well drained, gravelly medium textured and are derived from a wide variety of bedrock types including sedimentary, metamorphic and igneous. These soils occur on ridgetops and steep sideslopes that are unaffected by glacial deposits. These soils are relatively stable but are highly erosive. Major mapping units representative of this group are 51, 52, 61, 62, 71 and 72.

### Generalized Soil Areas

The Forest has been stratified into five generalized soil management areas that exhibit broad similarities in soil characteristics, landforms and management problems (Figure 2). Soils and bedrock characteristics, major management problems, and soil management recommendations are described for the soils of each area. However, certain kinds of management problems are very widespread and occur in more than one area. The management considerations and recommendations are generally oriented toward attaining the highest level of multiple use management. However, they are broad and apply to the average conditions occurring throughout each area. They are intended for broad planning purposes. For more specific information on soil properties and interpretations for each mapping unit, refer to the Soil Report for the "Descriptions of Mapping Units", and to the Atlas for the appropriate tables. Management recommendations for detailed projects need onsite evaluations.

Figure 2 GENERALIZED SOIL AREA MAP



## SOIL AREA "A"

This area is primarily comprised of rock outcrop, talus slopes, alpine meadows, and perpetual snow and ice. This area is characteristically steep and rugged and occupies the high elevations of the Alpine Resource Zone (Figure 3). Timbered areas are of minor extent and are primarily noncommercial. The primary use is recreation, watershed, and aesthetics.

### Mapping Units of the Area

The major mapping units of this area are 2, 5, 8, 45, 47, 50, 60, 70, 80, 85, 90, 95 and complexes of these mapping units.

Mapping Unit 2 consists of the fresh sands and gravels deposited below active alpine glaciers. Mapping Unit 5 consists of talus slopes and is widespread throughout the area (Figures 4 and 5). Mapping Unit 8 is perpetual ice and snow. Mapping Unit 45 is a very shallow alpine meadow soil derived from bedrock. Mapping Unit 47 is a deep alpine meadow soil derived from glacial till. The remaining mapping units are rock outcrops. Their differences are reflected by the type of bedrock and are shown on the following chart:

<u>Mapping Units</u>	<u>Type of Bedrock</u>
50	Nonmarine sedimentary rocks
60	Metasedimentary and metavolcanic rocks
70	Schist rocks
80	Granitic intrusive igneous and gneissic rocks
85	Serpentinized rocks
90	Mesozoic extrusive igneous rocks
95	Recent andesite, basalt and pyroclastic rocks

### Management Problems

As a result of rugged high-elevation alpine topography, the primary management problems are very severe surface erosion (where soils do occur), revegetation and protection of meadow soils (Mapping Units 45 and 47), and problems associated with road construction.

The scattered soils (Mapping Units 45, 47 and unidentified inclusions) that do occur throughout this area are very fragile. They are often high in volcanic ash content and lack the soil structure necessary to resist erosion. Due to their location and position, they are subjected to the erosional factors of heavy precipitation, snowmelt, freeze and thaw, and high winds. The rate of erosion is greatly increased whenever

the vegetation is destroyed and the surface soils become exposed to rain-drop impact. This problem is especially acute on trails and meadows. Meadows (Mapping Units 45 and 47), due to their qualities for aesthetics, frequently receive high use from recreationists (Figure 6). Heavy concentrations of foot and horse traffic cause extensive trampling damage to the vegetative cover and the fragile soils. The vegetative cover generally consists of sedges, grass, and small shrubs that have a low tolerance to resist trampling and are easily destroyed. Also, the vegetation may suffer severely from over-grazing by recreation and domestic stock. Once the vegetation is destroyed there are severe problems for both vegetation reestablishment and soil erosion.

This area is generally above the commercial timber zone requiring no roads for timber access. However, some roads have been constructed (Austin Point) and others are planned for the purpose of recreational access. Because of the weathered and unstable rock in many areas and the excessively steep and rugged topography, road planning and construction requires extreme caution to avoid damage to the landscape. Sidecast waste causes unsightly scars that not only greatly impair the aesthetics value, but also erode and contribute to stream sedimentation. Also, the high potential for debris slides, rockfall and snow avalanches results in high maintenance costs (Figure 7).

Recommendations - Optimum management for recreation, watershed and aesthetics should be the primary consideration in this area.

Recreation:

1. All trails should be carefully water-barred on soil areas, especially through meadows (Mapping Units 45 and 47). Abandoned trails should be water-barred and revegetated, preferably with native vegetation.
2. Heavy concentrations of foot or horse traffic should be avoided on meadow soils (Mapping Units 45 and 47). Frequently-used trails and campgrounds should be rotated before deterioration occurs. As stressed previously, alpine soils (Mapping Units 45 and 47) and vegetation have little resistance to trampling. Rotation deferment or restricted use is the best management practice for prevention of soils and vegetation damage. Vegetation is difficult to reestablish but the best success can be expected with the planting or seeding of species native to the area.
3. Over-grazing of recreation and domestic stock must be avoided to prevent destruction of the vegetative cover.

Roads:

Roads cause excessive soil and landscape damage demanding intensive protective measures during their construction. These should include minimum width construction, rolling with the topography to facilitate water removal, and avoidance of unstable areas. It is essential that construction sidecast and maintenance waste be end-hauled to suitable areas to avoid damage to resources and aesthetics.



Figure 3 - View of Soil Area "A".

This photo shows the rock outcrop, talus slopes, alpine meadows, and perpetual snow and ice that are characteristic of Soil Area "A." This photo is a good example of how mapping unit complexes are used. Mt. Baker in the background is composed of rock outcrop (Mapping Unit 95), and snow and ice (Mapping Unit 8). Since these are too interrelated to separate, they are mapped together as Mapping Unit 958. A similar relationship occurs for the rock outcrop (Mapping Unit 95), talus slopes (Mapping Unit 5), and meadows (Mapping Unit 45), that occur in the foreground. They are too interrelated to separate at the mapping scale used so they are combined as Mapping Unit 955.



Figure 4 - Mapping Unit 5.

Mapping Unit 5 is talus slopes consisting of loose gravels and boulders. They occur from the fracturing and breaking off from rock outcrops. These slopes are often devoid of soil. When soil does occur it is very thin and supports scrub willow, alder, and related species.

This road is passing through the talus of Mapping Unit 5. This particular talus slope is stable. The rocks are large, angular and tend to interlock. However, many talus slopes consist primarily of small loose gravels that are unstable and ravel extensively. Because of their variability, close field examination is required during road location through talus slopes.



Figure 5 - Road on Mapping Unit 5.



Figure 6 - Recreation use on Mapping Units 45 and 47.

This photo of high-elevation meadows illustrates the high trail use that it frequently receives. Trails may become deeply eroded from over-use and should be rotated before severe erosion occurs. Abandoned trails should be water-barred and revegetated. These meadows also need protection from over-grazing.



Figure 7 - Avalanche.

This photo shows incorporated soil and bedrock debris carried down by an avalanche. Avalanches are a common occurrence throughout Soil Area "A" and have the potential of causing extensive road and trail damage.

## SOIL AREA "B"

This area is comprised of both shallow residual soils and deep glacial soils. The landscape is typified by long steep slopes, ridges and narrow valleys (Figure 8). This occupies much of the Forest and extends through the Principal and Upper Forest Resource Zones.

Because of the complex bedrock and glacial geology of the area, soil types occur in complex patterns and arrangements. Similar deep glacial soils frequently extend from toeslope to high on the sideslope. Conversely, in many locations shallow soils extend from toeslopes to the ridgetops. Often there is an intermixture of shallow and deep soils. In general, however, deep glacial soils occur most frequently below approximately 3,000 feet, while the shallow soils are more predominant above this elevation.

### Mapping Units of the Area

The major mapping units are 20, 21, 22, 23, 24, 25, 26, 36, 37, 38, 41, 51, 52, 54, 61, 62, 71, 72, 73, 74, 75, 76, 81, 82, 86, 91, 92, 96, 97, and complexes of these mapping units. While there is a large number of mapping units in this area, they have several broad similarities for management. However, each mapping unit reflects a soil, geologic or landform difference important in rating many of the specific interpretations found in the Atlas.



Figure 8 - View of Soil Areas "A" and "B"

The steep timbered slopes in the foreground are characteristic of Soil Area "B." The rugged snow-covered peaks are characteristic of Soil Area "A."

Other soils that occur to a minor extent but are very important are Mapping Units 56, 66, 78, 79, and 83. These mapping units are deep, moderately fine to medium textured and unstable.

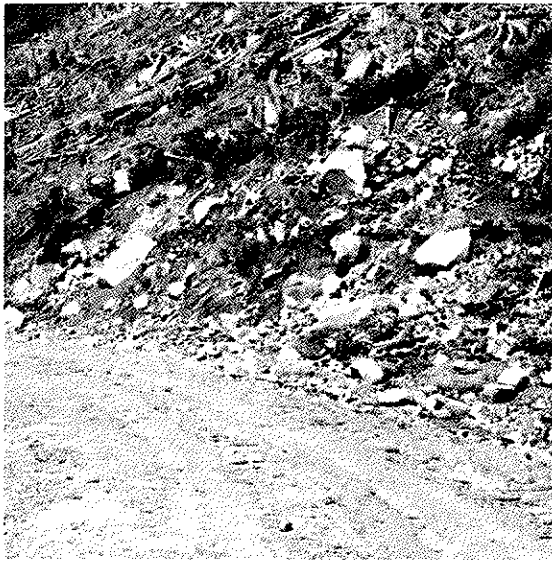
Deep Glacial Soils on Midslopes and Toeslopes

Of the major mapping units, 20 through 41 belong to this group. This is the group of deep, medium to moderately coarse textured soils derived from glacial till, glacial drift and colluvium (Figures 9, 10 and 11). They occur typically on midslopes and toeslopes. Their essential characteristics and differences are shown in the following chart:

MU <sup>1/</sup>	Surface Soil Texture	Subsoil Texture	Landform	DFSI <sup>2/</sup>
20	Gravels & cobbly sandy loam, granitic origin	Very cobbly, moderately compact sandy loam	Somewhat uneven & dissected toeslopes & valley bottoms. <35% slope	IV & V
21	"	"	Somewhat uneven & dissected toeslopes & sideslopes. >35%	IV & V
22	Loam or silt loam	Gravelly sandy clay loam	Slightly to moderately dissected slopes. < 35% slope	II & III
23	"	"	Slightly to moderately dissected slopes of 35-50% slope*	II & III
24	Gravelly sandy loam	Very gravelly sandy clay loam	Dissected slopes >50% slope.	II & III
25	Similar to 22 except lower site due to higher elevations.			III & IV
26	Similar to 23 except lower site due to higher elevations.			III & IV
36	Loam or sandy loam	Very gravelly sandy loam, moderately compact	Slight to moderately dissected slopes. <35% slope.	III & IV
37	"	"	Slightly to moderately dissected slopes of 35 to 50% slopes.	III & IV
38	Very gravelly sandy loam	Gravelly sandy loam, weakly to moderately compact.	Dissected toeslopes. > 50% slopes	III & IV
41	Loam or sandy loam	Very gravelly loam or sandy loam, non-compacted.	Steep sideslopes, occurs frequently in pockets.	III, IV&V

<sup>1/</sup> Mapping Unit

<sup>2/</sup> Douglas-fir Site Index Class



Mapping Unit 21 consists of very deep, moderately compact, cobbly and stony, moderately coarse to coarse textured glacial till soils occurring in steep toe-slopes. The soils of Mapping Unit 20 are similar except they occur on gentle slopes and valley bottoms. The rocks in these soils are granitic or gneissic that have weathered to produce a "sugary" feel to the soils. A common occurrence on both Mapping Units 20 and 21 is the presence of large granitic boulders on the soil surface.

Figure 9 - Profile of Soil 21

Mapping Unit 36 consists of thin sandy loam surface soils overlying very deep, moderately compact, gravelly, moderately coarse textured glacial till. This soil has similarities to many of the deep glacial soils throughout Soil Area "B." Notice the intensive rooting in the surface soils and the absence of rooting in the subsoils. This is because of rooting restriction by compacted subsoils.



Figure 10 - Profile of Soil 36

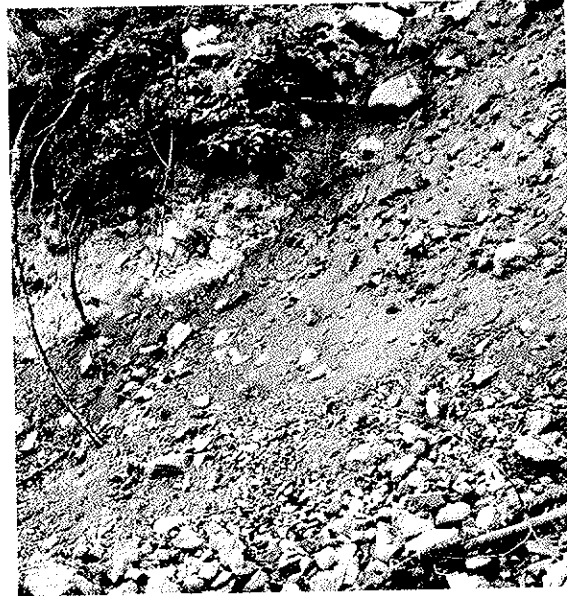


Figure 11 - Profile of Soil 41.

Mapping Unit 41 consists of very deep, extremely gravelly, moderately coarse textured soils occurring on steep sideslopes. These soils are derived primarily from colluvium as indicated by their lack of compaction and the angularity of the gravels. This soil has a moderate cutbank failure potential and a high ravel potential.

Shallow Residual Soils on Ridges and Sideslopes

Mapping Units 51 through 97 of those mapping units listed for soil area "B" belong to this group. This soil group consists of shallow, gravelly, medium to moderately coarse textured soils derived from various types of bedrock (Figures 12 and 13). These soils more typically occur on upper sideslopes and ridges. Their essential characteristics are shown on the following chart:

Mapping Unit	Soil Texture	Soil Depth	Landform	Geology
51	Gravelly loam or silt loam.	2-3'	Steep smooth slopes > 35%.	Nonmarine sedimentary rocks.
52	"	1-3'	Steep dissected slopes > 35%.	"
54	Gravelly loam	3-7'	Steep slopes > 35%	"
61	Gravelly loam or sandy loam	1-3'	Steep smooth slopes > 35%.	Metasedimentary and metavolcanic rocks.
62	"	"	Steep dissected slopes > 35%.	"
71	Gravelly loam or sandy loam.	1-3'	Steep smooth slopes > 35%.	Schist rocks.
72	"	"	Steep dissected slopes > 35%.	"
73 <sup>1/</sup>	Gravelly silt loam or loam	2-5'	Smooth slopes < 35%.	"
74 <sup>1/</sup>	"	2-5'	Somewhat uneven and dissected slopes > 35%.	"
75 <sup>1/</sup>	"	2-5'	Smooth slopes < 35%.	"
76 <sup>1/</sup>	"	3-5'	Steep, smooth to somewhat dissected slopes > 35%.	"

<sup>1/</sup>Mapping Units 73 and 74 differ from Mapping Units 75 and 76 in that they have Douglas-fir site class of II and III, while 75 and 76 have Douglas-fir site class of IV and V. This is due to differences in elevation.

Mapping Unit	Soil Texture	Soil Depth	Landform	Geology
81	Gravelly sandy loam	1-3'	Steep, smooth slopes >35%	Intrusive igneous & gneissic rocks
82	Gravelly sandy loam	1-3'	Steep dissected slopes >35%	"
86	Gravelly loam or silt loam	2-4'	Steep, smooth to somewhat dissected sideslopes >35%	Serpentinized rocks.
91	Gravelly loam or sandy loam	2-6'	Steep, smooth sideslopes. >35%	Mesozoic Extrusive Igneous Rocks.
92	"	2-4'	Steep dissected sideslopes >35%	"
96	Sandy loam	1-3'	Smooth slopes less than 35% slope.	Recent andesite and basalt rocks.
97	Gravelly sandy loam	1-3'	Steep slopes greater than 35% slope.	"



Mapping Unit 61 consists of shallow, gravelly, medium to moderately coarse textured soils derived from metasedimentary and metavolcanic bedrock. Most of the other shallow soils in Soil Area "B" are similar with the exceptions of bedrock type and landforms.

Figure 12 - Profile of Soil 61.

Mapping Unit 76 consists of shallow to moderately deep, gravelly medium textured soils derived from highly fractured, moderately competent, low grade schist bedrock. This mapping unit is extensive throughout the Finney Block and occurs locally in other parts of the Forest.

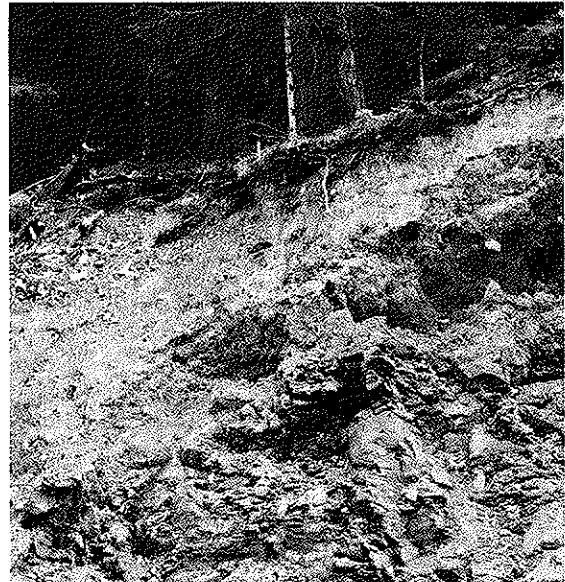


Figure 13 - Profile of Soil 76.

## Management Problems

Severe surface erosion, windfall, regeneration, cutbank failures and raveling, and stream sedimentation from sidecast road waste are the primary management problems associated with the soils and bedrock of this area. An additional problem on steep dissected slopes at higher elevations is road damage from avalanches.

The high surface erosion potential results from weakly structured soils, high precipitation and steep slopes. The potential for surface erosion is equally high on both the shallow and deep soils, with both contributing sediment to streams. However, erosion is especially detrimental on the shallow soils, because in addition to stream sedimentation, there is a serious depletion to the soil reservoir of nutrients, water-holding capacities and productivity (Figures 12 and 13). When soils are only two or three feet deep, any loss becomes highly significant. The fact that soils are shallow and occur in areas of extensive rock outcrop indicates that soil formation is not maintaining pace with natural geologic erosion. This rate of erosion is greatly increased whenever the surface soils are exposed to raindrop impact (Figure 14). Surface soils become exposed as a result of timber harvest activities such as slash burning, log skidding, and road construction (Figures 15, 16 and 17).

A problem that is common on most of the soils in this area is the phenomenon of nonwettability. This phenomenon becomes expressed when soils become droughty and is considered more important throughout this area than other soil areas because many of the soils in Soil Area "B" are shallow and become droughty during dry periods. Other soil areas generally have deep soils that are wetter for longer periods and the problems of nonwettability become less significant.

Nonwettability is when mineral soils exhibit a resistance to water infiltration. Examination of exposed mineral soil surfaces following summer rainy periods has frequently revealed that the surface soils were wet only to a depth of  $\frac{1}{2}$ -inch or less. This results from the presence of hydrophobic substances in the surface soils. They seem to be present for a variety of reasons and imply some important management considerations. One consideration is increased erosion. Since rainwater does not readily infiltrate, most of the water runs over the surface, causing erosion. Another consideration is that the lack of infiltration causes soil drouthiness. This can result in severe moisture deficiency to tree and other vegetation. This problem of soil nonwettability further points out the desirability of management practices that cause minimal disturbance to the soil duff layer.

Another major problem is the excessive damage caused to resources from sidecasting of surplus waste material. On steep sideslopes this material produces raw scars considerable distance below the road prism. These are not only unsightly, but are difficult to revegetate and continue to erode (Figure 18). Sidecasting is especially detrimental in stream crossings as the material causes sedimentation with a reduction in water quality and a loss to fisheries (Figure 19). This problem applies to both system and spur roads.

The deep glacial soils, Mapping Units 21, 22, 23, 24, 25, 26, 38 and 41 (not glacial), are subject to moderate cutbank failures and moderate to high raveling (Figure 20). This is highest on Mapping Units 24, 38 and 41, with a lesser but equal amount on 21, 22, 23, 25 and 26 (Figure 21).

On the shallow soils, with the exception of Mapping Units 96 and 97, all the mapping units have a moderate potential for bedrock failures, especially on the dissected landforms (Mapping Units 52, 62, 72, etc.). These failures not only increase the damage to resources, but also damage the road and cause high maintenance costs.

A problem that will be encountered more as roads are constructed at higher elevations is road damage from snow avalanches. These are common on many of the steep mapping units, especially on the higher-elevation, dissected mapping units such as Mapping Units 62, 72, 82, and 92. Some of the major avalanche tracks are shown on the soil maps. However, in many areas the tracks are too numerous to indicate.

Windfall potential is a common problem throughout this area, especially on exposed locations (Figure 22). The windfall potential is highest on the shallow soils and is due to root restriction by bedrock. However, it also occurs with moderate frequency on many of the till soils (20, 21, 22, 23, 24, 25, 26, 36, 37 and 38). This is attributed to the shallow rooting depth which is usually restricted to the surface two feet due to subsoil compaction.

Slash burning is another serious problem in this area and it is detrimental to the soil in several respects. Burning reduces the fertility of the soil by volatilizing many of the nutrients and rendering many others vulnerable to leaching. Burning destroys the surface duff and litter layers. Surface soils are then exposed to erosion and the effects of nonwettability (previously discussed). Burning frequently intensifies the degree of nonwettability from the effect of the burning itself. This increases the potential for both erosion and soil drouthiness (Figures 14 and 15).

Regeneration, while not a particular problem over much of the lower-elevation area now harvested, can be expected to become an increasingly severe problem as the timber harvest activities are expanded to higher elevations. Low fertility, shallow rooting depth, soil nonwettability and climatic limitations are very significant above 3,000 feet elevation. Fertility is especially limiting on Mapping Units 20, 21, 81 and 82 because of the inherent low fertility of the gneiss and granitic parent rock.



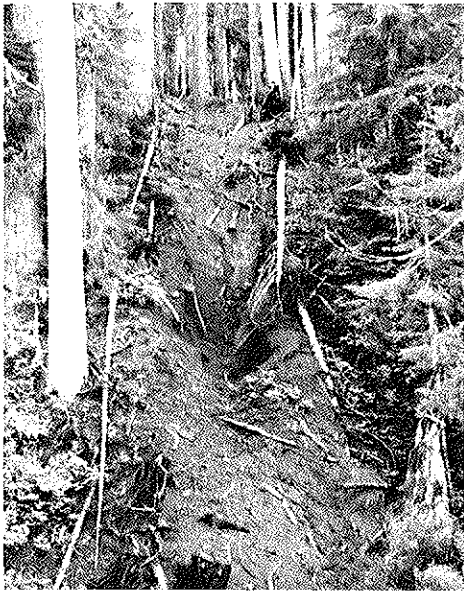
This photo shows the surface erosion that takes place from raindrop dispersion and transport on bare mineral soil. The top of the pedestals was the original soil level. This is an example of sheet erosion.

Figure 14 - Severe surface erosion.

This surface erosion occurred after the protective duff was destroyed by slash burning. This damage could have been greatly reduced in extent by burning the slash in piles rather than broadcast burning.



Figure 15 - Surface erosion resulting from burning.



Logs skidded down this has caused excessive soil disturbance. A channel has been formed that will collect water and result in severe erosion.

Figure 16 - log skidding damage.

This spur road is eroding rapidly. It was obviously not properly retired. Water bars should have been installed to remove the water and prevent the channeling that is occurring. Also, the road should have been seeded to grass.

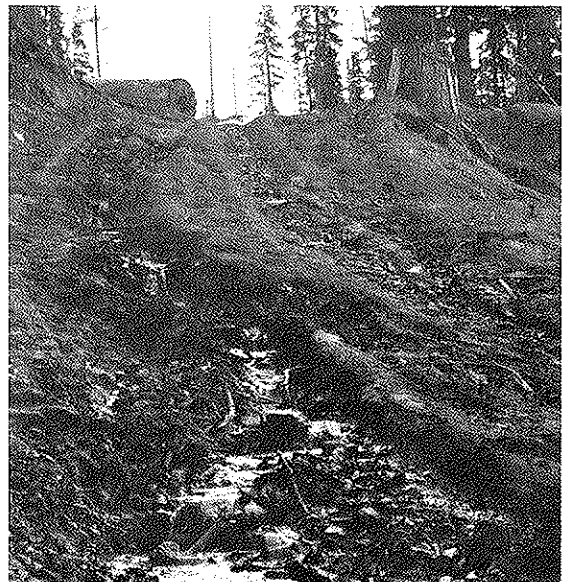
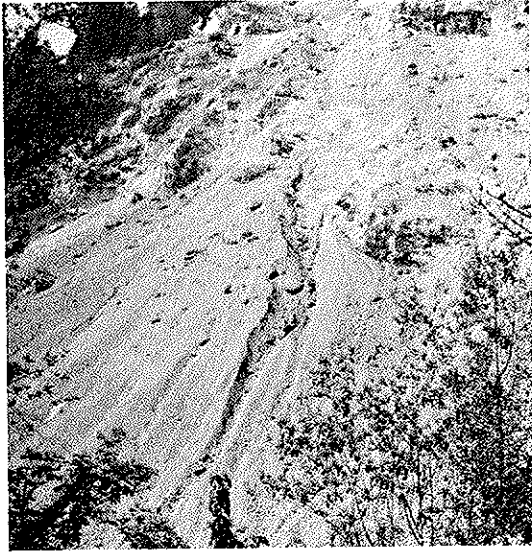


Figure 17 - Severe road erosion.



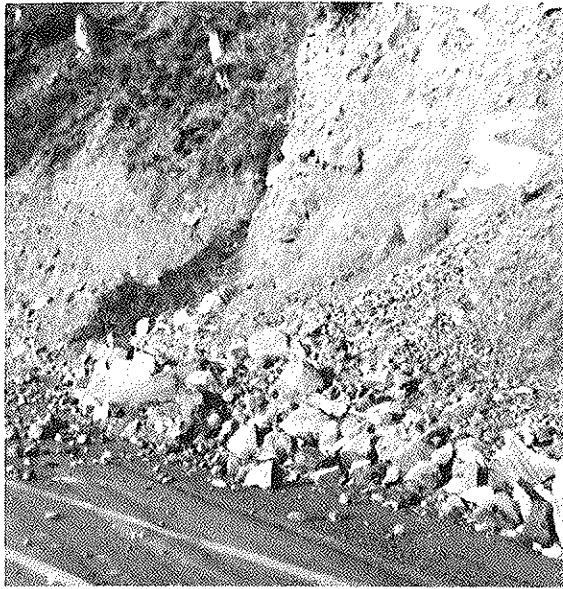
This sidecast waste has caused excessive soil and resource damage. Notice the severe erosion occurring in the center. Continued erosion and raveling contribute to stream sedimentation and inhibits vegetative establishment.

Figure 18 - Sidecast waste damage.

Surplus waste was sidecast directly into the stream channel. Damage was caused to water quality, soils, landscape and aesthetics. This material should have been end-hauled.



Figure 19 - Sidecast waste damage.



Soil 38 consists of very deep, very gravelly and stony, moderately coarse textured till deposits occurring on steep dissected toeslopes. These materials slough and ravel excessively, causing high maintenance costs.

Figure 20 - Cutbank raveling on Soil 38.

The inside ditch has been completely plugged by slough and ravel. Water is actively eroding the road surface.



Figure 21 - Cutbank raveling on Soil 24.

## Recommendations

### Erosion:

1. All soils greater than 35-percent slope in this area have a high surface erosion potential. This potential becomes greater as the slope increases. The effects of erosion are especially detrimental to the shallow soils (Mapping Units 50 to 96) due to the extremely limited soil reservoir. Minimal physical disturbance and adequate erosion protection is an absolute requirement for maintaining the soil resource.
2. Erosion protection can be accomplished in part by grass seeding or mudding bare soil areas, skid trails, spur roads and landings; and most important, using timber harvest practices that do not destroy the surface duff.

### Timber:

1. Logging debris should be removed rather than broadcast burned. A desirable alternative is to collect in piles and then burn. By reducing the soil area affected by slash burning, the problems of soil fertility loss, nonwettability and surface erosion are minimized.
2. The factors relating to regeneration problems are too varied to lend themselves well to the broad scope of this study and require onsite evaluation. However, there are some generalities that are applicable and should be considered. These are as follows:
  - a. On the shallow soils above 3,000-foot elevation (Mapping Units 51, 52, 61, 62, 71, 72, 81, 82, 86, 91, 92, 96 and 97) regeneration is affected by climatic limitations, soil drouthiness during summer periods, and low fertility. The fertility is especially limiting on Mapping Units 81 and 82 and also on the deep soils of Mapping Units 20 and 21 because of the inherently low fertility of the parent rock. Fertilization treatment program is needed.
  - b. The conservation of moisture in the soil profile is most important. This can best be accomplished by causing minimal disturbance to the soil duff cover. The elimination of slash burning would reduce the duff destruction and would minimize the nonwettability factor along with its increased drouthiness effects. Areas that have been burned and are exhibiting nonwettability effects should be scarified. This will increase the infiltration and help to reestablish the proper soil moisture regime.
  - c. The use of narrow clearcuts or partial cut would allow protection from temperature extremes and provide seed source.



Figure 22 - Windfall.

Windfall is a common problem on the shallow soils, especially on exposed locations or at the edge of clearcuts. Windfall also occurs, but less frequently, on the deep soils because of shallow rooting depth resulting from subsoil compaction.



This photo illustrates the ditch erosion that can occur when culverts become plugged.

Figure 23 - Ditch erosion.

Benching can be effective in ravel and slough control on coarse textured cutbanks. The primary advantage is that much of the ravel falls on the benches rather than on the road.

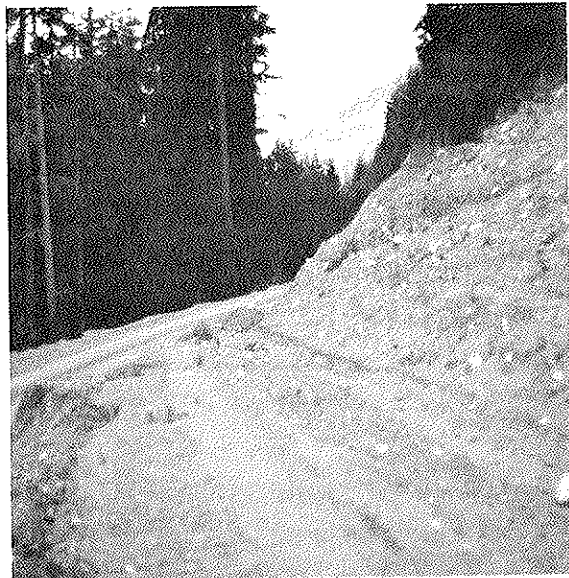


Figure 24 - Benching on Soil 38.

- d. Species other than Douglas-fir should be tried on areas where difficulty is encountered with Douglas-fir regeneration.
3. The use of skyline or other swing logging systems are strongly recommended on all mapping units in steep dissected drainages. The highest priority is on Mapping Units 24 and 38. Next on priority and equally ranked for this purpose are Mapping Units 52, 62, 72, 82 and 92. The remaining mapping units are also recommended when they occur on slopes greater than 70-percent slope.

The primary advantage of skyline systems is that they minimize the number of roads required. Roads are the single greatest contributor to soil and landscape damage. Also, skyline minimizes soil disturbance from the actual logging operation, thereby maintaining acceptable erosion levels.

#### Roads:

The following recommendations apply to system and spur roads and are considerations for minimizing damage to soils and other resources.

1. Roads should be avoided on Mapping Units 24 and 38 whenever possible. These mapping units are unstable and have a high cutbank ravel potential. Roads constructed through these mapping units cause high soil and resource damage and are costly to maintain.
2. Roads should be constructed to minimum width and should be designed to allow adverse grade when necessary to best fit the landscape.
3. Surplus construction and maintenance waste should be end-hauled and disposed of in a suitable area and compacted as needed. This especially applies to Mapping Units 24 and 38, all dissected drainages (Mapping Units 52, 62, 72, 82 and 92), and on all other mapping units on slopes greater than 60 percent.
4. On many of the existing roads there is inadequate provision to remove water. Roads should be constructed to roll with grade to allow water removal. They should be adequately water-barred with the water outlet draining onto vegetated areas.
5. Proper frequency of culverts and adequate installation should be ensured so that excessive moisture is removed. Water should not be allowed to run across roads or on fill slopes. Sufficient maintenance should be provided to prevent plugging of culverts (Figure 23).
6. Fills should be kept free of organic debris. This material prevents adequate compaction and provides channels for water, often contributing to fill collapse.

7. Fill slopes should be terraced when necessary and seeded to grass. They must be kept free of maintenance waste.
8. Cutbank stabilization may be improved on Mapping Units 21, 23, 24, 26, 35 and 41 by such techniques as benching, steps, internal drainage, and planting deep-rooted species such as willow (Figures 24 and 54).
9. The crossing of avalanche tracks should be avoided when possible as snow avalanches have the potential of causing high road damage with subsequent high maintenance costs.

SOIL AREA "C"

This area is comprised of deep, unstable soils occurring on steep toeslope and midslope drainages throughout portions of the Principal Forest Zone. These soils are found in the drainages and tributaries of Wanlick Creek, O'Toole Creek, Pressentin Creek, Clendenen Creek, North Fork Stillaguamish River, Dan Creek and locally in other midslope and toeslope drainages throughout the Forest.

Mapping Units of the Area

The major mapping units of Soil Area "C" are 29, 56, 66, 78, 79, 83 and complexes of these mapping units. The essential characteristics and differences of these mapping units are shown on the following chart:

*MU	Depth	Surface Soil Texture	Subsoil Texture	Drainage	Bedrock Geology	Landform
29	12'+	Loam	Gravelly sandy clay loam	Moderate - well	Weathered schist, volcanic or sedimentary rocks.	Steep, somewhat dissected, uneven sideslopes
56	9-12'+	Gravelly loam	Very gravelly silt loam & clay loam	Well to mod.well	Highly weathered sedimentary rocks	Steep midslope & toeslope drainages
66	8-12'+	Gravelly loam	Very gravelly, silty clay loam	Well to mod.well	Highly weathered metasedimentary & metavolcanic rocks	Steep midslope & toeslope drainages
78	6-12'	Silt loam	Very gravelly silt loam	Well to mod.well	Weathered schist & serpentinitized rocks	Steep, highly dissected sideslope drainages
79	12'+	Gravelly silt loam	Gravelly sandy clay & silty clay loam	Mod.well to imperfect	Highly weathered schist and serpentinitized rocks	Steep, highly dissected sideslope drainages.
83	6-12'	Gravelly, sandy loam	Very gravelly silty clay loam	Well to moderately well	Weathered gneiss & granitic rocks	Steep, highly dissected sideslope drainages

\* Mapping Unit

## Management Problems

Deep-seated mass movement is the primary management problem in this area. The mapping units occur in steep, highly dissected, unstable midslope and toeslope drainages (Figure 25). The instability is caused by the combination of deep plastic soils, highly weathered bedrock, steep slopes and subterranean water. Deep-seated mass movements, observable both on the ground and on aerial photography, occur on the virgin landscape (Figures 25, 26 and 27). The frequency of occurrence is greatly increased by road construction. Roads in the Clendenen Creek, North Fork Stillaguamish, and Dan Creek area, for instance, are closed by numerous slides each winter (Figures 28, 29 and 30). Fill-slope and sidecast failures are numerous and deposit large quantities of debris into downslope streams, causing extensive damage to other resources. The practice of sidecasting both surplus and construction waste causes extensive damage on these mapping units.

Damage to streams is caused by increased sedimentation and pollution levels with a subsequent loss to water quality and fisheries. Sidecast material continually ravel and sloughs, thereby preventing successful vegetative establishment. Also, by contributing additional weight that reduces fill slope stability, damage is often caused to the road prism resulting in high maintenance costs (Figures 31 and 32). The damage levels are greatly increased during wet weather construction. The potential for both natural and road construction related failures is substantially increased when wet. Road construction equipment causes excessive muddiness that, along with failures, causes high levels of stream sedimentation (Figure 33).

Another problem associated with roads is the high rate of cutbank raveling and sloughing (Figure 34). This often plugs the inside ditch and allows water to run across the road, causing erosion to the road prism and fill slope. Of even greater importance is the fact that excessive water may enter the road prism. This reduces the cohesive and frictional strength and directly contributes to road prism failure.



Figure 25 - Landform of Mapping Unit 79.

This photo of upper Clendenen Creek shows the landform of the very deep, plastic, and very unstable Soil 79. Notice the abundance of active slide scars that are primary indicators of high instability. A road constructed across this slide area would trigger massive failures and cause unacceptable soil and resource damage. Although Mapping Unit 79 is the most unstable, high instability and its associated problems also occur in Mapping Units 29, 56, 66, 78 and 83.



This raw stream channel is typical of Soil 66. Natural failures are occurring in the deep, plastic, unstable soils. These failures are greatly accelerated by road construction.

Figure 26 - Landform of Mapping Unit 66.

This is a natural failure in Mapping Unit 78. The nearest road was several miles distant. Natural failures such as this are indicators of instability and should be avoided during road location.



Figure 27 - Failure in Mapping Unit 78.



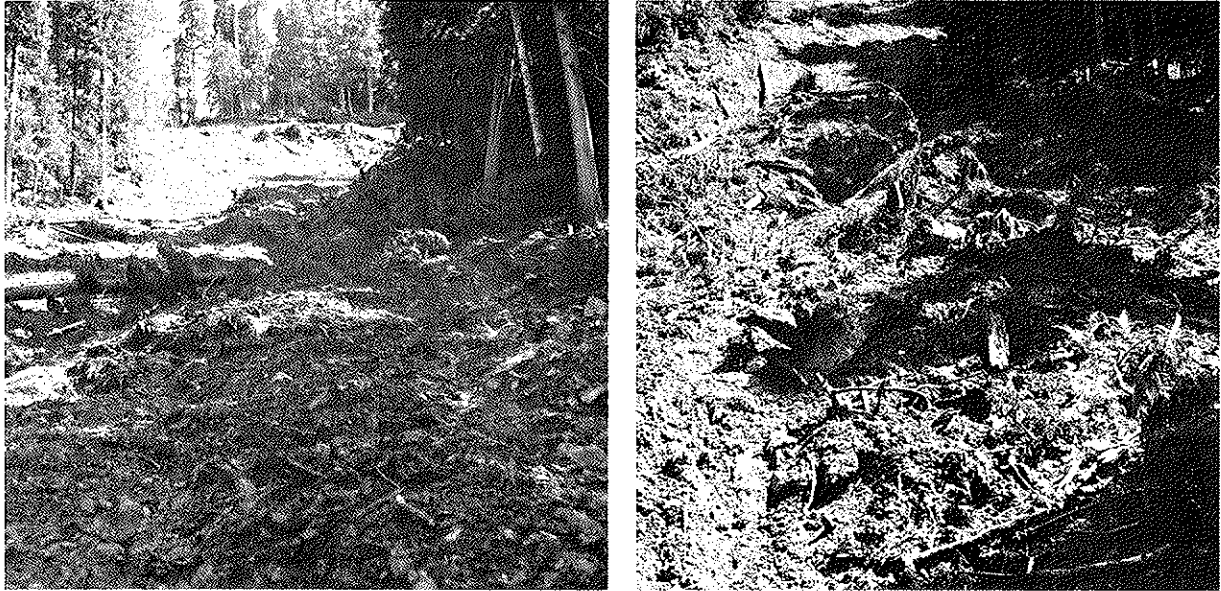
Figure 28 - Slide in Mapping Unit 56.

This spur road through Mapping Unit 56 has been obliterated at the stream crossing by a massive failure.



Figures 29 & 30 - Cutbank failures in unstable soils.

These are typical cutbank failures that occur in Mapping Units 29, 56, 66, 78, 79, 83 and their complexes. These failures cause high soil and resource damage and result in high road maintenance costs.



Figures 31 & 32 - Sidecast damage in unstable soils.

These photos, in Dan Creek area, exhibit the tremendous damage caused to unstable soils from sidecast. This is Mapping Unit 789 but similar damage also occurs in Mapping Units 29, 56, 66 and 83. The photo at left is looking upslope to the road. The photo at the right is the same slope near the bottom. Notice how effective this sidecast has been in removing the timber. A large area is now exposed to erosion, and since unstable soils are generally fine textured, considerable siltation will be caused to streams with subsequent loss of water quality and damage to the fisheries.

Although sidecasting is harmful on any steep soil, it is especially damaging on steep unstable soils. The natural soil on the sideslope, unable to resist the weight and gouging effect of the sidecast, is torn loose and combines with the sidecast as it travels rapidly downslope. The result is large volumes of soil and rock debris that literally wipes out the sideslope. The soil and rock debris remaining on the sideslope often contributes to future deep-seated mass movements.

The damage shown here could have been avoided or minimized by end-hauling the surplus waste, adequate drainage, compaction, and dry season construction.



Figure 33 - Muddiness from wet weather road construction.

Mapping Units 29, 56, 66, 78, and 79 exhibit a strong tendency to become muddy from road construction and timber harvest activities during wet weather. These activities should be suspended during wet periods to prevent damage to the soils and landscape and to prevent excessive stream siltation.

The soils in Soil Area "C" exhibit a frequent occurrence of cutbank sloughing and raveling. This plugs the inside ditch and diverts water that causes erosion to the road surface and the fill slope.

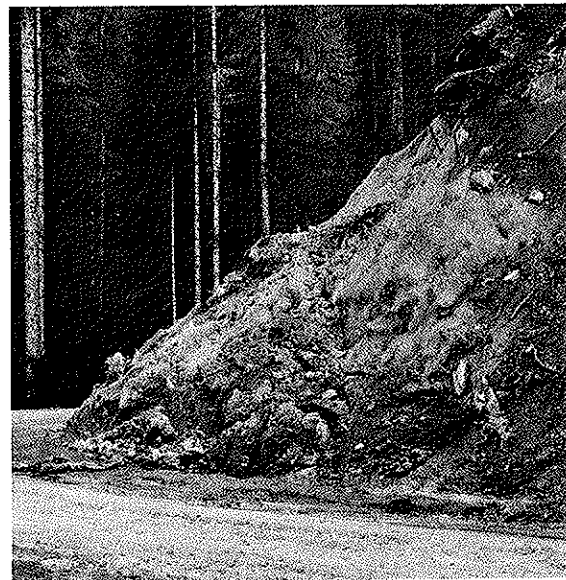


Figure 34 - Cutbank sloughing.

## Recommendations

### Timber:

Skyline or other swing logging systems should be used on Mapping Units 56, 66, 78, 79 and 83 in order to minimize damage to other resources. These systems cause minimal soil disturbance from the actual logging operation. The major advantage of skyline is that it greatly reduces road requirements, the greatest single cause of massive failures and landscape disturbances.

### Roads:

Road construction must be avoided on Mapping Unit 79. Road construction through this mapping unit causes an unacceptable level of soil and resource damage. Roads should also be avoided on Mapping Units 56, 66, 78 and 83 when at all possible. When it becomes necessary to construct roads on these mapping units, the following should be considered to minimize damage to soils and other resources. These considerations apply to both system and spur roads.

1. Road construction will demand very careful and conscientious planning in the route selection, design and construction specifications.
2. Road location should allow for adverse grade where necessary. This gives the road locator a better opportunity to avoid the most unstable areas.
3. Full-bench construction should be used on steep sideslopes and across in-curve areas. Sideslope fills associated with partial-bench roads often fail due to inadequate support and compaction of soil materials.
4. Fills should be kept free of organic debris. This material prevents adequate compaction and provides channels for water, often contributing to fill collapse.
5. Surplus waste materials must be end-hauled to a suitable area rather than sidecast. Sidecasting not only destroys timber and watershed values, but is a major contributor of mass movements. This material is in a loose, noncompacted state, resulting in a very high rate of surface erosion. More important is the fact that this material adds weight to downslope areas, which is greatly increased when the material absorbs water. Slides often occur, uprooting and destroying trees and depositing vast quantities of soil debris in streams.
6. Proper frequency of culverts and adequate installation should be ensured so that excessive moisture is removed. Water should not be allowed to run across the road prism and onto nonvegetated

fillslopes. Sufficient maintenance should be provided to prevent plugging of culverts. Water bars should be used and properly located so that discharge is onto vegetated fillslopes.

7. Drainage of inside ditches and cutbanks is necessary in areas of excessive water.
8. A catch area left between the inside ditch and the cutslope may prove helpful. This would reduce the plugging of the inside ditch from cutbank raveling and sloughing. Other considerations for cutbank ravel and slough control are drainage with perforated pipe and planting of deep-rooted vegetative species such as willow.

SOIL AREA "D"

This area is comprised of deep, stable, glacial till and outwash soils occurring on valley toeslopes and bottoms in the major valleys of the Principal Forest Zone. This area includes portions of the North Fork Nooksack, Suiattle, Sauk, Whitechuck and portions of other valleys.

Mapping Units of the Area

The major mapping units of Soil Area "D" are 10, 11, 12; 13, 36, 37 and complexes of these mapping units. A minor soil, but one of importance, is Mapping Unit 38. This mapping unit occurs infrequently in Soil Area "D", but is relatively unstable and has a high cutbank ravel potential. The essential characteristics and differences of these mapping units are shown on the following chart:

<u>1/</u> MU	Surface Soil Texture	Subsoil Texture	Landform	D.F. Site <u>2/</u> Index
10	Gravelly loamy sand	Very gravelly coarse textured river wash	Flats adjacent to streams	II & III
11	Gravelly loamy sand	Very gravelly coarse textured glacial drift	" "	IV & V
12	Loam	" "	Valley bottoms <35% slope	II & III
13	Loam	" "	Valley toe-slopes >35% slope	II & III
36	Loam or sandy loam	Very gravelly coarse textured till and drift	Valley bottoms <35% slope	III & IV
37	" "	" "	Valley toe-slopes >35% slope	III & IV
38	Gravelly loam or sandy loam	" "	Unstable dissected toe-slopes > 50% slope	III & IV

1/ Mapping Unit

2/ Douglas-fir Site Index Class

## Management Problems

Relatively few management problems exist in this area.

Due to the location along major valley bottoms, the area has a high demand for recreational developments. While the soils are generally well suited for this purpose, there are some limitations. Soil 10, because of its presence along the river, is generally unsuited for filter field development due to a high water table and the possibility of flooding.

Mapping Units 12 and 36 have a moderate suitability for filter field development. Of these, Mapping Unit 12 is generally the better suited. On both Mapping Units 12 and 36, the factors that impose limitations are related to drainage restrictions and topographic position. Mapping Unit 12, for instance, generally has deep, coarse textured, weakly compacted subsoils that are well drained. This is excellent for filter field requirements (Figure 35). Locally, however, the soil often has discontinuous silt lenses in the subsoils. Water will percolate downward until it encounters one of these silt lenses and then will move laterally. This limits filter field operation as the effluent will not readily disperse, but will appear in depressional areas or pollute nearby bodies of water. Mapping Unit 36, in addition to having discontinuous silt lenses, generally has moderately compact subsoils that impose drainage restrictions (Figure 36). Both Mapping Units 12 and 36 have limitations related to topographic position. Since these mapping units are in valley-bottom and toeslope positions, water will move into and through their subsoils from upslope drainage.

One mapping unit that is particularly well suited for recreation development is 11. The moderately coarse textured surface soils resist compaction damage and muddiness. Subsoils are gravelly coarse-textured, well drained, and have excellent filter field characteristics (Figures 37 and 38).

A problem that exists with Mapping Units 11, 12, 13 and 38 is the high rate of subsoil erosion that occurs from wave action of lakes and reservoirs. This is especially evident on Mapping Unit 12 at the Baker Lake campground on the Baker River District (Figure 39). This potential subsoil erosion problem should be recognized on future reservoir developments and the planning of corrective measures such as riprap placement should be taken into consideration.

Relatively few problems are associated with road construction in Soil Area "D". The soils are stable with the exception of Mapping Unit 38, which occurs infrequently. A problem that does occur is raveling and sloughing in road cutbanks. Highest occurrence is Mapping Unit 38 (Figure 40) followed by Mapping Units 13 and 37. Raveling and sloughing fills the inside ditch and diverts water across the road and onto the fill slope, causing erosion to both the road prism and the fill slope.



Figure 35 - Profile of Soil 12.

Mapping Unit 12 generally consists of very deep, coarse textured, weakly compacted subsoils that have good filter field characteristics. However, locally, there are silt lenses, shown at "A", that restrict downward drainage. Also, these soils have local moderate compaction that restricts drainage. These limitations require that permeability test be made prior to filter field installation. This profile also shows cutbank raveling which is common in these soils.

Mapping Unit 36 generally consists of very deep, coarse textured, moderately compact subsoils. It is similar to Mapping Unit 12 except it occurs at higher elevations and usually has the moderately compact subsoils that inhibit free drainage. Permeability tests must be made prior to filter field installation.



Figure 36 - Profile of Soil 36.



Figure 37 - Profile of Soil 11.

Mapping Unit 11 consists of very deep, coarse textured outwash deposits. It is similar to Mapping Unit 12 except that it has better drainage.

Mapping Unit 11 occurs on flat, well to excessively drained river terraces. This Mapping Unit is excellent for recreational and filter field developments. Notice the lodgepole pine. This is an indicator of the excellent drainage.



Figure 38 - Landform of Mapping Unit 11.



Wave action on lakes and reservoirs can severely erode the coarse textured, weakly compacted subsoils of Mapping Unit 12.

Figure 39 - Wave action in Mapping Unit 12.

This is Mapping Unit 38. Raveling also occurs on Mapping Units 12, 13, 36 and 37, but to a lesser extent. Material along this road ditch has been recently removed, but the ditch is rapidly refilling .



Figure 40 - Cutbank Raveling.



Figure 41 - Grass Seeding on Mapping Unit 13.

This is an excellent example of a good-looking cutbank. It is protected from erosion and is aesthetically pleasing.

SOIL AREA "E"

This area is comprised of deep, unstable, glacial lake deposits, till and outwash soils occurring in the valleys of Deer Creek, Little Deer Creek, Higgins Creek, and Finney Creek, all in the Finney Block; and along the valleys of the South Fork Canyon Creek on the Monte Cristo District, and the North and South Forks of the Sauk River Valley.

Mapping Units of the Area

The major mapping units of Soil Area "E", are 17, 18, 30, 31, 32, 33, 34, 35 and complexes of these mapping units. The essential characteristics and differences of these mapping units is shown on the following chart:

*MU	Surface Soil	Subsoils	Drainage	Landform	D.F. Site Index
17	Loam or sandy loam	Gravels and loose sands	Well	Valley bottoms & toeslopes of < 35% slope	III & IV
18	"	" "	Well	Moderately dissected toeslopes > 35% slope	III & IV
30	Loam or silt loam	Coarse textured till interlayered with fine glacial lake deposits	Moderate well to imperfect	Uneven, slightly to moderately dissected valley bottoms & toeslopes of < 35% slope	II & III
31	"	" "	Moderate well	Uneven, slightly to moderately dissected valley toeslopes > 35% slope	II & III
32	Similar to MU 30 except lower site due to higher elevations				III & IV
33	Similar to MU 31 except lower site due to higher elevations				III & IV
34	Silt loam	Fine textured glacial lake deposits	Imperfectly	Uneven, slightly to moderately dissected valley bottoms and toeslopes < 35% slope.	II to IV
35	"	" "	Moderate well to imperfectly	Uneven, dissected toeslopes > 35% slope.	II to IV

\* Mapping Unit

## Recommendations

### Recreation:

1. Recreation developments are best suited to the well drained Mapping Unit 11. Mapping Units 12 and 36 are generally suited also, but locally have filter field limitations due to drainage restrictions. Mapping Unit 10 is generally unsuited except for minor developments due to high water table and flooding hazard.
2. The following precautions should be taken on Mapping Units 12 and 36 prior to filter field installation:
  - a. Several test holes at least 10 feet deep should be placed in each of the proposed filter field sites. These should be left open and observed during the winter and spring to determine if there is a rise in the water table. To be usable as a filter field site, the water table should come no closer than 5 and preferably 10 feet from the surface.
  - b. Permeability tests at each site should be made to properly evaluate the filter field size and spacing.
  - c. Filter fields should be located a minimum of 200 feet from streams or lakes to minimize water pollution.

### Roads:

1. Road construction causes few problems in this area with the exception of Mapping Unit 10 because of flooding, and Mapping Unit 38 because of stability and raveling problems. Mapping Unit 38 also occurs in Soil Area "B." See this section for road considerations.
2. Adequate maintenance should be provided on all roads to prevent the inside ditch from becoming plugged and diverting water across the road, causing erosion.

## Management Problems

Management problems in this area are associated with instability, soil texture, restricted drainage and topographic position.

Mapping Units 31, 33, 34, and 35 are unstable with the greatest instability occurring on Mapping Unit 35. This instability is caused by the combination of steep slopes, fine textured plastic subsoils and restricted drainage. These factors are expressed in Mapping Unit 35 to the extent that natural deep-seated failures on the virgin landscape frequently occur and are greatly accelerated by management activities (Figures 42, 43, 44 and 45).

Cutbank and fill failures are highest on Mapping Units 35 and 34 but also commonly occur on Mapping Units 31 and 33. These failures not only cause damage to the road and increase maintenance costs, but more importantly, cause high damage to various natural resources. One form of damage is the stream sedimentation that causes water pollution and a loss to fisheries. The highly erodible fine textured soil particles that predominate in these soils remain in suspension for long periods of time. Therefore, streams and rivers that drain areas occupied by these mapping units are highly susceptible to sedimentation and pollution.

Other mapping units that exhibit cutbank raveling and stability problems are Mapping Units 17 and 18 (Figure 48). These mapping units occur primarily on the Monte Cristo District in the Canyon Creek area and in the western part of the South Fork Stillaguamish Valley. While Mapping Units 17 and 18 have similar soils, the problems of stability are much greater in Mapping Unit 18 because of steep landforms. Mapping Unit 18 exhibits many of the problems of Mapping Units 34 and 35, but for different reasons. While Mapping Units 34 and 35 exhibit high cutbank and fill failures because of fine textured subsoils, Mapping Unit 18 has the same problems because of very coarse textured subsoils and steep slopes. Mapping Unit 18 consists primarily of deep, loose sand deposits that lack sufficient friction and cohesion to stand up well in cutbanks, resulting in cutbanks and fill slopes that ravel and fail and are subject to extensive erosion (Figures 49, 50 and 51). This problem is frequently accentuated by subterranean water that flows into and through the subsoils from upslope.

Road construction involves several problems on Mapping Units 18, 30, 31, 32, 33, 34 and 35 in addition to stability, raveling and cutbank failures. Because of the soil textures and restricted drainage, fills are difficult to properly compact and culvert requirements are high. Thick base course is required to provide a satisfactory road surface. During wet weather the problems become much greater. Proper fill compaction becomes impossible, which increases the probability of fill failure. Also, the probability of cutbank failures and other forms of instability is greatly increased. However, the most important consideration of wet weather construction is the excessive damage that is caused to soils and resources. During these periods the operation of road construction equipment causes much greater soil disturbance and damage than when conditions are dry.

Rainfall impact and abundance of surface waterflow combine to produce severe muddiness (Figures 52 and 53), causing subsequent high levels of stream turbidity, pollution, and sedimentation. This results in a reduction in water quality and loss to fisheries.

During wet weather, damage is also caused to soils from timber harvest, recreation traffic and other activities. In addition to the muddiness problems previously discussed, damage is caused by destroying soil structure and causing soil compaction. This creates soil damage with increased erodibility and causes probable reduction in productivity.

Mapping Units 30, 32 and 34, although occurring on gentle slopes, have serious limitations for recreational developments due to restricted drainage and fine subsoil textures. Surface soils are wet for longer periods. This causes the soil to become susceptible to muddiness, compaction and other damage from recreation activities. Also, this wetness reduces the desirability as a recreation site. Restricted drainage further affects recreation developments by causing severe limitation for filter field operations.

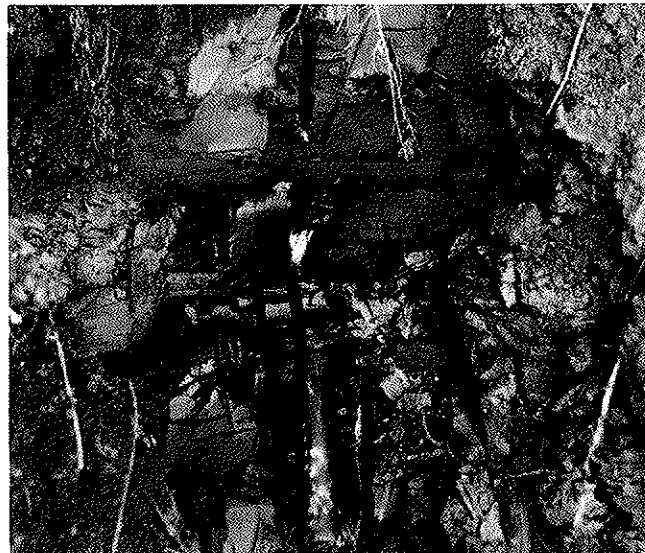


Figure 42.- Profile of Soil 35.

Mapping Unit 35 consists of very deep deposits of lake deposits of silty clay. These materials are plastic and are usually very wet. Mapping Unit 35 occurs on steep, dissected slopes and are very unstable, which is greatly accelerated by road construction.

Mapping Unit 34 has the same soil profile but occurs on gentle slopes. Mapping Units 30, 31, 32 and 33 are closely related to Mapping Units 34 and 35 but differ in that their subsoils are not pure silty clays but occur with layers of silt or silty clays interbedded with coarse textured glacial till.



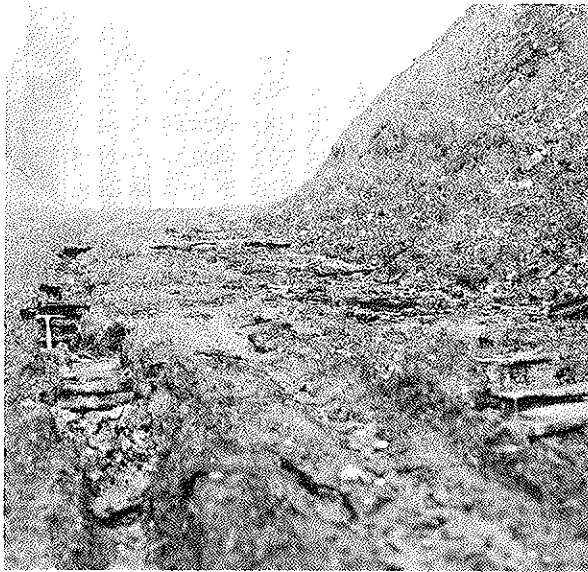
Figure 43 - Failure in Mapping Unit 35.

This is a typical example of the failures that occur in the virgin landscape on Mapping Unit 35.



Figures 44 & 45 - Road prism failures in Mapping Units 34 and 35.

These photos exhibit the road slumps that are common in Mapping Units 34 and 35. The photo at the left shows a section of the road that has slumped. Water is being ponded and will feed into the road prism, thereby enhancing the slumping process. In the photo at right, a section of the road in the foreground was removed by a large failure. Rerouting was required as shown by the road in the photo center.



The varved silty clay subsoils of Mapping Unit 34 are exposed in this new road construction. Water erosion has removed, transported and deposited much of the surface soil materials into the nearest stream.

Figure 46 - Road in Mapping Unit 34.

Mapping Unit 30 consists of interbedded layers of coarse textured till (A) and glaciolacustrine deposits of silt or silty clay (B). Mapping Units 31, 32 and 33 have the same kind of soils but differ from Mapping Unit 30 in landform and/or Site Class.



Figure 47 - Profile of Soil 30.

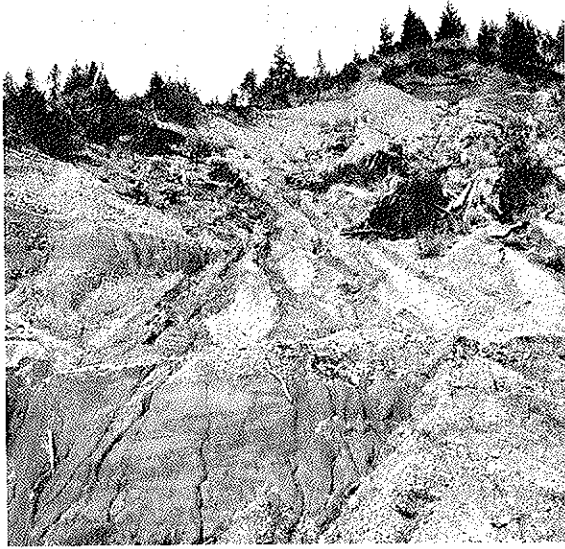


Figure 48 - Profile of Soil 18.

Mapping Unit 18 consists of very deep deposits of sands, with interbeds of gravel and gravelly sandy loams. Mapping Unit 18 occurs on steep slopes. Mapping Unit 17 is similar except it occurs on gentle slopes.

Cutbanks in Mapping Unit 18 severely ravel and slough and often extend the cutbank upslope a considerable distance. This contributes to high road maintenance costs and is unsightly.

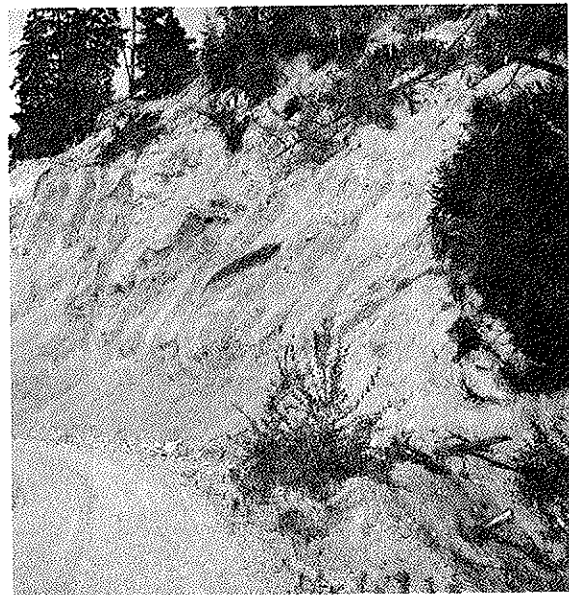


Figure 49 - Cutbank raveling and sloughing in Mapping Unit 18.



Figures 50 and 51 - Severe erosion in Soil 18.

These cutbanks in Soil 18 show the severe erosion that frequently occurs. The loose sandy materials have very little resistance to raindrop impact or running water. On the photo at the bottom, the inside ditch has become plugged and is diverting water onto and eroding the road surface.



Figures 52 and 53 - Muddiness in Soil 32.

Mapping Units 31, 32, 33, 34 and 35 all exhibit a strong tendency to become muddy from road construction and timber harvest activities during wet weather. These activities should be suspended during wet periods to prevent damage to the soils and to prevent excessive stream siltation.

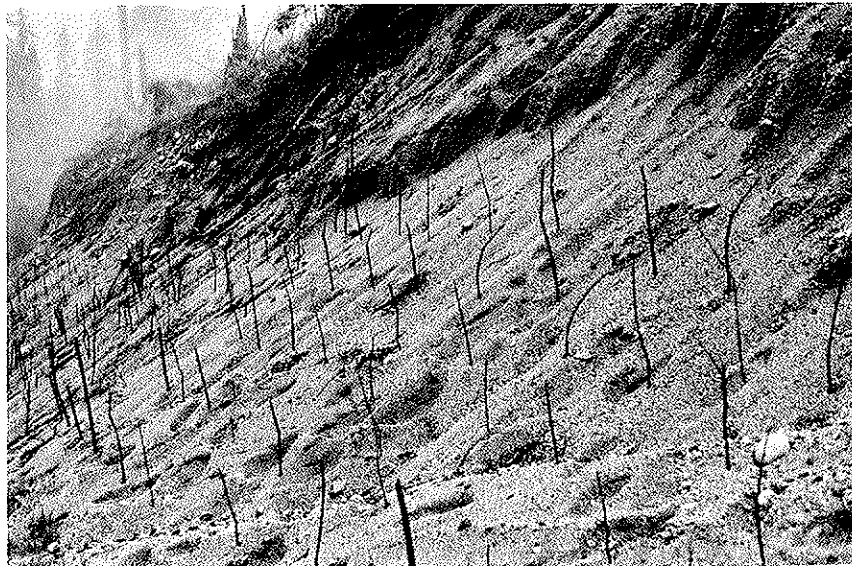


Figure 54 - Willow plantings in Soil 18.

Willow shoots have been planted to stabilize this cutbank. This is an excellent practice. Willow does much to arrest sloughing and raveling: (1) it develops deep and widespread rooting systems that hold the soil particles together, (2) willow removes considerable subterraneous water, and (3) the above-ground portions provide protection and help to hold soil and rock particles in place.

## Recommendations

### Timber:

High-lead logging is recommended on Mapping Units 30, 32 and 34 as less soil and resource damage would result than from tractor logging. If tractor logging is used, then the following recommendations apply:

1. An arch should be used to minimize skidding damage.
2. During dry periods, rubber-tired tractors generally do less damage than cats as they have less tendency to destroy the organic duff layer. Cats destroy duff with their tracks and do unnecessary damage with their blades. Blade removal on cats would do much to reduce damage during their operation.
3. Tractor operation should be suspended during wet weather on Mapping Units 30, 32 and 34 to prevent excessive damage to soils and resources.
4. Skyline or other swing logging systems should be used on Mapping Unit 35, and on slopes greater than 50-percent slope on Mapping Units 18, 31 and 33. This method causes minimal damage to soils and other resources. The primary advantage of skyline logging is that it reduces the number of roads required.

### Roads:

The following applies to both system and spur roads:

1. Road construction should be avoided on Mapping Unit 35 when possible due to high instability, and planned with extreme caution on Mapping Units 18, 31 and 33. Roads increase the rate of failure with resultant damage to the road and high damage to other resources.
2. Road construction should be suspended during the winter and other excessively wet periods to minimize damage to soils, water quality and other resources on Mapping Units 30, 31, 32, 33 and 35.
3. Road location should allow for adverse grade where necessary. This provides an opportunity to avoid the most unstable areas.
4. Full-bench construction should be used on steep sideslopes and across in-curve areas. Sideslope fills associated with partial-bench roads often fail due to inadequate support and compaction of soil materials.
5. Fills should be kept free of organic debris. This material prevents adequate compaction and provides channels for water, often contributing to fill collapse.
6. Surplus construction and maintenance waste should be end-hauled on Mapping Units 18, 31, 33 and 35 on slopes greater than 40 percent,

and disposed of in a suitable area. Sidecasting not only destroys timber and watershed values, but is a major contributor of mass movements. This material is in a loose, noncompacted state, resulting in a very high rate of surface erosion. More important is the fact that this material adds weight to downslope areas, which is greatly increased when the material absorbs water. A natural shear plane exists between sidecast materials and the underlying soils. Slides often occur, uprooting and destroying trees and depositing vast quantities of soil debris in streams. As these soils are high in silt and clay content, high levels of stream sedimentation and pollution occur with a subsequent loss of water quality and damage to fisheries.

7. Proper frequency of culverts and adequate installation should be ensured so that excessive moisture is removed. Water should not be allowed to run across the road prism and onto nonvegetated fill slopes. Sufficient maintenance should be provided to prevent plugging of culverts. Water bars should be used and properly located so that discharge is onto vegetated fill slopes.
8. Cutbank stability problems on Mapping Units 18, 30, 31, 32, 33 and 35 can be reduced by installation of subsurface drains and planting brush on the cutslopes. Grass seeding aids in the prevention of surface erosion, but is of little value in aiding stability. Deep-rooted brush species such as alder or willow are effective as an aid to water removal, thereby increasing friction, and have extensive root systems that hold soil in place (Figure 54).
9. Perforated pipe installed along the inside ditch should be effective under certain conditions. The pipe will intercept and remove water when the ditch is plugged. Another advantage is that perforated pipe will remove water from the upper part of the road prism equivalent to its depth beneath the surface. This would provide a dryer road surface and reduce maintenance costs.
10. A catch area left between the inside ditch and the cutslope may prove helpful. This would reduce the plugging of the inside ditch from cutbank raveling and sloughing.

Recreation:

1. Campground roads and trails should be surfaced on Mapping Units 30 and 32, and especially on Mapping Unit 34 to prevent deterioration and muddiness.
2. Filter fields are generally unsuited on Mapping Units 30, 32 and 34 as the fine textured subsoils and subterraneous water severely restricts their operation. Locally, however, there may be sites that are suitable. The recommendations listed on Soil Area "D" should be followed when considering filter field sites.
3. Mapping Unit 17 has moderate to good filter field suitability.

## GENERALIZED GEOLOGY OF AREA<sup>1/</sup>

The bedrock of the survey area consists of an extremely complex mixture of nonmarine sedimentary, igneous (volcanic and magmatic) and metamorphic rocks (Figure 55).<sup>2/</sup> Other than the relatively minor exceptions of Recent and Pleistocene lavas and Permian sedimentary-volcanic complexes, the majority of the rocks were formed during the time period extending from the middle or upper Mesozoic era to the Tertiary period of the Cenozoic era.

### Nonmarine Sedimentary Rocks

These rocks were formed during the Cretaceous period from sediments of silt and sand deposited on the floors of ancient fresh water lakes. These rocks are moderately to extensively folded and consist of coarse textured, thickly bedded graywacke or arkose sandstone interbedded with fine textured, thinly bedded mudstone, siltstone and shale (Figure 56). Weathering is generally slight to moderate in the coarse textured rocks, while the thinly bedded, fine textured mudstone, siltstone and shale exhibit local deep, intensive weathering.

These rocks are TKc as shown on the Geologic Map of Washington. Soils derived from these rocks are Mapping Units 50 through 56. The nonmarine sedimentary rocks are of comparatively minor extent on the Forest. They occur primarily in the vicinity of Higgins Mountain, DeForest Creek, and Upper Helena Creek.

### Metasedimentary and Metavolcanic Rocks

These rocks consist of a complex mixture of sedimentary and volcanics that were formed during the Mesozoic era. Subsequent metamorphism and alteration has changed the rock characteristics to the extent that field identification as to sedimentary or volcanic origin is difficult. In general, the rocks in this group include graywacke, argillite, slate, conglomerates, chert, greenstone, andesite and spilitic volcanics. These rocks are generally hard and competent except locally in some drainages where they are moderately hard to soft and range from moderately competent to incompetent. The degree of fracturing varies from moderately to highly, depending upon the local area (Figure 57). Color is predominate dark gray and greenish black, but other colors include light brown to tan.

<sup>1/</sup> Division of Mines and Geology; Geologic Map of Washington, 1961.

<sup>2/</sup> The Geologic Map of Washington was used as a general field guide for the development of this bedrock map; however, the Geologic Map of Washington differs somewhat from the bedrock map because of field observations. Many of the bedrock types shown on the Geologic Map had sufficient similarities to enable them to be grouped together into broader groups that would both simplify the bedrock map and satisfy the survey requirements of best fitting the map to the purpose of the soil interpretations.

Figure 55 GENERALIZED BEDROCK MAP

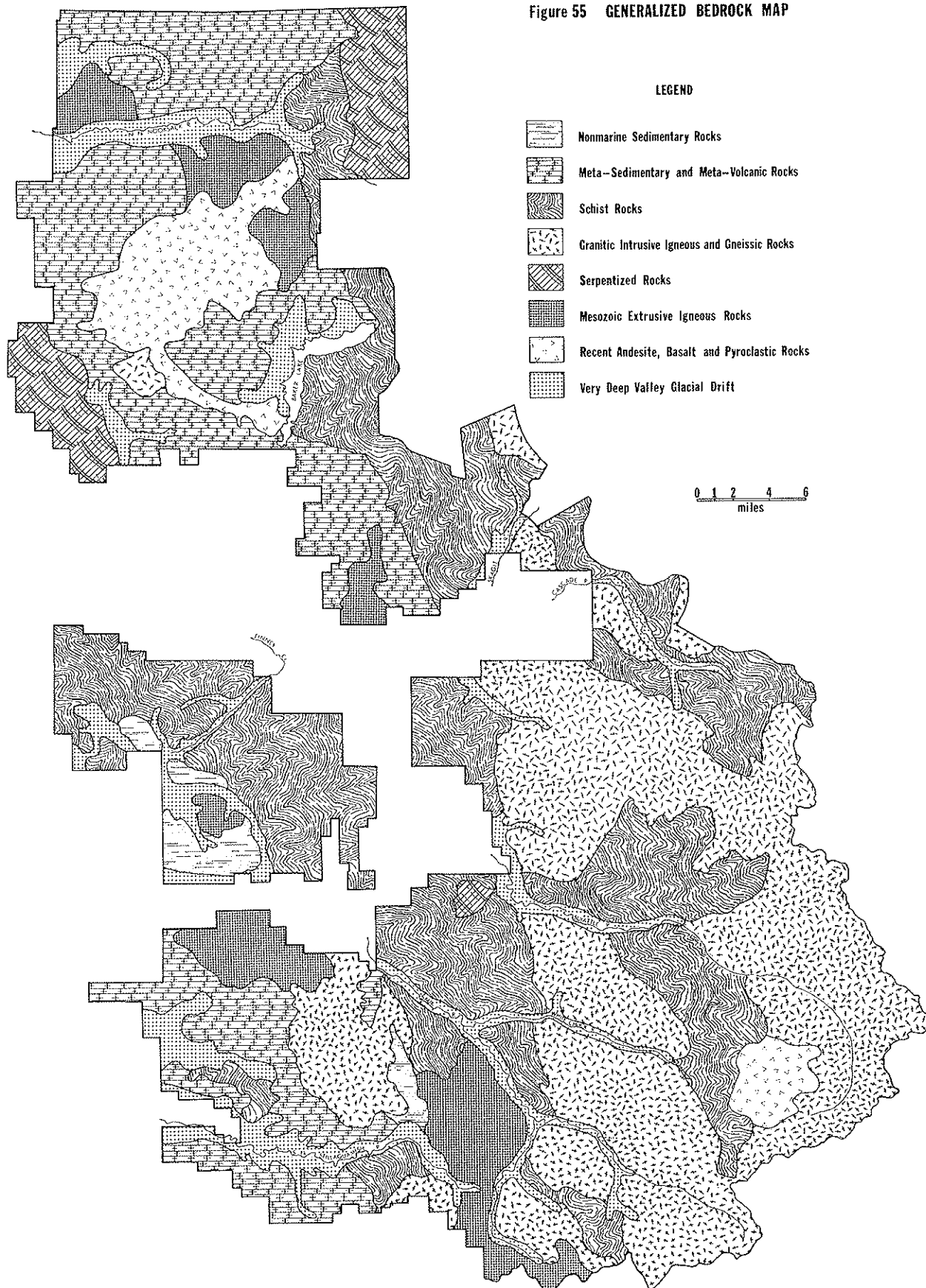




Figure 56. Nonmarine Sedimentary Bedrock.

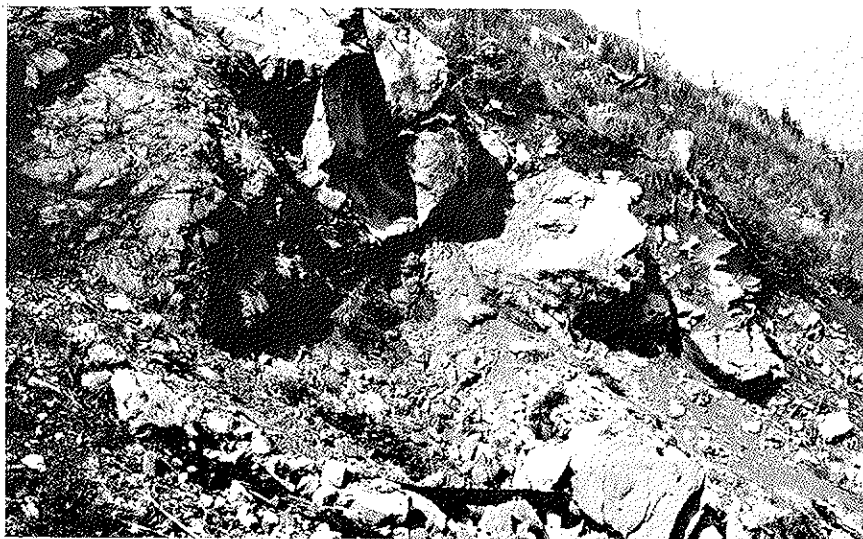


Figure 57. Highly fractured metasedimentary bedrock.



Figure 58. High grade Schist bedrock. This bedrock is intensely folded but generally hard and competent.

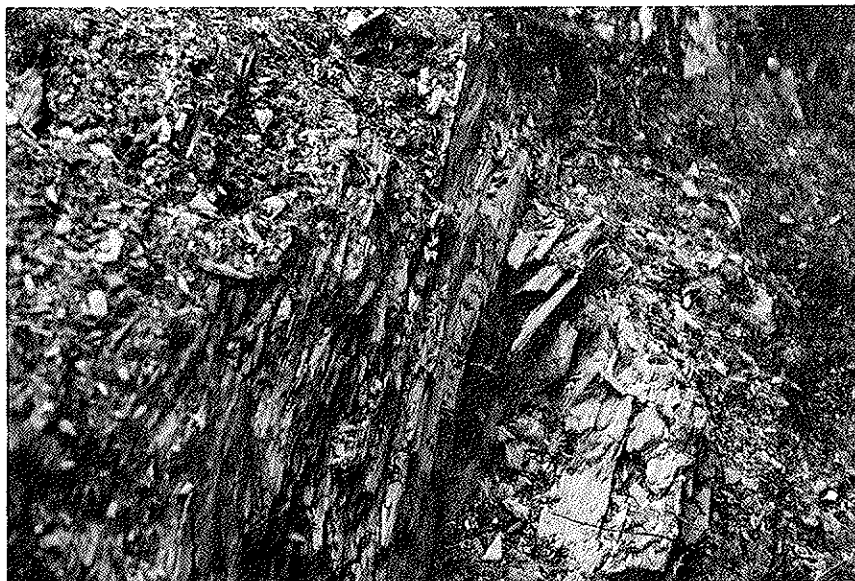


Figure 59. Low grade Phyllite Schist. Note intensive fracturing and evident softness of the rock.

These rocks include JK, JKs, pJ, pJs, CPm, CPms, pT, Pm and PTm as shown on the Geologic Map of Washington. Soils derived from these rocks are Mapping Units 60 through 66.

This rock group is extensive on the Forest. It occurs in the north portion of the Glacier District, throughout a broad band extending generally southeast from Mt. Baker to the Skagit River, the western part of the Forest between the North and South Forks of the Stillaguamish River and locally in other parts of the Forest.

#### Schist Rocks

These rocks were formed during the Jurassic period. This group is composed of phyllite schist, and greenschist, slate, quartzose phyllite schist, and schistose metaconglomerate with minor lime silicate rocks, marble and quartzite. The schistose rock group has been subdivided into two broad zones that reflect relative competency. These are the high grade and low grade zones.

#### High Grade Zone

The rocks of the high zone are generally hard, competent and moderately to highly fractured in random fracture systems (Figure 58). Thin veins of quartz and granodiorite are commonly present. Colors are predominately black to bluish black except white to reddish in veins.

These rocks are pJsc as shown on the Geologic Map of Washington. Soils derived from these rocks are Mapping Units 70, 71 and 72. The high grade zone occurs throughout a large area along the Suiattle River in the vicinity of Buck, Downey, and Milk Creeks; in parts of the Finney Block and locally in other parts of the Forest. Occurring within the high grade zone are local inclusions of the low grade zone.

#### Low Grade Zone

The rocks of the low grade zone generally exhibit more intensive weathering than those of the high grade zone (Figure 59). The low grade phyllite schist and greenschist frequently weather deeply and very intensively to saprolite in drainages with moderate weathering occurring on the sideslopes, toeslopes and ridges.

The rocks in the drainages are frequently soft and incompetent, resulting in a high occurrence of deep-seated failures. The rocks are generally bluish black to light gray in color and are highly fractured.

The rocks on the smooth sideslopes exhibit less weathering and are moderately hard, and competent to moderately competent. They are highly fractured in random systems. Colors range from black to very light gray.

These rocks include pJph and pJgs as shown on the Geologic Map of Washington. Soils either partially or completely derived from these rocks are Mapping Units 70, 73, 74, 75, 76, 78 and 79. The low grade schist

rocks occur as the principal bedrock type throughout the eastern half of Finney Block and the Illabot Peak area. They flank sedimentary and igneous rocks from Gold Mountain to White Chuck Mountain and south to Iron Mountain. Smaller areas of the low grade zone occur in the Green Mountain area (Verlot), and locally in other parts of the Forest.

#### Granitic Intrusive Igneous and Gneissic Rocks

The granitic igneous and gneissic rocks were considered together due to their similarity in physical and chemical weathering characteristics, and their intimate and indistinguishable physical association (Figures 60 and 61). The primary rock types are granite, granodiorite, quartz diorite, quartz monzonite, trondhjemite and hornblende gneiss and range in age from the late Paleozoic to the early Cenozoic era. These rocks are coarse textured, and generally hard and competent. They are massive to moderately fractured and exhibit both random and blocky fracturing, with blocky being the more common. Colors are quite variable and range from dark gray through pinkish gray to white.

Most of this bedrock shows slight to moderate weathering; however, in some drainages weathering has been intense. The rocks in these drainages are generally soft and incompetent, resulting in a frequent occurrence of mass movements.

These rocks include Tkg, Tg, pCg, Mzg, pJgn and pCm as shown on the Geologic Map of Washington. Soils derived from these rocks are Mapping Units 80 through 83. These rocks occur as the primary bedrock type throughout a large area in the southeastern part of the Forest from a few miles east of Illabot Peaks and occurring in a clockwise band to Pugh Mountain. They also occur in the area of Jumbo Mountain, Three Fingers Mountain, and locally in other parts of the Forest.

#### Serpentinized Rocks

Dunite, saxonite, gabbro, pyroxenite and peridotite are the primary rock constituents of this group. They are primarily pre-Tertiary and Tertiary in age. The most important characteristic of this group is that the rocks are generally altered partly or wholly to serpentine.

The amount of serpentinization is quite variable. In some areas the influence is comparatively insignificant, while in other areas the serpentinization is extensive. Where serpentinization has not had a significant influence, the rocks are hard and competent, highly fractured in random systems and generally dark gray to brownish black in color (Figure 62). Conversely, where serpentinization has been intensive the rocks are moderately hard to soft, and characteristically have a smooth "greasy" feel. They are highly fractured in random systems with smooth slickensides frequently present in the fracture zone. The color of these rocks is generally greenish black. These rocks are unstable and occur locally in drainages.

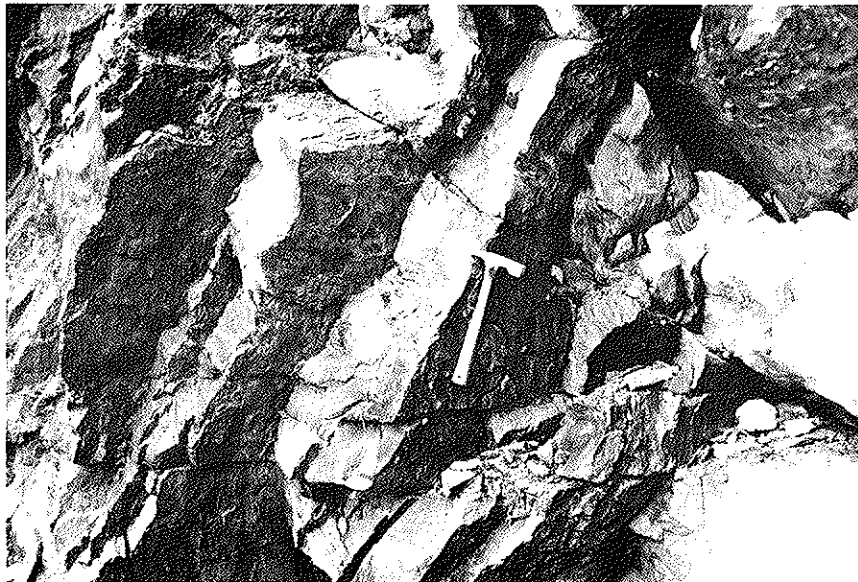


Figure 60. Intrusive igneous bedrock. Notice the large quartz veins.

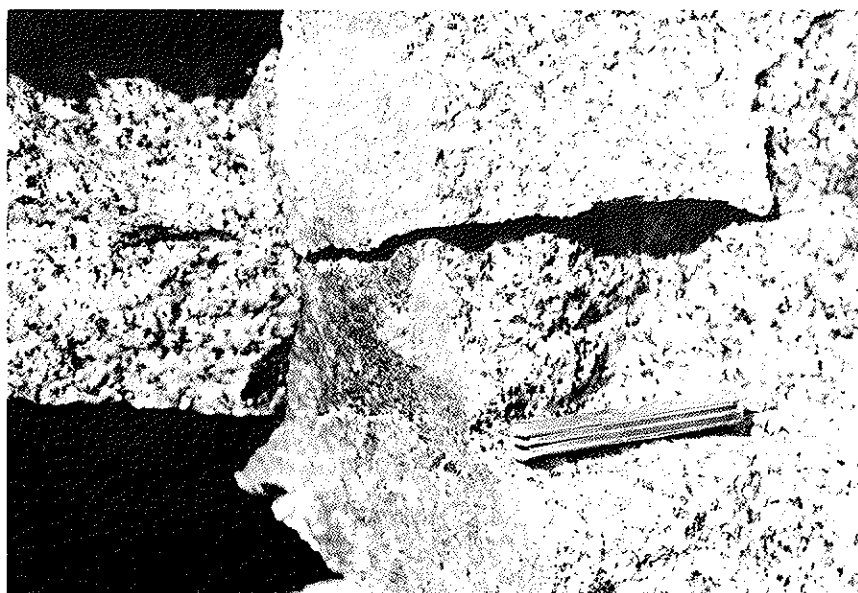


Figure 61. Gneissic bedrock.

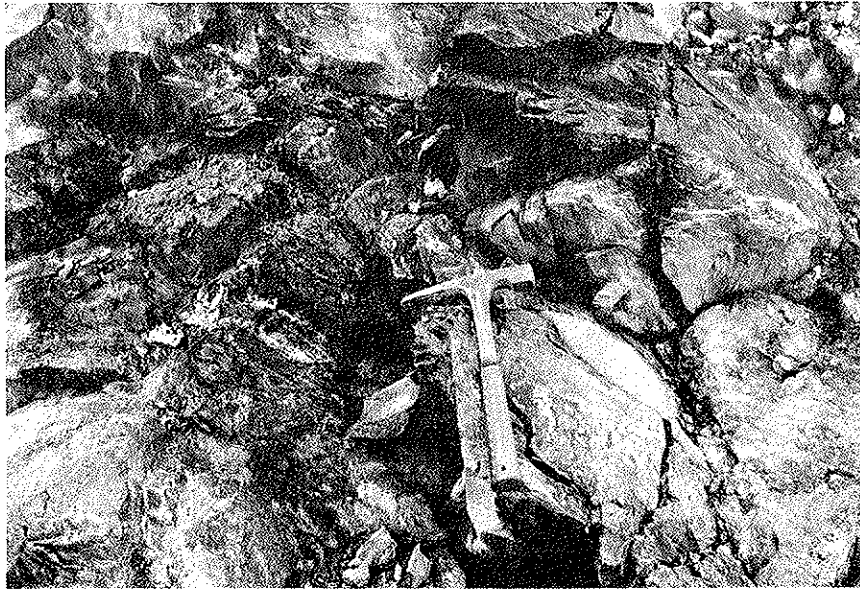


Figure 62. Serpentinized bedrock. Slickensides appear at bottom of photo.

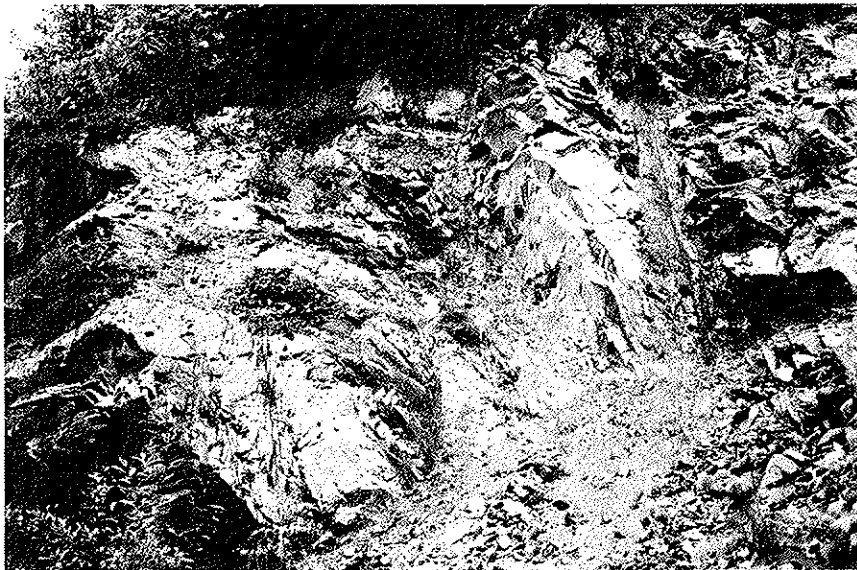


Figure 63. Mesozoic basalts and andesites.

The period known as the "Ice Age" began about one million years ago and continued until recent time. Radiocarbon dating indicates that the last major advance of continental and alpine glaciers began about 25,000 years ago and reached its maximum about 14,500 years ago.<sup>1/</sup> During that time, all but the highest peaks lay under a thick mantle of ice. Glacial erratics on the higher peaks of the northern Cascade Mountains indicate that the ice was as much as 6,000 feet thick in some areas. Since then the continental ice has disappeared and the alpine glaciers have receded to high elevations.

This glaciation has had a profound impact on the North Cascades as glaciers are a very powerful agent of erosion. The jagged peaks, cirque basins, lakes, truncated spurs, hanging valleys and broad U-shaped valleys are characteristic of glacially modified mountains. Examples of glacial grooves can be found that exhibit the effect of glacial abrasion and erosion (Figure 66).

Upon melting, the glaciers deposited materials in the valleys and on many of the ridges and sideslopes below approximately 5,000-foot elevation. These glacial materials are of various thicknesses and composition and consist of till, outwash and lacustrine (lake lain) deposits.

Glaciation has also exerted a major influence on streams and stream patterns. Many of the existing streams result from glaciers having carved depressions in the landscape such as cirque basins. These become natural water collection areas that contribute to stream formation. Glacial erosion and deposition has greatly altered the major valleys. Many of these streams were in a narrow V-shaped valley and were rapidly downcutting through bedrock on a comparatively steep gradient. The valley glacier caused modification by widening and straightening the valley and reducing the gradient. Upon melting, the glacier left deep deposits that resulted in a broad, relatively flat valley bottom. This changed the original stream from one that is flowing rapidly in a narrow valley to one that is flowing slower and meandering across a wide valley bottom.

Bedrock also has a major influence on stream patterns and density. Areas of sedimentary, metasedimentary and schist bedrock generally affect control of stream location. Stream patterns reflect the location of the least resistant beds or banded strata. These less resistant beds or bands weather more readily and are consequently the first to be eroded and form the drainage channels. Density of drainages in these rock types is generally high.

The other bedrock types on the Forest exhibit less control over stream location. In the granitic and gneissic bedrock, some streams follow jointing structure, while other streams are more the result of glacial effect on topography rather than from bedrock control.

<sup>1/</sup> Moen, Wayne S., Mines and Mineral Deposits of Whatcom County, Wash., Washington Department of Natural Resources, Division of Mines & Geology, 1969.

These rocks include Td, bi and pTb as shown on the Geologic Map of Washington. Soils derived from these rocks are Mapping Units 85, 86, 78 and 79. The serpentized rocks occur as the principal bedrock types in areas of Twin Sisters and Prairie Mountains. They also occur locally in other parts of the Forest.

#### Mesozoic Extrusive Igneous Rocks

These rocks consist primarily of basalt, andesite, rhyolite and diabase flows with interbeds of tuff and sedimentary rocks occurring locally. The rocks of this group are generally moderately hard to hard, and competent to moderately competent. They are generally fine textured, gray to black, and are highly fractured into random fracture systems (Figure 63). Locally, where tuffs and sedimentary rocks predominate, the rocks are highly weathered, soft and incompetent. These rocks have weathered to form steep, highly dissected and unstable drainages.

These rocks include Mv, CPmv, Tv, UTv, lTv, Jv and pTv as shown on the Geologic Map of Washington. Soils derived from these rocks are Mapping Units 90, 91, 92 and 66. The rocks of this group occur along the northern and northeastern flank of Mt. Baker; west and southwest of Church Mountain; the general area of Stillaguamish and Twin Peaks; and locally in other parts of the Forest.

#### Recent Andesite, Basalt and Pyroclastic Rocks.

This group consists of porphyritic basalts and andesites, and pyroclastic rocks. The basalts and andesites occur in ridges and in intercanyon flows on both Mt. Baker and Glacier Peak. The rocks in the ridges are hard, competent, grayish in color and columnar jointed (Figures 67 and 68). The rocks in the recent intercanyon flows are fractured into blocky fracture systems. These rocks are black to gray, hard and competent, and quite porous. Near the tops and edges of these flows the rocks are scoriaceous and have a "frothy" appearance. They are of reddish color and are easily broken.

Frequently associated with the basalts and andesites but generally above snowline on both Mt. Baker and Glacier Peak, are the pyroclastic rocks. These rocks are highly variable in texture and composition. They exist in a variety of colors from black to light tan. They are highly fractured, moderately hard to soft and generally incompetent.

These rocks are shown as Qv on the Geologic Map of Washington. Soils derived from these rocks are Mapping Units 95, 96 and 97.

#### Volcanic Ash, Cinders, Pumice and Tuffs<sup>1/</sup>

Deposits of volcanic ash and/or cinders originating from Glacier Peak, Mt. Baker and Mt. Mazama extend over much of the central and eastern

<sup>1/</sup> Tabor, R.W. and C.F. Crowder, On Batholiths and Volcanoes, Geological Survey Professional Paper 604, Washington, 1969.

portions of the Forest. Both thickness and extent of the deposits are dependent upon the proximity to, and the relative direction from, the source or sources.

Generally, the ash originating from Mt. Mazama may occur over all but the westernmost portion of the Forest. However, its occurrence is unpredictable due to redeposition by wind, water and ice, and is most commonly found on high-elevation ridge meadow areas. It is light gray in color and only a few inches thick throughout the areas where it does occur.

The ash, cinders and pumice of consequence on the Forest has originated from Mt. Baker and Glacier Peak. These materials extend outward from both peaks in a northeasterly direction (Figure 64). The deposits from Mt. Baker area are reddish colored ash and cinders, while the deposits from Glacier Peak are whitish gray ash and pumice. Depth of both deposits is greatest near their source (Figure 65) and steadily decreases with distance. The deposits from Mt. Baker, except locally on the mountain flanks, are generally less than one foot deep and contain incorporated gravels. The average depth throughout the main depositional area from Glacier Peak is not known. Thin to thick deposits from both mountains occur locally throughout the Forest in scattered, highly unpredictable pockets.

The dissected terrace of the Upper White Chuck River, as well as the Upper Suiattle River and the headwaters of Baker River and its tributaries consist of thin to very thick pumice and ash deposits over very thick tuff and/or interbedded brecciated lava flows. The pumice size ranges from three inches to one-half inch in diameter and is light yellowish gray in color.

#### Geomorphology and Glaciology

The oldest known rocks in the North Cascades date back approximately 250 million years. During that time the mountains consisted of northwest-southeast trending chain of uplifted sedimentary, basaltic and granitic rocks known as the Calkin Range.<sup>1/</sup> Later, buckling and uplifting of this chain on a north-south axis greatly increased the size of the mountain range and formed the majority of the pre-glacial mountain systems and drainage patterns. During this uplifting and continuing into the ice age, intense volcanism formed the present cone-shaped volcanoes of Mt. Baker and Glacier Peak. Towards the end of this volcanic activity, glacial erosion began and has subsequently been the dominant factor contributing to the present configuration of the North Cascades. Were it not for the advent of the continental and alpine glaciers, the present skyline of the North Cascades would likely conform to that of the gently rolling Great Smokey Mountains of North Carolina.

<sup>1/</sup> Mackin, J. Hoover and Allen S. Cary, Origin of Cascade Landforms, Division of Mines and Geology, 1965.

Figure 64 MAJOR ASH ZONES

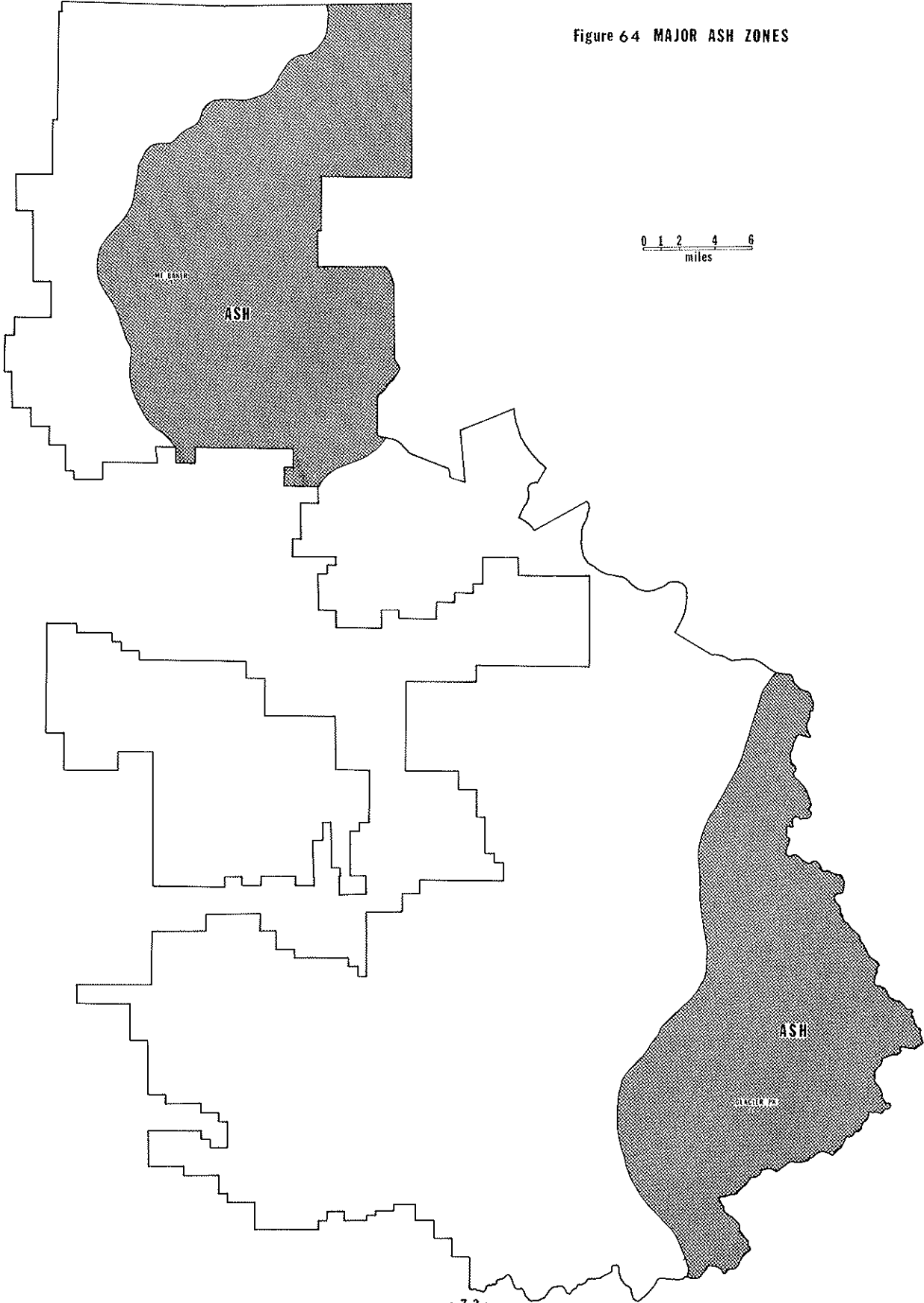




Figure 65 - Profile of Soil 43.

Mapping Unit 43 consists of deep deposits of volcanic ash and cinders. Unique and very limited in distribution, it occurs primarily in the Schrieber's meadow area.

This is an example of glacial grooving. Gravels and boulders imbedded in the ice sheet abraded against this rock face and caused its smooth but grooved appearance.

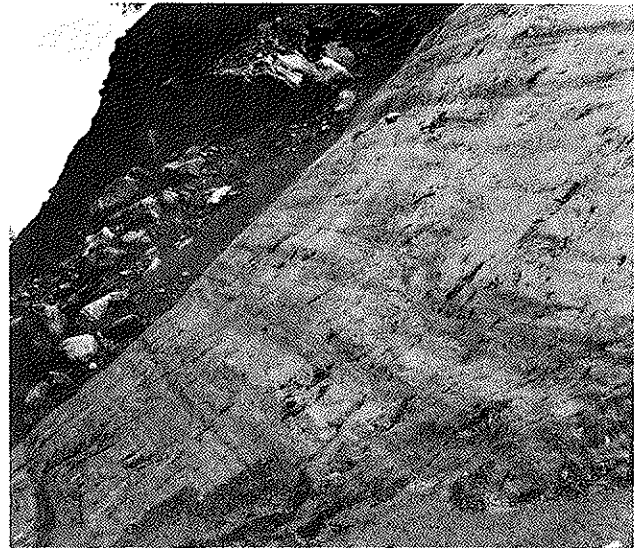
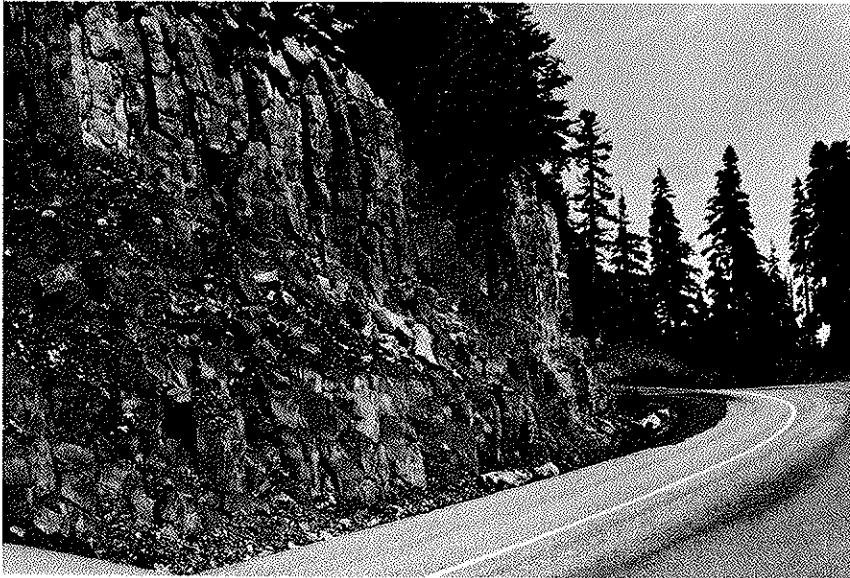


Figure 66 - Glacial Grooves.



Figures 67 & 68 - Recent columnar-jointed basaltic bedrock.



## CLIMATE

The climate of the Mt. Baker National Forest is primarily influenced by terrain, the position and intensity of the high and low pressure centers over the North Pacific Ocean, and the distance and direction from the ocean. Distinct differences in the climate are found within a few miles. Variation in topography is the major contributor to this condition.

Although annual precipitation and temperatures vary greatly throughout the Forest, the general pattern is similar. Precipitation is lowest in the major valley bottoms and slowly increases as the headwaters are approached. Precipitation increases more rapidly as elevation is gained from the valley floor.<sup>1/</sup> Temperature averages are highest in the valley bottoms and decrease with elevation. Most of the precipitation in the valleys is in the form of rain; whereas, it is in the form of snow at elevations greater than 3,000 feet. One-half of the annual precipitation falls in the four-month period October through January, and three-fourths in the six months, October through March.

Winter Conditions. Heaviest precipitation occurs in the fall, reaching a peak in December and then decreasing in the spring. Most of the winter precipitation falls as rain in elevations below 1,500 feet, as rain or snow between 1,500 and 2,500 feet, and as snow in the higher elevations. The winter season snowfall ranges from 30 to 60 inches in valleys, increasing 150 to 200 inches at 3,000 feet, and 200 to 300 inches above 4,500 feet.

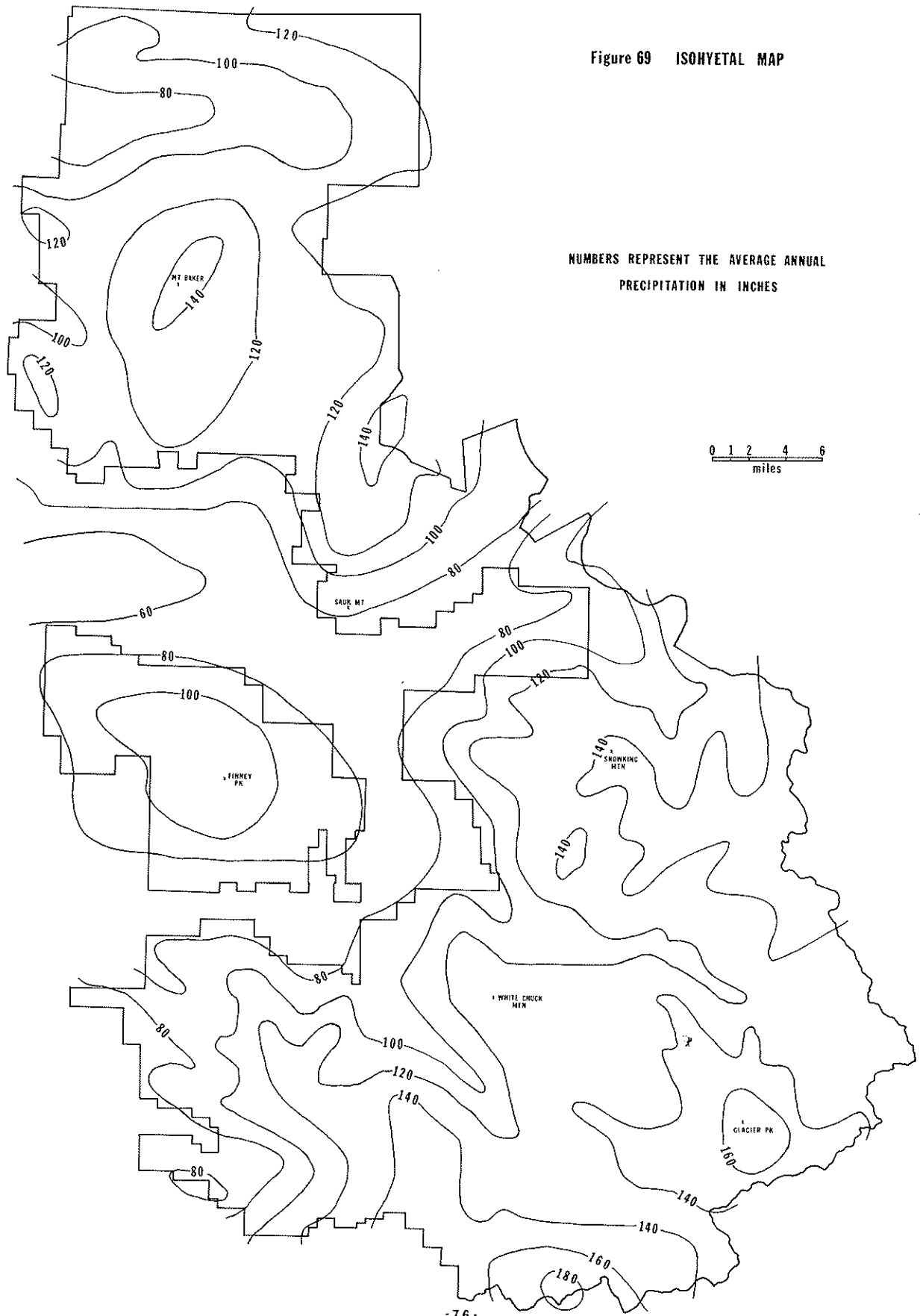
At Heather Meadows, a snow cover usually remains on the ground after the first of November and reaches a depth of 15 to 20 feet by the last of March or first of April. In a few of the heavier snowfall seasons, the depth has reached 20 to 25 feet. Heavy rains on a snow cover from the latter half of October until the middle of December sometimes results in rapid melting of the snow and flooding in the lower river valleys. Rainfall amounts ranging from 3 to 6 inches in 24 hours and 10 inches in 48 hours have been recorded in the Heather Meadows area.

Summer Conditions. During late spring and summer, the prevailing westerly and northwesterly flow of air over the Forest results in a dry season beginning in May and reaching a peak in midsummer. July and August each normally have a range of 1 to 4 inches of precipitation throughout the Forest. Heavy thunderstorms are unusual; however, there are usually a few days during the summer when some thunderstorm activity occurs.

The diurnal range in temperature is approximately 20° in summer. During the warmest summer months, afternoon temperatures range from 60° to 70°. Maximum temperatures reach 85° to 90° in a few days. Over the lower elevations, minimum temperatures are in the 50's, decreasing into the 40's in the mountains. In summer, the daily variation in relative humidity

<sup>1/</sup> These precipitation figures were taken from a projected Isohyetal Map of Mean Annual Precipitation, 1930 through 1957, State of Washington, U.S. Weather Bureau (Figure 69).

Figure 69 ISOHYETAL MAP



is from 85 percent at night to 45 percent in the afternoon. During brief periods of dry easterly winds, the relative humidity may drop to 20 percent or lower. Highest temperatures, lowest humidity, and the greatest danger of forest fires generally occur during periods of easterly winds. These conditions seldom prevail longer than one<sup>2/</sup> to four days before cooler moist air moves inland from the Pacific Ocean.

Table of Mean Temperature and Precipitation Data

This table includes data from U.S. Weather Bureau Stations on and adjacent to the Mt. Baker National Forest. Glacier Ranger Station, Mt. Baker Lodge, Verlot Ranger Station and Silverton are within the National Forest. Both Darrington and Concrete Stations are located outside the National Forest boundaries. All stations are low-elevation with the exception of the Mt. Baker Lodge Station, and do not adequately reflect conditions in the high-elevation forest areas. However, they do show climatic variations in the various quadrants of the National Forest and, therefore, are useful for comparative information.

<u>Darrington, Washington</u>		Elevation: 550 feet
		Period: 1931 - 1960
<u>Month</u>	<u>Mean Temperature (°F)</u>	<u>Precipitation (Inches)</u>
January	35.0	11.79
February	37.9	9.37
March	41.8	8.13
April	48.8	5.30
May	54.9	3.43
June	59.1	3.20
July	63.5	1.36
August	63.0	1.50
September	58.5	3.92
October	50.6	8.23
November	40.7	11.14
December	37.0	13.14
Annual	49.3	80.51

<u>Glacier Ranger Station, Washington</u>		Elevation: 935 feet
		Period: 1934 - 1960
<u>Month</u>	<u>Mean Temperature (°F)</u>	<u>Precipitation (Inches)</u>
January	31.1	7.03
February	34.9	5.60
March	39.5	5.59
April	46.5	3.71
May	53.2	2.90
June	57.6	2.92
July	62.5	1.42
August	61.3	1.75
September	56.9	3.64
October	48.3	6.69
November	39.2	7.48
December	35.2	9.30
Annual	47.2	58.03

<sup>2/</sup> Earl L. Phillips, "Climates of the States, Washington," Climatography of the United States, No. 60-45, U.S. Department of Commerce, Weather Bureau, Revised and Reprinted, April 1965.

TABLE I (Cont.) Mean Temperature and Precipitation Data

Mt. Baker Lodge  
 (Heather Meadows Recreational Area) Elevation: 4150 Feet  
 Period: 1927 - 1951

<u>Month</u>	<u>Mean Temperature (°F)</u>	<u>Precipitation (Inches)</u>
January	26.9	11.86
February	29.7	10.61
March	32.1	12.12
April	35.8	8.52
May	43.3	6.39
June	47.8	4.73
July	54.0	3.32
August	56.7	3.19
September	49.4	7.64
October	42.5	11.34
November	34.7	13.14
December	29.0	16.99
Annual	40.1	109.85

Concrete, Washington Elevation: 270 Feet  
 Period: 1931 - 1960

<u>Month</u>	<u>Mean Temperature (°F)</u>	<u>Precipitation (Inches)</u>
January	36.7	8.80
February	40.1	7.03
March	44.5	6.76
April	51.3	4.12
May	57.3	2.87
June	61.1	2.75
July	65.4	1.30
August	65.2	1.50
September	61.2	3.57
October	53.3	7.03
November	43.7	9.10
December	39.2	10.38
Annual	51.6	65.21

TABLE I (Cont.) Mean Temperature and Precipitation Data

<u>Silverton, Washington</u>		
		Elevation: 1475 feet Period: 1943 - 1961
<u>Month</u>	<u>Mean Temperature (°F)</u>	<u>Precipitation (Inches)</u>
January	Not recorded	17.12
February		14.61
March		12.14
April		8.59
May		5.42
June		5.05
July		2.19
August		3.10
September		6.64
October		13.95
November		16.35
December		18.25
Annual		123.41

<u>Verlot Ranger Station</u>		
		Elevation: 980 Feet Period: 1946 - 1960
<u>Month</u>	<u>Mean Temperature (°F)</u>	<u>Precipitation (Inches)</u>
January	Not recorded	17.86
February		16.03
March		13.03
April		9.99
May		5.97
June		7.34
July		2.79
August		3.59
September		6.25
October		15.10
November		16.84
December		20.75
Annual		135.54

APPENDIX I

DEFINITIONS OF MANAGEMENT INTERPRETATIONS

This appendix contains the definitions for the Tables of Management Interpretations found in the Atlas and report. Definitions apply to Erosion and some Hydrologic Interpretations, Recreation, Timber Management and Engineering.

## ENGINEERING

Interpretations for engineering include characteristics for roads, foundations, bedrock, and some miscellaneous interpretations. These are presented in two tables. One table, "Characteristics Pertinent to Roads and Airfields," is a standard engineering table for road construction based on the Unified Soil Classification System. The other table, "General Engineering Interpretations," gives other engineering interpretations which will be useful to engineers and other resource managers. These interpretations are explained and defined in this section.

### Unified Classification

Each soil is classified as to its Unified Classification. Most soils will be classified into one class. Those soils with significant layers of different soil materials will have a classification for each layer designated. The classification will be made for some representative soils by laboratory testing. Those soils not tested will be classified by comparing their properties to those tested.

Generally, the following interpretations and ratings are based on the entire soil unit including soil, bedrock and landform. Some interpretations are based only on the soil material or bedrock material. These are stated in the description for each interpretation. The interpretations pertaining to roads are based on standard Forest Service regulations and construction methods presently used.

### Suitability for Use as Topsoil Source

This rating evaluates each soil as to its suitability for use as topsoil. It does not specify any particular use of the topsoil. Ratings are based on soil characteristics.

Suited - Soil texture ranges from sandy loam to clay loam and gravel content is less than 30 percent.

Unsuited - This rating indicates the soils do not satisfy the requirements specified under "Suited." However, soils rated "Unsuited" may still satisfy a particular requirement. See the Table of soil Characteristics" for soil texture, thickness and gravel content.

### Suitability of Soil as Sand and/or Gravel Source

This interpretation indicates the suitability of each soil as a possible source of sand and/or gravel. It does not indicate the kind or quality of sand or gravel, or refer to any specific use of the sand and/or gravel.

Suited - This rating indicates that sand and/or gravel is present and the following conditions are satisfied: There is a layer present which is composed of 80 percent, by volume, of sand and/or gravel. This layer is at least 4 feet thick and has no more than a 5-foot overburden.

Unsuited - This rating indicates that sand and/or gravel is generally not present in amounts which satisfy the requirements under "suited." However, soils rated "unsuited" may still satisfy a particular requirement. See the table of soil characteristics for soil depth and gravel content.

#### Suitability of Soil as a Possible Clay Source

This rating indicates the suitability of each soil as a possible source of clay. It does not indicate the kind or quality of clay or refer to any specific use of the clay.

Suited - This rating indicates that the soil is a possible source of clay. Soils with this rating have the following: Texture ranges from clay loam to clay. Gravel content is less than 30 percent.

Unsuited - Soils with this rating generally are not possible sources for clay.

#### Suitability of Bedrock for Road Rock

This interpretation indicates the general stability of rock when used as road rock for base course or wearing surface. These ratings are based on rock hardness, density, and susceptibility to weathering and breakdown. Soils are not rated when depth to bedrock is greater than 12 feet.

Unsuited - Rock is soft and breaks down rapidly under logging traffic.

Poor - Rock is only moderately hard and breaks down easily under logging traffic, usually in one or two years' time.

Fair - Rock is hard and dense but tends to break down under logging traffic after about two to four years' use.

Good - Rock is hard, dense and resists breakdown under logging traffic.

#### Limitations of Bedrock for Road Rock

This column indicates the major limitation of the bedrock when used for road rock.

### Estimate of Road Rock Thickness

This interpretation refers to estimated amount of road rock (base course) and wearing surface) generally needed on heavy-vehicle, all-weather-use roads constructed on each soil. Factors involved in making this interpretation include texture and plasticity of soil, depth of bedrock, drainage, and kind of subgrade the road generally will have -- common material or bedrock. Ratings are based on uncompacted fills.

Very thin - Generally less than 10 inches.

Thin - Approximately 10 to 22 inches.

Thick - Approximately 22 to 36 inches.

Very thick - Generally over 36 inches.

### Considerations for Road Location and Construction

This column indicates the major considerations for road location and construction through each soil. The rating evaluates the impact of road construction on other resources and/or road construction problems likely to be encountered.

### Method of Excavation

This interpretation refers to excavation methods most commonly required for each soil. This includes soil, bedrock and cemented and/or compacted layers in the soil. Methods are blading, ripping, and/or blasting.

### Subsoil Erosion Potential

This interpretation indicates the potential for subsoil erosion of each soil. Subsoil refers to that material from approximately the 5-foot depth extending to bedrock. It primarily includes erosion which takes place along road ditches and on cutslopes. Rating is of soil material only and does not apply when cutbank or ditch is in bedrock. Factors considered in making ratings are texture and structure of subsoil materials, permeability, compaction, and climate.

Low - Factors indicate that little or not subsoil erosion is likely to occur.

Moderate - Factors indicate that the subsoils have moderate erosion potential.

High - Factors indicate that the subsoils are likely to erode severely.

### Susceptibility to Cutbank Sloughing and Raveling

This rating evaluates each unit for its susceptibility to sloughing or raveling after excavation. Ratings are based on cutbanks at least 10 feet high. Factors include soil and bedrock characteristics, backslope ratio, frost action, climate and potential for revegetation.

Low - Sloughing and/or raveling is a minor problem requiring occasional road maintenance.

Moderate - Sloughing and/or raveling causes some damage. Annual road maintenance is usually adequate.

High - Sloughing and raveling occur at a rate that often plugs culverts and fill inside ditches. Frequent road maintenance with heavy equipment such as front-end loader is required.

### Estimated Cutslope Ratio

This interpretation estimates the cutslope ratio which generally will result in the most stable cutbank condition. Ratings made are for cutbanks at least 10 feet high and pertain to both soil and bedrock material.

Steep - Cutbank ratio from vertical to  $\frac{1}{2}$ :1.

Moderate - Cutbank ratio from about  $\frac{1}{2}$ :1 to  $1\frac{1}{2}$ :1.

Flat - Cutbank ratio flatter than  $1\frac{1}{2}$ :1.

### Probability of Cutbank Failures

This interpretation indicates the probability of failures in cutbanks following road construction or excavation for buildings. Failures are considered to be at least 10 cubic yards of material in volume. Ratings are based on cutbanks of at least 10 feet in height and refer to more than a 50-percent chance for failures. These ratings are the same as in the Mantle Stability Surveys.

- I. Very stable - practically no probability chance of cutbank failures.
- II. Stable - probability of no more than 3 failures per mile of road cutbank.
- III. Moderately stable - probability of 4 to 8 failures per mile of road cutbank.
- IV. Unstable - probability of 9 to 15 failures per mile of road cutbank.
- V. Very unstable - probability of more than 15 failures per mile of road cutbank.

### Considerations for Cutbank Stability Problems

This rating gives recommendations, when applicable, to increase stability of cutbanks or reduce damage from raveling and sloughing.

### Failure and Erosion on Road Waste and Fills

This interpretation rates the soil units as to the susceptibility of failure and erosion occurring on fill and sidecast waste material and related damage to resources. Failures are defined as a loss or partial loss of road fill or sidecast material on the fill slope. Erosion is a loss of surface soil material from fill or sidecast. Considered are initial and subsequent failures caused by construction, erosion and additional sidecast during maintenance. Failures result in damage to various resources. Stream sedimentation levels are increased, resulting in an adverse effect on both water quality and fisheries. Timber growth potential is affected as fill slope areas no longer contribute to production. Occasionally the failures do damage to the road itself. The ratings are based on current road construction practices and procedures and on type of soil materials, natural drainage of the site, landform, slope of the fill, and field observation.

Low - Failure and erosion on road waste and fills is sufficiently low to result in only minor damage to resource values.

Moderate - Failures and erosion on road waste and fills occur with sufficient frequency to cause moderate damage to resource values.

High - Failures and erosion on road waste and fills occur at a rate and magnitude sufficient to cause major damage to resource values.

### Suitability of Cutbanks to Seeding

This interpretation indicates the probable success of cutbank seeding. Factors considered in making ratings are soil characteristics, elevation, slope, climate, snowpack, and frost hazard. Ratings are based on current methods and practices of seeding, grass species, fertilizer application and time of seeding.

Poor - Probability of success is low. Seeding generally is not successful and requires three or more reseedings and special treatments.

Fair - Success is likely on about 50 percent of area treated. Requires one or two followup treatments. Seeding is usually spotty; some areas become easily established while others fail completely.

Good - Probability of high success. Seeding usually becomes well established within two years. Little followup seeding necessary.

### Limitations to Cutbank Seeding

This indicates the major limitations to success of cutbank seeding.

### Recommendations for Cutbank Seeding

This indicates special treatment to be given, when applicable, to increase the chance of success of cutbank seeding.

### Suitability of Fill Slopes to Seeding

This interpretation indicates the probable success of fill slope seeding. Factors considered in making ratings are soil characteristics, elevation, slope, climate, snowpack, and frost hazard. Ratings are based on current methods and practices of seeding, grass species, fertilizer application and time of seeding.

Poor - Probability of success is low. Seeding generally is not successful and requires three or more reseeding and special treatments.

Fair - Success is likely on about 50 percent of area treated. Requires one or two followup treatments. Seeding is usually spotty; some areas become easily established, while others fail completely.

Good - Probability of high success. Seeding usually becomes well established within two years. Little followup seeding necessary.

### Limitations to Fill Slope Seeding

This indicates the major limitations to success of fill slope seeding.

### Recommendations for Fill Slope Seeding

This indicates special treatment to be given, when applicable, to increase the chance of success of fill slope seeding. A statement indicates the necessary requirements other than normal fill slope seeding practices carried on by the Forest.

## TIMBER MANAGEMENT

Interpretations for timber management are of two types. One type includes some interpretations that directly affect timber management, such as "windthrow hazard" and "potential for regeneration." The other type indicates the effect on soils and other resources from timber harvest activities.

### Windthrow Hazard

This interpretation indicates the general susceptibility to windthrow for each mapping unit. Windthrow hazard ratings are based on such factors as texture, soil depth, water table, and effective rooting depth, and are considered individually or in combination.

Low - Factors indicate windthrow is not likely. The effective rooting depth is generally greater than 36 inches.

Moderate - Factors indicate some susceptibility to windthrow, but major problems are not likely. The effective rooting depth is generally between 18 and 36 inches.

High - Factors indicate that windthrow hazard is high. The effective rooting depth is generally less than 18 inches.

### Susceptibility to Brush Revegetation.

This indicates the susceptibility of mapping units to revegetate naturally by brush following clearcut timber harvest. These ratings are based on soil characteristics, field observation, slope, aspect, climate, and elevation.

Low - Indicates brush revegetation is insignificant.

Moderate - Indicates that some brush revegetation will occur.

High - Indicates brush revegetation is severe.

### Susceptibility to Alder Revegetation

This interpretation indicates the susceptibility of mapping units to revegetate to alder following clearcut timber harvest. These ratings are based on soil characteristics, drainage, elevation, climate, topographic position and field observations.

Low - Factors do not encourage alder establishment and growth. Little or no alder revegetation occurs.

Moderate - Factors are moderately favorable for alder establishment and growth. Alder revegetation is moderate.

High - Factors are highly favorable for alder establishment and growth. Alder revegetation occurs rapidly.

### Potential for Regeneration

This interpretation indicates the potential for each mapping unit to regenerate at a minimum level of stocking as set by the Forest Service. Factors included in this interpretation are soil characteristics, climate, aspect, elevation, frost potential, brush competition, and tree species.

Low - This rating indicates the potential for regeneration is low. Probability of success is very limited. Major regeneration problems can be expected and reseeding or replanting may be required throughout the area. Several years may elapse before an adequate stocking level is achieved.

Moderate - This rating indicates that some problems will be encountered in attaining a satisfactory stocking level. Usually regeneration is spotty and some replanting will be necessary.

High - This rating indicates that regeneration has a high probability of success. Few problems should be encountered in attaining good stocking levels.

### Limits to Regeneration

This indicates the major limitations to regeneration.

### Recommended Tree Planting Species

This column lists the tree species that the soil, climate, and topographic factors indicate would be best suited for planting.

### Susceptibility to Soil and Other Resource Damage by Timber Harvest Operation

This interpretation indicates the susceptibility of soils and other resources to incur damage during timber harvest. This includes timber removal, spur roads, slash burning, landings and other activities related to timber harvest operations. Damage is caused to soils by creating soil disturbance which may destroy soil structure, cause compaction and increase erosion. This may affect other resources through loss of timber production, lower water quality and yield, and loss of fisheries. Factors involved in making these ratings are wetness of the soil, soil texture, percentage of coarse fragments, slope and drainage.

Low - This rating indicates that soils and other resources are likely to incur minor damage.

Moderate - This rating indicates that soils and other resources are likely to incur moderate damage.

High - This rating indicates that soils and other resources are likely to incur major damage.

## Type of Damage Expected During and Subsequent to Timber Harvest Operations

This indicates the type of soil or other resource damage expected.

## Recommended Slash Disposal Method

This rating indicates the slash disposal method that is most adapted to conserving and protecting the soil and water values of each soil. When more than one method is listed, the first method is the more preferable. Factors considered in these recommendations include soil properties, elevation, aspect, slope, litter thickness, drainage, and the ability of the site to revegetate. The methods considered in this rating are numbered and defined as follows:

1. No treatment - the slash is left on the ground with no burning.
2. Broadcast burn - standard methods of broadcast burning.
3. Machine pile - the slash is piled with cats or tractors and then burned.
4. Clean logging - culls and tops are pulled or swung to landing, piled and burned.

## Considerations for Management Practices

This column provides some considerations for management practices which best protect the soil and water resource. These considerations, which are directed toward the highest level of multiple use management, provide additional information that may apply to a particular mapping unit.

Considered are such factors as seasonal operation, fertilization, harvest methods, restrictions to road construction and road construction season, slash disposal and yarding.

## RECREATION

Interpretations for recreation pertain primarily to recreation development. They are based on soil and bedrock properties, drainage, landform and vegetation. Factors such as aesthetics and accessibility are not considered when making these ratings. The following interpretations are some most generally needed for planning recreation developments.

### Soil Suitability for Recreation Area Development

This rating is based on soil and bedrock characteristics and topographic features of each unit as related to recreation development. Factors important to this interpretation are soil depth, texture, structure, permeability, drainage, topography, and susceptibility to flooding.

Unsuited - This rating indicates that soils and/or topography are of a nature which would prohibit recreation development without extensive modification.

Low - These soil units have major limitations to recreation development but limited development is feasible.

Moderate - This rating indicates that the soil unit is generally suitable for recreation development but has minor limitations.

High - These soils are particularly well suited for recreation development. Generally, they have no limitations.

### Soil Limitations for Recreation Development

This indicates the major limitations to recreation development.

### Treatment Required to Increase Suitability

This indicates, when applicable, the treatment necessary to increase the suitability for recreation development.

### Soil and Site Damage Susceptibility

This interpretation applies to recreational areas after development. Each soil that is suitable or can be made suitable for campground development is rated for its susceptibility to damage of soil and/or site by normal recreation use. Site includes vegetation as well as soil conditions. Factors used in determining ratings include erosion potential, soil compactibility, and vegetative growth potential.

Low - These soils resist compaction and have low erosion potential. The native vegetation is hardy and not readily destroyed. These soils will withstand and hold up well under continual use.

Moderate - These soils are not readily compacted or eroded and vegetative types are somewhat hardy. In general, these soils and site can sustain continual use but require some rehabilitation.

High - These soils are fragile and easily damaged and have vegetation that is not hardy, easily damaged and generally herbaceous. Under normal use, the vegetation will very likely be destroyed, the soil compacted and/or eroded to such a degree that period nonuse and major rehabilitation will be required.

#### Susceptibility to Dustiness

This interpretation pertains only to the soils suitable, or recreation development, and applies primarily to unsurfaced roads within recreation areas.

Low - Factors indicate dust will not be a problem.

Moderate - Under normal conditions dust will not be a problem but under heavy use and droughty conditions dust very likely will be a problem.

High - Factors indicate dust will be a problem. Dust abatement measures are necessary under normal conditions and use.

#### Susceptibility to Muddiness

This interpretation pertains only to the soils suitable, or those that can be made suitable, for recreation development. This interpretation rates each soil as to its susceptibility to becoming muddy. The rating is limited to the surface soil under normal conditions. Factors include soil characteristics, climate and drainage.

Low - Muddiness is not likely to be a problem. Factors indicate soils are not susceptible to muddiness.

Moderate - Soils become muddy at times for short periods, occasionally causing problems. Road rock is usually necessary.

High - Soils are very likely to become muddy and stay muddy for long periods. Road rock is necessary. Campground closure may be necessary during wet periods.

#### Trail Suitability

This interpretation indicates the suitability of each soil for trails. Factors include soil and bedrock characteristics, drainage, climate and slope.

Poor - These soils have properties which severely limit their use for trails. Extensive treatment measures are required.

Moderate - These soils have some limitations for trail development. Certain treatment measures may be required.

Well - These soils have no limitations for trail development.

#### Limitations for Trails

This indicates the limitations to trails.

#### Considerations for Trail Improvements

This indicates some treatment measures to be considered in improving suitability for trails.

#### Suitability for Sewage Filter Field

This interpretation evaluates the soil as to its suitability as a sewage filter field. Ratings are based on soil depth, texture, permeability, drainage and slope. Only those soils suitable for recreation development are rated. Onsite investigation is recommended before design or installation of filter system.

Poor - These soils have properties which make them poorly suited as sewage filter fields. Sewage filter disposal in these soils would be ineffective and create major problems.

Moderate - These soils have properties which limit their use as sewage filter field. They require a large filter area for adequate drainage which limits the capacity of the campground.

Well - These soils are well suited to sewage filter use and offer only minor limitations, if any.

#### Soil Limitation to Sewage Filter Field Use

This indicates the major limitations to sewage filter field use.

## EROSION AND SOME HYDROLOGIC INTERPRETATIONS

Erosion and some hydrologic interpretations include erosion and water management interpretations. Interpretations for erosion include the two major kinds of erosion -- surface and mass movement. Surface erosion pertains only to surface soil loss by runoff and overland flow. Mass movement pertains to all types of soil and bedrock movement which occurs below the soil surface such as landslips, slumps, slides, rock-fall and land flow.

### Surface Erosion Potential

This rating is based on expected losses of surface soil when all vegetative cover, including litter, is removed. Evaluations of climate, slope gradient and length, soil characteristics, hydrologic characteristics of the soil and bedrock materials of each mapping unit are considered in making ratings.

Very slight - Practically no loss of surface soil materials is expected.

Slight - Little loss of soil materials are expected. Some minor sheet and rill erosion may occur.

Moderate - Some loss of surface soil materials can be expected. Rill erosion and some small gullies or sheet erosion may be occurring. Sheet erosion can be determined by some soil pedestals and observable accumulation of soil materials along the upslope edge of rocks and debris. At this level of erosion there is a possible fertility loss.

Severe - Considerable loss of surface soil materials can be expected. Rill erosion, numerous small gullies or evidence that considerable loss from sheet erosion may occur. Sheet erosion is indicated by frequent occurrence of soil pedestals and considerable accumulation of soil materials along the upslope edge of rocks and debris. This is accompanied by a probable fertility loss.

Very severe - Large loss of surface soil material can be expected in the form of many large gullies and/or numerous small gullies or large loss from sheet erosion. Sheet erosion loss is exhibited by numerous examples of soil pedestals and extensive accumulation of soil materials along the upslope edge of rocks and debris. This is accompanied by a fertility loss.

### Natural Stability

This rating is based on the relative stability of the mapping units as they occur in the natural state. This includes any movement or loss

other than surface erosion, by slumps, slides and all kinds of deep-seated failures. This rating applies throughout Region 6.

- I. Very Stable - No evidence of failure.
- II. Stable - Occasional failures are observed.
- III. Moderately Stable - Several failures are observed.
- IV. Unstable - Many failures are observed.
- V. Very Unstable - Entire area shows evidence of recent and past failures.

#### Nature of Mass Movement

This is an estimation of the kind and/or size of mass movement observed.

#### Expected Mass Movement as a Result of Man's Activities

This rating indicates the expected mass movement resulting from man's activities as compared to stability under natural conditions. Ratings are based on soil and bedrock characteristics, slopes, revegetation potential, and effects of timber removal, road construction and fire.

Unchanged - The expected mass movement is relatively unchanged from that of the natural state.

Increased - The expected mass movement is greater than that of the natural state.

Greatly Increased - The expected mass movement is much greater than that of the natural state.

#### Subsoil Erosion Potential

This interpretation indicates the potential for subsoil erosion by water for each unit. It includes erosion which takes place after the surface soil has been removed (about 1-foot depth) such as in skid trails and firebreaks. Factors considered in making ratings are texture and structure of subsoil materials, slope, permeability, compaction, climate, and landform.

Low - Factors are such that little or no erosion may occur. Very little evidence of erosion.

Moderate - Considerable erosion occurring such as rills and small gullies. Factors indicate considerable erosion is likely to occur.

High - Factors indicate severe erosion may occur.

## Recommendations for Controlling Subsoil Erosion

In this column recommendations are given, when applicable, for controlling subsoil erosion.

### Water Yield Class

This interpretation is an indication of the rate and amount of water yield expected from each soil. It is based on factors such as soil characteristics, infiltration rates, permeability, 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 flow.

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.

### Bedrock Hydrologic Characteristics

This interpretation indicates the relative capacity of bedrock to store and transmit water. The rating is based on bedrock kind, texture, type and extent of fracturing, frequency of jointing, bedding characteristics, and degree of weathering.

Class I - This indicates that the bedrock has a relatively high capacity to store water. The water transmission rate is low unless the storage capacity is exceeded. Rocks in this class include sandstones because of their texture, fracture and bedding characteristics; and basalts where water occurs in large tubes and other cavities or in the interflow zone between successive lava flows.

Class II - This indicates that the bedrock has a moderate capacity to store water. The rate of water transmission is moderate. Rocks in this class are generally hard to moderately hard, moderately fine textured, and moderately to highly fractured siltstone, mudstone, argillite and schist.

Class III - This indicates that the bedrock has a relatively low capacity to store water. The rate of water transmission is

rapid. Rocks generally in this class are fractured coarse crystalline (i.e., granite, gabbro and gneiss) and other hard-fractured rocks such as conglomerate.

Class IV - This indicates that the bedrock has both low storage capacity and low rate of water transmission. Rocks in this class are generally highly weathered, fine textured, and lack open fracture channels.

#### Hydrologic Group

This interpretation is a grouping of soils into four classes, indicating the general infiltration and water movement ability of the soil and bedrock materials. This method of ratings has been developed by the Soil Conservation Service. The four groups are the standard SCS groupings and definitions.

Group A - Soils having high infiltration rates even when thoroughly wetted, consisting chiefly of deep, well to excessively drained sands and/or gravel. These soils have a high rate of water transmission and would result in a low runoff potential.

Group B - Soils having moderate infiltration rates when thoroughly wetted, consisting chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.

Group C - Soils having slow infiltration rates when thoroughly wetted, consisting chiefly of (1) soils with a layer that impedes the downward movement of water or, (2) soils with moderately fine to fine texture and a slow infiltration rate. These soils have a slow rate of water transmission.

Group D - Soils having very slow infiltration rates when thoroughly wetted, consisting chiefly of (1) clay soils with high swelling potential, (2) soils with a high permanent water table, (3) soils with claypan or clay layer at or near the surface, and (4) shallow soils over nearly impervious materials. These soils have a very slow rate of water transmission.

#### Expected Sediment Size

This interpretation indicates the expected sediment size reaching the streams resulting from erosion of each unit. This interpretation is a statement of the two dominate separates expected (gravel, sand, silt or clay) from each soil unit. The ratings are presented in two columns. The first column indicates the separates expected from the surface soils, and the second indicates the separates expected from the subsoils.

### Sedimentation Yield Potential

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 and 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.

### Water Resource Management Requirements

This interpretation indicates the relative level of management necessary to maintain high water standards in relation to quality, quantity and temperature. This interpretation also pertains to fishery values as affected by these water standards, and also to stream 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 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 and fishery values. Measures required may include some or all of the following: intensive water bars on roads and trails, wet weather suspension on cat operation, restricted operation with cat blade, wet weather suspension on road construction, end hauling of surplus waste, and skyline or swing logging systems.

High - This rating indicates that very intensive protective measures are required to maintain high water and fishery values. These include such measures as the following: skyline or other swing system logging, minimum road density, minimal frequency of spur roads, strict requirements of

surplus waste end hauling, suspended road construction during wet weather, intensive water barring and revegetation programs, and a critical analysis of cutting levels. This rating also includes soils of such a critical nature that present management techniques are not adequate.

## APPENDIX II

### SUMMARY OF INTERPRETATIONS

This appendix contains the summaries of management interpretations. Each page shows all the interpretations for one management unit. However, some of the interpretations are very brief due to space limitations. The complete interpretation is presented in the tables in the Map Atlas. This summary sheet was prepared for use primarily in the field and for quick reference.

MAPPING UNIT 1  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements No recommendations		Est. Roadrock Thickness	Th
Surface Eros. Potential	SI			Cons. for Rd. Loc. & Const.:	
Natural Stability	I	Suit. for Sewage F.F.	N/A	Local annual flooding	
Nature of Mass Movement: N/A		Soil Lim. to Sewage F.F.: N/A		Method of Excav.: Blading	
Exp. Mass Mvmt. from Man's Act.	Un	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	L
Subsoil Eros. Pot.	L	Windthrow Hazard	N/A	Cutbnk. Slough. & Rav.	M
Recom. for Controlling Subsoil Erosion:  No recommendations		Susc. to Brush Reveg.	N/A	Est. Cutslope Ratio	M
		Susc. to Alder Reveg.	N/A	Prob. of Cutbnk. Fail.	II
		Potential for Regen.	N/A	Cons. for Cutbnk. Stab. Probs.: N/A	
Water Yield Class	III	Lim. to Regen.: N/A		Waste and Fill Failure	L
Bedrock Hydro. Charac.	N/A			Suit. of Cutbnk. Seeding	P
Hydrologic Group	A	Recom. Tree Species: N/A		Lim. to Cutbnk. Seeding: Coarse textured soils have limitations for support of vegetation	
Expect. Sed. Size	Surface - Sand Gravel Subsoil - Sand Gravel	Susc. to Soil and Other Res. Dam. by Harvest	N/A	Recom. for Cutbnk. Seeding: Seeding not recommended	
Sed. Yield Potential	L	Type of Damage: N/A		Suit. of Fill Seeding	N/A
Water Res. Mgt. Req.	L			Lim. to Fill Seeding: N/A	
<b>RECREATION</b>		Recom. Slash Disposal		Recom. for Fill Seeding: N/A	
Soil Suit. for Rec. Dev.	U	Cons. for Mgt. Pract.: N/A			
Soil Limits to Rec. Dev.: High water table, annual flooding locally		<b>ENGINEERING</b>			
Treat. Req. to Inc. Suit.: No recommendations		Unified Class	Surface - — Subsoil - —		
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	U	<b>LEGEND</b>	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	S	F = Fair	In = Increased
Susceptibility to Mud	N/A	Suit. as Clay Source	U	G = Good	T = Thin
Trail Suitability	M	Suitability of Bedrock for Roadrock	N/A	U = Unsuitable	Th = Thick
Limitations for Trails: Locally Flooded		Limit of Bedrk. for Roadrk.:	N/A	S = Suited	Gr = Greatly
				L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor	V = Very
				W = Well	St = Steep
				SI = Slight	FI = Flat
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 2  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	Th
Surface Eros. Potential	VSe	No recommendations		Cons. for Rd. Loc. & Const.: Very unstable, very high cutbank failure	
Natural Stability	IV-V	Suit. for Sewage F.F.	N/A	Method of Excav.: Blading	
Nature of Mass Movement: Large debris slides		Soil Lim. to Sewage F.F.: N/A		Subsoil Erosion Pot.	
Exp. Mass Mvmt. from Man's Act.	Gr In	TIMBER MANAGEMENT		H	
Subsoil Eros. Pot.	H			Cutbnk. Slough. & Rav.	
Recom. for Controlling Subsoil Erosion: No recommendations		Windthrow Hazard	N/A	Est. Cutslope Ratio	
		Susc. to Brush Reveg.	N/A	Prob. of Cutbnk. Fail.	
		Susc. to Alder Reveg.	N/A	V	
		Potential for Regen.	N/A	Cons. for Cutbnk. Stab. Probs.: No considerations	
Water Yield Class	III	Lim. to Regen.: N/A		Waste and Fill Failure	
Bedrock Hydro. Charac.	N/A			H	
Hydrologic Group	A	Recom. Tree Species: N/A		Suit. of Cutbnk. Seeding	
Expect. Sed. Size	Surface - Sand, Silt Subsoil - Sand, Silt	Susc. to Soil and Other Res. Dam. by Harvest		N/A	
Sed. Yield Potential	M	Type of Damage: N/A		Lim. to Cutbnk. Seeding: High elevations, very coarse textured soils will not support vegetation	
Water Res. Mgt. Req.	M			Recom. for Cutbnk. Seeding: Seeding not recommended	
RECREATION		Recom. Slash Disposal		N/A	
Soil Suit. for Rec. Dev.	U	Cons. for Mgt. Pract.: N/A		Suit. of Fill Seeding	
Soil Limits to Rec. Dev.: Very steep slopes, unstable				Lim. to Fill Seeding: Coarse textures, raveling, high elevations	
Treat. Req. to Inc. Suit.: No recommendations		ENGINEERING		Recom. for Fill Seeding: Seeding not recommended	
		Unified Class	Surface - -- Subsoil - --		
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	U	<p style="text-align: center;"><u>LEGEND</u></p> F = Fair            In = Increases G = Good            T = Thin U = Unsuitied      Th = Thick S = Suited          Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor            V = Very W = Well            St = Steep Sl = Slight Se = Severe Un = Unchanged	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	U		
Susceptibility to Mud	N/A	Suit. as Clay Source	U		
Trail Suitability	P	Suitability of Bedrock for Roadrock	N/A		
Limitations for Trails: Loose soil material, unstable		Limit of Bedrk. for Roadrk. N/A			

MAPPING UNIT 3  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements; Use of puncheons; restrict use of horse and motor scooter		Est. Roadrock Thickness	VTh
Surface Eros. Potential	VS1	Suit. for Sewage F.F.		Cons. for Rd. Loc. & Const.: Water table at or near surface	
Natural Stability	I			N/A	
Nature of Mass Movement:		Soil Lim. to Sewage F.F.: N/A		Method of Excav.: Blading	
Exp. Mass Mvmt. from Man's Act.	Un	<b>TIMBER MANAGEMENT</b>			
Subsoil Eros. Pot.	L				
Recom. for Controlling Subsoil Erosion: No recommendation		Windthrow Hazard	N/A	Subsoil Erosion Pot.	L
		Susc. to Brush Reveg.	N/A	Cutbnk. Slough. & Rav.	L
		Susc. to Alder Reveg.	N/A	Est. Cutslope Ratio	M
		Potential for Regen.	N/A	Prob. of Cutbnk. Fail.	II
Water Yield Class	I	Lim. to Regen.: N/A		Cons. for Cutbnk. Stab. Probs.: N/A	
Bedrock Hydro. Charac.	N/A	Recom. Tree Species: N/A		Waste and Fill Failure	L
Hydrologic Group	D				
Expect. Sed. Size	Surface - Sand, Silt Subsoil - Sand, Silt	Susc. to Soil and Other Res. Dam. by Harvest		Suit. of Cutbnk. Seeding	F
Sed. Yield Potential	M-H	Type of Damage: N/A		Lim. to Cutbnk. Seeding: Excessive water	
Water Res. Mgt. Req.	H	<b>RECREATION</b>			
RECREATION					
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	N/A	Recom. for Cutbnk. Seeding: Use water tolerant grasses	
Soil Limits to Rec. Dev.: Excessive wetness, poorly drained, muddiness		Cons. for Mgt. Pract.: N/A		Suit. of Fill Seeding	N/A
Treat. Req. to Inc. Suit.: Drainage		<b>ENGINEERING</b>			
		Unified Class	Surface - -- Subsoil - --	Lim. to Fill Seeding: N/A	
				Recom. for Fill Seeding: N/A	
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	U	<b>LEGEND</b> F = Fair      In = Increases G = Good      T = Thin U = Unsuitd    Th = Thick S = Suited     Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor       V = Very W = Well       St = Steep S1 = Slight    Fl = Flat Se = Severe Un = Unchanged	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	U		
Susceptibility to Mud	N/A	Suit. as Clay Source	U		
Trail Suitability	P	Suitability of Bedrock for Roadrock	N/A		
Limitations for Trails: Excessive wetness		Limit of Bedrk. for Roadrk.: N/A			

MAPPING UNIT 4  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T- Th
Surface Eros. Potential	SI	No recommendations		Cons. for Rd. Loc. & Const.: Large boulders, local wetness	
Natural Stability	I- II	Suit. for Sewage F.F.	N/A		
Nature of Mass Movement:	N/A	Soil Lim. to Sewage F.F.: N/A		Method of Excav.: Ripping and blasting	
Exp. Mass Mvmt. from Man's Act.	Un	TIMBER MANAGEMENT		Subsoil Erosion Pot.	N/A
Subsoil Eros. Pot.	N/A			Windthrow Hazard	N/A
Recom. for Controlling Subsoil Erosion:	N/A	Susc. to Brush Reveg.	N/A	Est. Cutslope Ratio	St
		Susc. to Alder Reveg.	N/A	Prob. of Cutbnk. Fail.	II
Water Yield Class	III	Potential for Regen.	N/A	Cons. for Cutbnk. Stab. Probs.: N/A	
Bedrock Hydro. Charac.	III	Lim. to Regen.: N/A			
Hydrologic Group	N/A			Waste and Fill Failure	L
Expect. Sed. Size	Surface - Sand, Silt Subsoil - N/A	Recom. Tree Species: N/A		Suit. of Cutbnk. Seeding	N/A
Sed. Yield Potential	L	Susc. to Soil and Other Res. Dam. by Harvest	N/A	Lim. to Cutbnk. Seeding: Material is loose rock	
Water Res. Mgt. Req.	L	Type of Damage: N/A		Recom. for Cutbnk. Seeding: Seeding not recommended	
RECREATION					
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	N/A	Suit. of Fill Seeding	N/A
Soil Limits to Rec. Dev.: Uneven and bouldery		Cons. for Mgt. Pract.: N/A		Lim. to Fill Seeding: N/A	
Treat. Req. to Inc. Suit.: No recommendations		ENGINEERING		Recom. for Fill Seeding: N/A	
		Unified Class	Surface - -- Subsoil - --		
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	U	LEGEND	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	U	F = Fair	In = Increases
Susceptibility to Mud	N/A	Suit. as Clay Source	U	G = Good	T = Thin
Trail Suitability	M	Suitability of Bedrock for Roadrock	N/A	U = Unsuitd	Th = Thick
Limitations for Trails: Rough, bouldery topography		Limit of Bedrk. for Roadrk.: N/A		S = Suited	Gr = Greatly
				L = Low	M = Medium or Moderate
				H = High	P = Poor
				W = Well	V = Very
				SI = Slight	St = Steep
				Se = Severe	Fl = Flat
				Un = Unchanged	

MAPPING UNIT 5  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements No recommendations		Est. Roadrock Thickness	T-Th
Surface Eros. Potential	N/A			Cons. for Rd. Loc. & Const.: Steep, large boulders, frequently unstable	
Natural Stability	II-IV	Suit. for Sewage F.F.	N/A	Method of Excav.: Ripping, blading and some blasting	
Nature of Mass Movement: Rockfall and debris slides		Soil Lim. to Sewage F.F.: N/A		Subsoil Erosion Pot.	
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		N/A	
Subsoil Eros. Pot.	N/A	Windthrow Hazard	N/A	Cutbnk. Slough. & Rav.	
Recom. for Controlling Subsoil Erosion: N/A		Susc. to Brush Reveg.	N/A	Est. Cutslope Ratio	
		Susc. to Alder Reveg.	N/A	Prob. of Cutbnk. Fail.	
		Potential for Regen.	N/A	Cons. for Cutbnk. Stab. Probs.:	
Water Yield Class	III	Lim. to Regen.: N/A		No major considerations	
Bedrock Hydro. Charac.	III			Waste and Fill Failure	
Hydrologic Group	N/A	Recom. Tree Species: N/A		M	
Expect. Sed. Size	Surface - Sand,Silt	Susc. to Soil and Other Res. Dam. by Harvest		Suit. of Cutbnk. Seeding	
	Subsoil - N/A	Type of Damage: N/A		N/A	
Sed. Yield Potential	L	RECREATION		Lim. to Cutbnk. Seeding:	
Water Res. Mgt. Req.	L	Soil Suit. for Rec. Dev. U		Material is loose rock	
		Recom. Slash Disposal		Recom. for Cutbnk. Seeding:	
		Cons. for Mgt. Pract.: N/A		Seeding not recommended	
Treat. Req. to Inc. Suit.: No recommendations		<b>ENGINEERING</b>		Suit. of Fill Seeding	
		Unified Class	Surface - --	N/A	
			Subsoil - --	Lim. to Fill Seeding: N/A	
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source		Recom. for Fill Seeding:	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source		N/A	
Susceptibility to Mud	N/A	Suit. as Clay Source			
Trail Suitability	M	Suitability of Bedrock for Roadrock		<b>LEGEND</b>	
Limitations for Trails: Loose talus slopes		Limit of Bedrk. for Roadrk.: N/A		F = Fair      In = Increases G = Good      T = Thin U = Unsited   Th = Thick S = Suited    Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor      V = Very W = Well      St = Steep Sl = Slight   Fl = Flat Se = Severe Un = Unchanged	

MAPPING UNIT 6  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements Water bar		Est. Roadrock Thickness	Th
Surface Eros. Potential	M-Se			Cons. for Rd. Loc. & Const.: Cutbank failure, raveling	
Natural Stability	II	Suit. for Sewage F.F.	M		
Nature of Mass Movement: Small debris slides		Soil Lim. to Sewage F.F.: Local drainage restrictions		Method of Excav.: Blading, ripping and blasting	
Exp. Mass Mvmt. from Man's Act.	In	TIMBER MANAGEMENT		Subsoil Erosion Pot.	H
Subsoil Eros. Pot.	H			Cutbnk. Slough. & Rav.	H
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration revegetate barren areas, mulch		Windthrow Hazard	L	Est. Cutslope Ratio	St
		Susc. to Brush Reveg.	L-M	Prob. of Cutbnk. Fail.	IV
		Susc. to Alder Reveg.	L	Cons. for Cutbnk. Stab. Probs.:	
Water Yield Class	III	Potential for Regen.	L-M	Plant willow shoots	
Bedrock Hydro. Charac.	II	Lim. to Regen.: Frost heave, low fertility			
Hydrologic Group	A			Waste and Fill Failure	M
Expect. Sed. Size	Surface - Sand, silt	Recom. Tree Species: Douglas-fir, true fir		Suit. of Cutbnk. Seeding	P
	Subsoil - Sand, Pumice			Lim. to Cutbnk. Seeding: High pumice content limits vegetative growth; high rate of raveling and snow slough	
Sed. Yield Potential	M	Susc. to Soil and Other Res. Dam. by Harvest	M	Recom. for Cutbnk. Seeding: Seeding not recommended	
Water Res. Mgt. Req.	M	Type of Damage: Increased erosion, cat turning and blade action tears soil		Suit. of Fill Seeding	
RECREATION				Lim. to Fill Seeding: High pumice content limits vegetative growth; high rate of raveling and snow slough	
Soil Suit. for Rec. Dev.	M	Recom. Slash Disposal	I	Recom. for Fill Seeding: Use terraces; seed, fertilizer and mulch	
Soil Limits to Rec. Dev.: Soil and vegetation easily damaged		Cons. for Mgt. Pract.: Use of rubber tire tractors, remove cat blade when not needed		LEGEND	
Treat. Req. to Inc. Suit.: Rotate use		ENGINEERING		F = Fair      In = Increased	
		Unified Class	Surface - -- Subsoil - --	G = Good      T = Thin	
Soil and Site Dam. Susc.	H	Suit. as Topsoil Source	U	U = Unsited      Th = Thick	
Susceptibility to Dust	M	Suitability as Sand, Gravel Source	U	S = Sited      Gr = Greatly	
Susceptibility to Mud	M	Suit. as Clay Source	U	L = Low	
Trail Suitability	W	Suitability of Bedrock for Roadrock	N/A	M = Medium or Moderate	
Limitations for Trails: Soils erode easily		Limit of Bedrk. for Roadrk.		H = High	
		N/A		P = Poor      V = Very	
				W = Well      St = Steep	
				Sl = Slight      Fl = Flat	
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 7  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	Th
Surface Eros. Potential	VSe	Water bar		Cons. for Rd. Loc. & Const.: Steep, cutbank failure, raveling	
Natural Stability	II-III	Suit. for Sewage F.F.	N/A		
Nature of Mass Movement: Small debris slides		Soil Lim. to Sewage F.F.: N/A		Method of Excav.: Blading, ripping and blasting	
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	H
Subsoil Eros. Pot.	H	Windthrow Hazard	L-M	Cutbnk. Slough. & Rav.	H
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration revegetate barren areas, mulch		Susc. to Brush Reveg.	L-M	Est. Cutslope Ratio	M
		Susc. to Alder Reveg.	L	Prob. of Cutbnk. Fail.	III-IV
		Potential for Regen.	L-M	Cons. for Cutbnk. Stab. Probs.:	
Water Yield Class	III	Lim. to Regen.: Frost heave, low fertility		No major considerations	
Bedrock Hydro. Charac.	II	Recom. Tree Species: Douglas-fir, true fir		Waste and Fill Failure	H
Hydrologic Group	A			Suit. of Cutbnk. Seeding	p
Expect. Sed. Size	Surface-Sand, silt Subsoil-Sand Pumice	Susc. to Soil and Other Res. Dam. by Harvest	M-H	Lim. to Cutbnk. Seeding: High pumice content limits vegetative growth; high rate of raveling and snow slough	
Sed. Yield Potential	M	Type of Damage: Increased erosion, road waste damage to resources		Recom. for Cutbnk. Seeding: Seeding not recommended	
Water Res. Mgt. Req.	M	RECREATION		Suit. of Fill Seeding	P
Soil Suit. for Rec. Dev.	U			Recom. Slash Disposal	I
Soil Limits to Rec. Dev.: Steep slopes		Cons. for Mgt. Pract.: Use skyline or other swing logging system on slope over 60%, minimize spur roads		Recom. for Fill Seeding: Use terraces; seed, fertilize, and mulch	
Treat. Req. to Inc. Suit.: No recommendations		<b>ENGINEERING</b>		<p style="text-align: center;"><u>LEGEND</u></p> F = Fair                      In = Increased G = Good                     T = Thin U = Unsited                 Th = Thick S = Sited                    Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor                     V = Very W = Well                    St = Steep Sl = Slight                 Fl = Flat Se = Severe Un = Unchanged	
		Unified Class	Surface - -- Subsoil - --		
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	U		
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	U		
Susceptibility to Mud	N/A	Suit. as Clay Source	U		
Trail Suitability	M	Suitability of Bedrock for Roadrock	N/A		
Limitations for Trails: Steep slopes, soils erode easily		Limit of Bedrk. for Roadrk.: N/A			

MAPPING UNIT 8  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	N/A
Surface Eros. Potential	N/A	N/A		Cons. for Rd. Loc. & Const.:	
Natural Stability	N/A	Suit. for Sewage F.F.	N/A	N/A	
Nature of Mass Movement:	N/A	Soil Lim. to Sewage F.F.:		Method of Excav.:	
Exp. Mass Mvmt. from Man's Act.	N/A	N/A		N/A	
Subsoil Eros. Pot.	N/A	TIMBER MANAGEMENT			
Recom. for Controlling Subsoil Erosion:	N/A	Windthrow Hazard	N/A	Subsoil Erosion Pot.	N/A
		Susc. to Brush Reveg.	N/A	Cutbnk. Slough. & Rav.	N/A
		Susc. to Alder Reveg.	N/A	Est. Cutslope Ratio	N/A
Water Yield Class	I	Potential for Regen.	N/A	Prob. of Cutbnk. Fail.	N/A
Bedrock Hydro. Charac.	N/A	Lim. to Regen.:	N/A	Cons. for Cutbnk. Stab. Probs.:	
Hydrologic Group	N/A	N/A			
Expect. Sed. Size	Surface - N/A Subsoil - Sand, Silt	Recom. Tree Species:	N/A	Waste and Fill Failure	N/A
Sed. Yield Potential	N/A	Susc. to Soil and Other Res. Dam. by Harvest	N/A	Suit. of Cutbnk. Seeding	N/A
Water Res. Mgt. Req.	N/A	Type of Damage:	N/A	Lim. to Cutbnk. Seeding:	
RECREATION		N/A			
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	N/A	Recom. for Cutbnk. Seeding:	
Soil Limits to Rec. Dev.:	This unit is ice and snow	Cons. for Mgt. Pract.:	N/A	N/A	
Treat. Req. to Inc. Suit.:	No recommendations	ENGINEERING			
		Unified Class	Surface - -- Subsoil - --	Recom. for Fill Seeding:	
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	N/A	N/A	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	N/A	<p style="text-align: center;"><u>LEGEND</u></p> F = Fair                      In = Increased G = Good                      T = Thin U = Unsuitable              Th = Thick S = Suited                    Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor                      V = Very W = Well                      St = Steep Sl = Slight                    Fl = Flat Se = Severe Un = Unchanged	
Susceptibility to Mud	N/A	Suit. as Clay Source	N/A		
Trail Suitability	N/A	Suitability of Bedrock for Roadrock	N/A		
Limitations for Trails:	N/A	Limit of Bedrk. for Roadrk.	N/A		

MAPPING UNIT 9  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements Water bar, restrict use by horses and motor scooters		Est. Roadrock Thickness	N/A
Surface Eros. Potential	VSe			Cons. for Rd. Loc. & Const.:	
Natural Stability	IV-V	Suit. for Sewage F.F.		N/A	
Nature of Mass Movement: Debris slides and slumps		Soil Lim. to Sewage F.F.:		Method of Excav.:	
		N/A		Blading	
Exp. Mass Mvmt. from Man's Act.	Gr In	<b>TIMBER MANAGEMENT</b>			
Subsoil Eros. Pot.	H	Windthrow Hazard	N/A	Subsoil Erosion Pot.	H
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration revegetate barren areas, mulch		Susc. to Brush Reveg.	N/A	Cutbnk. Slough. & Rav.	H
		Susc. to Alder Reveg.	N/A	Est. Cutslope Ratio	M-St
Water Yield Class	II	Potential for Regen.	N/A	Prob. of Cutbnk. Fail.	IV-V
Bedrock Hydro. Charac.	N/A	Lim. to Regen.:	N/A	Cons. for Cutbnk. Stab. Probs.:	
Hydrologic Group	B			Benching, internal drainage, plant willow shoots	
Expect. Sed. Size	Surface - Sand, silt Subsoil - Sand, silt	Recom. Tree Species:		Waste and Fill Failure	H
		N/A		Suit. of Cutbnk. Seeding	P
Sed. Yield Potential	L-H	Susc. to Soil and Other Res. Dam. by Harvest	N/A	Lim. to Cutbnk. Seeding:	
Water Res. Mgt. Req.	H	Type of Damage:	N/A	High failure and raveling rate, coarse textures locally	
<b>RECREATION</b>				Recom. for Cutbnk. Seeding:	
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	N/A	Seeding not recommended	
Soil Limits to Rec. Dev.: Very steep and unstable slopes		Cons. for Mgt. Pract.:		Suit. of Fill Seeding	P
		N/A		Lim. to Fill Seeding:	
Treat. Req. to Inc. Suit.:		<b>ENGINEERING</b>			
No recommendations		Unified Class	Surface - -- Subsoil - --	Recom. for Fill Seeding:	
				Terrace; seed, fertilize and mulch	
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	U	<b>LEGEND</b>	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	U	F = Fair	In = Increases
Susceptibility to Mud	N/A	Suit. as Clay Source	U	G = Good	T = Thin
Trail Suitability	P	Suitability of Bedrock for Roadrock	N/A	U = Unsuitable	Th = Thick
Limitations for Trails: Very steep and unstable slopes		Limit of Bedrk. for Roadrk.:	N/A	S = Suited	Gr = Greatly
				L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor	V = Very
				W = Well	St = Steep
				Sl = Slight	Fl = Flat
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 10  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential	SI	No recommendations		Cons. for Rd. Loc. & Const.: There is danger of flooding; local wet areas require extra culverts	
Natural Stability	I	Suit. for Sewage F.F.	P	Method of Excav.: Blading	
Nature of Mass Movement:	N/A	Soil Lim. to Sewage F.F.: High water table; close proximity to streams		Subsoil Erosion Pot.	
Exp. Mass Mvmt. from Man's Act.	Un	TIMBER MANAGEMENT		L	
Subsoil Eros. Pot.	L			Cutbnk. Slough. & Rav.	
Recom. for Controlling Sub- soil Erosion: Water bar, prevent water concentration revegetate barren areas, mulch		Windthrow Hazard	L	Est. Cutslope Ratio	
		Susc. to Brush Reveg.	M	Prob. of Cutbnk. Fail.	
		Susc. to Alder Reveg.	M-H	Cons. for Cutbnk. Stab. Probs.:	
Water Yield Class	III	Potential for Regen.	M	N/A	
Bedrock Hydro. Charac.	N/A	Lim. to Regen.: Coarse textured soils limit fertility		Waste and Fill Failure	
Hydrologic Group	A			L	
Expect. Sed. Size	Surface-Sand, silt	Recom. Tree Species: Douglas-fir, cedar		Suit. of Cutbnk. Seeding	
	Subsoil-Sand, gr			p	
Sed. Yield Potential	L	Susc. to Soil and Other Res. Dam. by Harvest	L	Lim. to Cutbnk. Seeding: Coarse textured subsoils	
Water Res. Mgt. Req.	L	Type of Damage: Cat turning and blade action tears soil and increases erosion		Recom. for Cutbnk. Seeding: Seeding not recommended	
RECREATION					
Soil Suit. for Rec. Dev.	M	Recom. Slash Disposal	$\frac{3}{2}$	Suit. of Fill Seeding	
Soil Limits to Rec. Dev.: Local high water table, local annual flooding		Cons. for Mgt. Fract.: Remove blade from cat when not needed		Lim. to Fill Seeding: Coarse textures limit fertility	
Treat. Req. to Inc. Suit.: Drainage, dykes might be used locally for flood protection		ENGINEERING		Recom. for Fill Seeding: Seed grass, fertilize and mulch	
Soil and Site Dam. Susc.	L	Unified Class	Surface - GM-d Subsoil - GW		
		Suit. as Topsoil Source	U	<b>LEGEND</b> F = Fair      In = Increased G = Good      T = Thin U = Unsited    Th = Thick S = Sited      Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor      V = Very W = Well      St = Steep SI = Slight    Fl = Flat Se = Severe Un = Unchanged	
Susceptibility to Dust	L	Suitability as Sand, Gravel Source	S		
Susceptibility to Mud	L	Suit. as Clay Source	U		
Trail Suitability	W	Suitability of Bedrock for Roadrock	N/A		
Limitations for Trails: Local flooding		Limit of Bedrk. for Roadrk.	N/A		

MAPPING UNIT 11  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	VT
Surface Eros. Potential	M	N/A		Cons. for Rd. Loc. & Const.:	
Natural Stability	I	Suit. for Sewage F.F.	W	No major considerations	
Nature of Mass Movement: N/A		Soil Lim. to Sewage F.F.: Maintain minimum of 300 ft. from stream		Method of Excav.: Blading	
Exp. Mass Mvmt. from Man's Act.	Un	TIMBER MANAGEMENT		Subsoil Erosion Pot.	L
Subsoil Eros. Pot.	M			Cutbnk. Slough. & Rav.	M
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration revegetate barren areas, mulch		Windthrow Hazard	L	Est. Cutslope Ratio	M-St
		Susc. to Brush Reveg.	L	Prob. of Cutbnk. Fail.	II
		Susc. to Alder Reveg.	M-H	Cons. for Cutbnk. Stab. Probs.:	
Water Yield Class	II	Potential for Regen.	M	No special considerations	
Bedrock Hydro. Charac.	N/A	Lim. to Regen.: Coarse textures limit fertility, droughty soil		Waste and Fill Failure	L
Hydrologic Group	A			Suit. of Cutbnk. Seeding	P
Expect. Sed. Size	Surface - Sand, silt Subsoil - Sand, gr	Recom. Tree Species: Douglas-fir		Lim. to Cutbnk. Seeding: Coarse textures, low fertility	
Sed. Yield Potential	L	Susc. to Soil and Other Res. Dam. by Harvest	L	Recom. for Cutbnk. Seeding: Seeding not recommended	
Water Res. Mgt. Req.	L	Type of Damage: None		Suit. of Fill Seeding	F
RECREATION				Lim. to Fill Seeding: Coarse textures limit soil moisture and fertility	
Soil Suit. for Rec. Dev.	H	Recom. Slash Disposal	3	Recom. for Fill Seeding: Seed, fertilize and mulch (use drought tolerant species)	
Soil Limits to Rec. Dev.: No major limitations		Cons. for Mgt. Pract.:		LEGEND	
Treat. Req. to Inc. Suit.:		ENGINEERING		F = Fair      In = Increased	
No recommendations		Unified Class	Surface - GM-d Subsoil - GW	G = Good      T = Thin	
Soil and Site Dam. Susc.	M	Suit. as Topsoil Source	U	U = Unsuitd    Th = Thick	
Susceptibility to Dust	M	Suitability as Sand, Gravel Source	S	S = Suited     Gr = Greatly	
Susceptibility to Mud	L	Suit. as Clay Source	U	L = Low	
Trail Suitability	W	Suitability of Bedrock for Roadrock	N/A	M = Medium or Moderate	
Limitations for Trails: None		Limit of Bedrk. for Roadrk.:		H = High	
		N/A		P = Poor      V = Very	
				W = Well      St = Steep	
				Sl = Slight    Fl = Flat	
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 12  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements N/A		Est. Roadrock Thickness	T	
Surface Eros. Potential	M			Cons. for Rd. Loc. & Const.: Local wet areas require extra culverts and thicker base course		
Natural Stability	I-II	Suit. for Sewage F.F.	M-H	Method of Excav.: Blading		
Nature of Mass Movement: Small debris slides		Soil Lim. to Sewage F.F.: Local inability to properly disperse the effluent due to compaction and wetness				
Exp. Mass Mvmt. from Man's Act.	Un	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	L-M	
Subsoil Eros. Pot.	M			Windthrow Hazard	L-M	Cutbnk. Slough. & Rav.
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	M-H	Est. Cutslope Ratio		M
		Susc. to Alder Reveg.	M-H	Prob. of Cutbnk. Fail.		II
Water Yield Class	II	Potential for Regen.	H	Cons. for Cutbnk. Stab. Probs.:		No special considerations
Bedrock Hydro. Charac.	N/A	Lim. to Regen.: N/A				
Hydrologic Group	B			Waste and Fill Failure	L	
Expect. Sed. Size	Surface-Sand, silt Subsoil-Sand, silt	Recom. Tree Species: Douglas-fir		Suit. of Cutbnk. Seeding	F	
Sed. Yield Potential	L	Susc. to Soil and Other Res. Dam. by Harvest	L-M	Lim. to Cutbnk. Seeding: Coarse textured subsoil, limited fertility		
Water Res. Mgt. Req.	L	Type of Damage: Cat turning and blade action tears soil and increases erosion		Recom. for Cutbnk. Seeding: Seed, fertilize and mulch		
<b>RECREATION</b>						
Soil Suit. for Rec. Dev.	M-H	Recom. Slash Disposal	3/2	Suit. of Fill Seeding		F
Soil Limits to Rec. Dev.: Restricted drainage locally		Cons. for Mgt. Pract.: Use of rubber tire tractor, remove blade from cat		Lim. to Fill Seeding: Coarse textures limit soil moisture and fertility		
Treat. Req. to Inc. Suit.: Drainage of local wet areas		<b>ENGINEERING</b>		Recom. for Fill Seeding: Seed, fertilize and mulch		
		Unified Class	Surface - SM-d to GM-d Subsoil - GM-d to GW			
Soil and Site Dam. Susc.	L	Suit. as Topsoil Source	U	<b>LEGEND</b> F = Fair      In = Increased G = Good      T = Thin U = Unsuitd    Th = Thick S = Suited     Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor       V = Very W = Well       St = Steep Sl = Slight     Fl = Flat Se = Severe Un = Unchanged		
Susceptibility to Dust	L	Suitability as Sand, Gravel Source	S			
Susceptibility to Mud	M	Suit. as Clay Source	U			
Trail Suitability	W	Suitability of Bedrock for Roadrock	N/A			
Limitations for Trails: None		Limit of Bedrk. for Roadrk.: N/A				

MAPPING UNIT 13  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential	Se	Water bar		Cons. for Rd. Loc. & Const.:	
Natural Stability	II	Suit. for Sewage F.F.	N/A	Damage to resources from sidecast waste	
Nature of Mass Movement: Debris slides		Soil Lim. to Sewage F.F.: N/A		Method of Excav.: Blading	
Exp. Mass Mvmt. from Man's Act.	Un	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	M-H
Subsoil Eros. Pot.	M-H			Windthrow Hazard	L-M
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	M-H	Est. Cutslope Ratio	M
		Susc. to Alder Reveg.	M-H	Prob. of Cutbnk. Fail.	II & III
Water Yield Class	II	Potential for Regen.	H	Cons. for Cutbnk. Stab. Probs.: Bench high cutbanks, plant willow shoots	
Bedrock Hydro. Charac.	N/A	Lim. to Regen.: N/A		Waste and Fill Failure	M-H
Hydrologic Group	B	Recom. Tree Species: Douglas-fir		Suit. of Cutbnk. Seeding	F
Expect. Sed. Size	Surface-Sand, silt Subsoil-Sand, silt			Susc. to Soil and Other Res. Dam. by Harvest	M
Water Res. Mgt. Req.	L-M	Type of Damage: Structure loss, compaction; increased erosion, road waste damage to resources		Recom. for Cutbnk. Seeding: Seed, fertilize and mulch	
<b>RECREATION</b>		Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	4
Soil Limits to Rec. Dev.: Steep slopes		Cons. for Mgt. Pract.: End haul road waste on slopes over 60 % and across all drainages		Suit. of Fill Seeding	F
Treat. Req. to Inc. Suit.: No recommendations		<b>ENGINEERING</b>		Lim. to Fill Seeding: Coarse textured soils limit fertility and soil moisture	
		Unified Class	Surface - <sup>SM-d</sup> to <sup>GM-d</sup> Subsoil - <sup>GM-d</sup> to <sup>GW</sup>	Recom. for Fill Seeding: Seed, fertilize and mulch; use terraces on steep areas; protect from sidecast	
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	U	<b>LEGEND</b>	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	S	F = Fair	In = Increases
Susceptibility to Mud	N/A	Suit. as Clay Source	U	G = Good	T = Thin
Trail Suitability	M	Suitability of Bedrock for Roadrock	N/A	U = Unsuitd	Th = Thick
Limitations for Trails: Steep slopes		Limit of Bedrk. for Roadrk.: N/A		S = Suited	Gr = Greatly
				L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor	V = Very
				W = Well	St = Steep
				Sl = Slight	Fl = Flat
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 17  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential	M	No recommendations		Cons. for Rd. Loc. & Const.: Cutbank raveling and sloughing	
Natural Stability	II	Suit. for Sewage F.F.	M-H	Method of Excav.: Blading	
Nature of Mass Movement: Debris slides		Soil Lim. to Sewage F.F.: Local wetness; coarse sands may allow effluent to reach nearby streams		Subsoil Erosion Pot.	
Exp. Mass Mvmt. from Man's Act.	In	TIMBER MANAGEMENT		Cutbnk. Slough. & Rav.	
Subsoil Eros. Pot.	H			H	
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration revegetate barren areas, mulch		Windthrow Hazard	M	Est. Cutslope Ratio	
		Susc. to Brush Reveg.	H	Prob. of Cutbnk. Fail.	
		Susc. to Alder Reveg.	M-H	III	
Water Yield Class	III	Potential for Regen.	H	Cons. for Cutbnk. Stab. Probs.: Bench high cutbanks, plant willow shoots, prepare wide ditch to serve as a catch area	
Bedrock Hydro. Charac.	N/A	Lim. to Regen.:	N/A	Waste and Fill Failure	
Hydrologic Group	A			M	
Expect. Sed. Size	Surface-Sand, silt	Recom. Tree Species: Douglas-fir		Suit. of Cutbnk. Seeding	
	Subsoil-Sand, gr			P	
Sed. Yield Potential	L	Susc. to Soil and Other Res. Dam. by Harvest	M	Lim. to Cutbnk. Seeding: Very coarse textured, very low fertility, snow slough and raveling	
Water Res. Mgt. Req.	L	Type of Damage: Soil damage from cat blade and log skidding		Recom. for Cutbnk. Seeding: Seeding not recommended until cutbank is stabilized with willow shoots	
RECREATION				Suit. of Fill Seeding	
Soil Suit. for Rec. Dev.	M	Recom. Slash Disposal	$\frac{3}{2}$	Lim. to Fill Seeding: Very coarse textured, snow slough and raveling	
Soil Limits to Rec. Dev.: Local wetness		Cons. for Mgt. Pract.: Rubber tire tractor preferred, remove blade from cat when not needed		Recom. for Fill Seeding: Seed, fertilize and mulch; protect from maintenance waste	
Treat. Req. to Inc. Suit.: Drainage of wet areas		ENGINEERING			
		Unified Class	Surface - CM-d Subsoil - SP		
Soil and Site Dam. Susc.	M-H	Suit. as Topsoil Source	U	LEGEND F = Fair      In = Increased G = Good      T = Thin U = Unsited   Th = Thick S = Sited      Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor      V = Very W = Well      St = Steep Sl = Slight   Fl = Flat Se = Severe Un = Unchanged	
Susceptibility to Dust	L	Suitability as Sand, Gravel Source	S		
Susceptibility to Mud	L	Suit. as Clay Source	U		
Trail Suitability	W	Suitability of Bedrock for Roadrock	N/A		
Limitations for Trails: N/A		Limit of Bedrk. for Roadrk. N/A			

MAPPING UNIT 18  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T-Th			
Surface Eros. Potential		Se	Water bar		Cons. for Rd. Loc. & Const.: Steep slopes, poor alignment, high rate of cutbank raveling and sloughing			
Natural Stability		III-IV	Suit. for Sewage F.F.	N/A				
Nature of Mass Movement: Debris slides		Soil Lim. to Sewage F.F.: N/A		Method of Excav.: Blading				
Exp. Mass Mvmt. from Man's Act.		Gr In	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	H		
Subsoil Eros. Pot.		H			Cutbnk. Slough. & Rav.	H		
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, Mulch		Windthrow Hazard		M	Est. Cutslope Ratio	M		
Water Yield Class		III	Susc. to Brush Reveg.		M-H	Prob. of Cutbnk. Fail.	III & IV	
Bedrock Hydro. Charac.		N/A	Susc. to Alder Reveg.		M-H	Cons. for Cutbnk. Stab. Probs.: Bench high cutbanks, stabilize with willow shoots, prepare wide ditch to serve as a catch area		
Hydrologic Group		A	Potential for Regen.		H	Waste and Fill Failure		H
Expect. Sed. Size	Surface-Sand, silt		Recom. Tree Species: Douglas-fir		Suit. of Cutbnk. Seeding		P	
Sed. Yield Potential		L	Susc. to Soil and Other Res. Dam. by Harvest		H	Lim. to Cutbnk. Seeding: Very coarse textures and very low fertility, extensive sloughing		
Water Res. Mgt. Req.		M-H	Type of Damage: Soil damage from skidding, road construction damage		Recom. for Cutbnk. Seeding: Seeding not recommended until cutbank is stabilized with willow shoots			
<b>RECREATION</b>			Recom. Slash Disposal		4	Suit. of Fill Seeding		F-P
Soil Limits to Rec. Dev.: Steep slopes		Cons. for Mgt. Pract.: Skyline log slope of greater than 50%, minimize spur roads, end haul surplus waste		Lim. to Fill Seeding: Very coarse textures, snow slough and raveling		Recom. for Fill Seeding: Terrace; seed, fertilize and mulch		
Treat. Req. to Inc. Suit.: No recommendations		<b>ENGINEERING</b>		Unified Class		Surface - GM-d		
Soil and Site Dam. Susc.		N/A	Subsoil - SP		LEGEND			
Susceptibility to Dust		N/A	Suit. as Topsoil Source		U	F = Fair	In = Increases	
Susceptibility to Mud		N/A	Suitability as Sand, Gravel Source		S	G = Good	T = Thin	
Trail Suitability		M	Suit. as Clay Source		U	U = Unsuitied	Th = Thick	
Limitations for Trails: Steep slopes		Limit of Bedrck. for Roadrk.: N/A		Suitability of Bedrock for Roadrock		S = Suited	Gr = Greatly	
						L = Low	M = Medium or Moderate	
						H = High	P = Poor	
						W = Well	V = Very	
						St = Steep	Fl = Flat	
						Se = Severe	Un = Unchanged	

MAPPING UNIT 19  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	Th	
Surface Eros. Potential	Se	Use puncheons through wet area		Cons. for Rd. Loc. & Const.: Slumpy, unstable areas; road maintenance problems		
Natural Stability	III-IV	Suit. for Sewage F.F.	N/A	Method of Excav.: Blading and ripping		
Nature of Mass Movement: Small debris slides and slumps		Soil Lim. to Sewage F.F.: N/A		Subsoil Erosion Pot.		
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		Cutbnk. Slough. & Rav.		
Subsoil Eros. Pot.	M	Windthrow Hazard	L	Est. Cutslope Ratio		
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration revegetate barren areas, mulch		Susc. to Brush Reveg.	M	Prob. of Cutbnk. Fail.		
Water Yield Class	II	Susc. to Alder Reveg.	M-H	Cons. for Cutbnk. Stab. Probs.:		
Bedrock Hydro. Charac.	II	Potential for Regen.	M	No major considerations		
Hydrologic Group	B	Lim. to Regen.: Climatic limitations, coarse textured soils limit fertility		Waste and Fill Failure		
Expect. Sed. Size	Surface-Sand, silt Subsoil-Sand, silt	Recom. Tree Species: Douglas-fir		Suit. of Cutbnk. Seeding		
Sed. Yield Potential	M	Susc. to Soil and Other Res. Dam. by Harvest	M-H	Lim. to Cutbnk. Seeding: Coarse textures, low fertility, snow slough and raveling		
Water Res. Mgt. Req.	M	Type of Damage: Soil damage from skidding, increased failure rate from spur road construction		Recom. for Cutbnk. Seeding: Prepare rough cutbank to provide a catch area for seed; fertilize and mulch		
<b>RECREATION</b>		Recom. Slash Disposal	1/4	Suit. of Fill Seeding		
Soil Suit. for Rec. Dev.	U	Cons. for Mgt. Pract.: No cat logging, minimize spur roads, end haul surplus waste		Lim. to Fill Seeding: Coarse textures, low fertility, raveling		
Soil Limits to Rec. Dev.: Steep slopes		<b>ENGINEERING</b>		Recom. for Fill Seeding: Seed, fertilize and mulch; protect from road maintenance waste		
Treat. Req. to Inc. Suit.:		Unified Class	Surface - SM-u Subsoil - SM-u to GM-d	<b>LEGEND</b> F = Fair      In = Increased G = Good      T = Thin U = Unsited    Th = Thick S = Sited      Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor      V = Very W = Well      St = Steep Sl = Slight    Fl = Flat Se = Severe Un = Unchanged		
No recommendations		Suit. as Topsoil Source				U
Soil and Site Dam. Susc.	N/A	Suitability as Sand, Gravel Source				U
Susceptibility to Dust	N/A	Suit. as Clay Source				U
Susceptibility to Mud	M	Suitability of Bedrock for Roadrock				P
Trail Suitability	M	Limit of Bedrk. for Roadrk. Rapidly breaks down under traffic				

MAPPING UNIT 20  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements Use puncheons across wet areas		Est. Roadrock Thickness	T	
Surface Eros. Potential	M			Cons. for Rd. Loc. & Const.: Very large boulders on soil surface		
Natural Stability	I-II	Suit. for Sewage F.F.	P	Method of Excav.: Blading and ripping		
Nature of Mass Movement: Small debris slides		Soil Lim. to Sewage F.F.: Restricted drainage				
Exp. Mass Mvmt. from Man's Act.	Un	TIMBER MANAGEMENT		Subsoil Erosion Pot.	L-M	
Subsoil Eros. Pot.	M-H	Windthrow Hazard	M	Cutbnk. Slough. & Rav.	L-M	
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	L-M	Est. Cutslope Ratio	ST-M	
		Susc. to Alder Reveg.	L	Prob. of Cutbnk. Fail.	II	
Water Yield Class	III	Potential for Regen.	L-M	Cons. for Cutbnk. Stab. Probs.: No major considerations		
Bedrock Hydro. Charac.	III	Lim. to Regen.: Inherent low fertility from gneiss and granitic parent rock, frost heave		Waste and Fill Failure	L	
Hydrologic Group	C			Suit. of Cutbnk. Seeding	P	
Expect. Sed. Size	Surface-Sand, silt		Recom. Tree Species: Douglas-fir, tru fir		Lim. to Cutbnk. Seeding: Coarse textures, elevation limitations; compaction limits root penetration	
	Subsoil-Sand, silt				Recom. for Cutbnk. Seeding: Prepare rough cutbank to provide catch area for grass; seed, fertilize and mulch	
Sed. Yield Potential	L	Susc. to Soil and Other Res. Dam. by Harvest	L	Suit. of Fill Seeding		P
Water Res. Mgt. Req.	L	Type of Damage: N/A		Lim. to Fill Seeding: Coarse textures, elevation limitations, snow slough		
RECREATION				Recom. for Fill Seeding: Seed, fertilize and mulch; protect from road maintenance waste		
Soil Suit. for Rec. Dev.	L	Recom. Slash Disposal	1/4			
Soil Limits to Rec. Dev.: Very bouldery surface, drainage restrictions		Cons. for Mgt. Pract.: No special considerations				
Treat. Req. to Inc. Suit.: Remove boulders, drain wet areas		ENGINEERING				
		Unified Class	Surface - GM-d			
			Subsoil - SW to GM-d			
Soil and Site Dam. Susc.	M	Suit. as Topsoil Source	U	LEGEND		
Susceptibility to Dust	L	Suitability as Sand, Gravel Source	S	F = Fair	In = Increased	
Susceptibility to Mud	L	Suit. as Clay Source	U	G = Good	T = Thin	
Trail Suitability	M	Suitability of Bedrock for Roadrock	N/A	U = Unsuitd	Th = Thick	
Limitations for Trails: Frequent large boulders, wet spots		Limit of Bedrk. for Roadrk.  N/A		S = Suited	Gr = Greatly	
				L = Low		
				M = Medium or Moderate		
				H = High		
				P = Poor	V = Very	
				W = Well	St = Steep	
				Sl = Slight	Fl = Flat	
				Se = Severe		
				Un = Unchanged		

MAPPING UNIT 21  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements N/A		Est. Roadrock Thickness	T- Th
Surface Eros. Potential	Se			Cons. for Rd. Loc. & Const.: Steep slope, many very large boulders on surface, cutbank failures	
Natural Stability	II- III	Suit. for Sewage F.F.	N/A	Method of Excav.: Blading and ripping	
Nature of Mass Movement: Small debris slides		Soil Lim. to Sewage F.F.: N/A			
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	M-H
Subsoil Eros. Pot.	H	Windthrow Hazard	M-H	Cutbnk. Slough. & Rav.	M
Recom. for Controlling Sub- soil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	L-M	Est. Cutslope Ratio	ST-M
		Susc. to Alder Reveg.	L	Prob. of Cutbnk. Fail.	II & III
Water Yield Class	III	Potential for Regen.	L-M	Cons. for Cutbnk. Stab. Probs.: Cutbank drainage in wet areas; plant willow shoots	
Bedrock Hydro. Charac.	III	Lim. to Regen.: Innerent low fertility from gneiss and granitic parent rock, frost heave			
Hydrologic Group	C			Waste and Fill Failure	M-H
Expect. Sed. Size	Surface-Sand, silt Subsoil-Sand, silt	Recom. Tree Species: Douglas-fir, true fir		Suit. of Cutbnk. Seeding	P
Sed. Yield Potential	L	Susc. to Soil and Other Res. Dam. by Harvest	M	Lim. to Cutbnk. Seeding: Coarse textures, elevation limitations, low fertility	
Water Res. Mgt. Req.	L-M	Type of Damage: Increased erosion, road waste damage to resources		Recom. for Cutbnk. Seeding: Prepare rough cutbank to provide catch area for grass; seed, fertilize and mulch.	
<b>RECREATION</b>				Suit. of Fill Seeding	P
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	1/4	Lim. to Fill Seeding: Coarse textures, elevation limitations, low fertility	
Soil Limits to Rec. Dev.: Steep slopes		Cons. for Mgt. Pract.: End haul road waste on all slopes over 60% and across all drainages		Recom. for Fill Seeding: Seed, fertilize and mulch; protect from road mainte- nance waste	
Treat. Req. to Inc. Suit.:		<b>ENGINEERING</b>			
No recommendations		Unified Class	Surface- GM-d Subsoil- SW to GM-d		
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	U	<b>LEGEND</b>	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	S	F = Fair	In = Increased
Susceptibility to Mud	N/A	Suit. as Clay Source	U	G = Good	T = Thin
Trail Suitability	M	Suitability of Bedrock for Roadrock	N/A	U = Unsuitd	Th = Thick
Limitations for Trails: Steep slopes, many very large boulders on soil surface		Limit of Bedrk. for Roadrk.:	N/A	S = Suited	Gr = Greatly
				L = Low	M = Medium or Moderate
				H = High	P = Poor
				W = Well	V = Very
				St = Steep	Fl = Flat
				Se = Severe	Un = Unchanged

MAPPING UNIT 22  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements: Use of puncheons in wet areas; surface, restrict horse and motor scooter traffic.		Est. Roadrock Thickness	Th	
Surface Eros. Potential	M	Suit. for Sewage F.F.		Cons. for Rd. Loc. & Const. Cutbank failures, wetness requires frequent culvert installation		
Natural Stability	II			P	Method of Excav.: Blading	
Nature of Mass Movement: Debris slides		Soil Lim. to Sewage F.F.: Wetness, drainage restrictions				
Exp. Mass Mvmt. from Man's Act.	Un	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	M	
Subsoil Eros. Pot.	M			Windthrow Hazard	M	Cutbnk. Slough. & Rav.
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.		Est. Cutslope Ratio	ST-M	
		Susc. to Alder Reveg.		Prob. of Cutbnk. Fail.	II& III	
Water Yield Class	II	Potential for Regen.		Cons. for Cutbnk. Stab. Probs.: Drainage of cutbank, plant willow shoots		
Bedrock Hydro. Charac.	II	Lim. to Regen.: N/A				
Hydrologic Group	C			Waste and Fill Failure	M	
Expect. Sed. Size	Surface-Sand, silt		Recom. Tree Species: Douglas-fir, cedar		Suit. of Cutbnk. Seeding	F
	Subsoil-Sand, silt		Susc. to Soil and Other Res. Dam. by Harvest		Lim. to Cutbnk. Seeding: High gravel and sand content, compacted subsoils restrict rooting	
Sed. Yield Potential	M	Type of Damage: Soil compaction, loss of structure, increased erosion and stream sedimentation		Recom. for Cutbnk. Seeding: Prepare rough cutbank to provide catch area for grass; seed, fertilize and mulch		
Water Res. Mgt. Req.	M	RECREATION		Suit. of Fill Seeding		F
Soil Suit. for Rec. Dev.	L	Recom. Slash Disposal		Lim. to Fill Seeding: High gravel and sand content, raveling		
Soil Limits to Rec. Dev.: Wetness, muddiness, restricted drainage		Cons. for Mgt. Pract.: Highlead, suspend road construction during excessively wet periods		Recom. for Fill Seeding: Seed, fertilize and mulch		
Treat. Req. to Inc. Suit.: Drainage		<b>ENGINEERING</b>				
Soil and Site Dam. Susc.		Unified Class	Surface- SM-u			
			Subsoil- SC-SM			
Susceptibility to Dust	L	Suit. as Topsoil Source		<b>LEGEND</b> F = Fair                      In = Increased G = Good                     T = Thin U = Unsuitd                 Th = Thick S = Suited                  Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor                     V = Very W = Well                     St = Steep Sl = Slight                  Fl = Flat Se = Severe Un = Unchanged		
Susceptibility to Mud	M-H	Suitability as Sand, Gravel Source				
Trail Suitability	M	Suit. as Clay Source				
Limitations for Trails: Wetness and muddiness		Suitability of Bedrock for Roadrock				
		Limit of Bedrk. for Roadrk. N/A				

MAPPING UNIT 23  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness		Th																								
Surface Eros. Potential	Se	Use of puncheons in wet areas, surface, restrict motor scooter & horse traffic		Cons. for Rd, Loc. & Const.: Cutbank failures, wetness requires frequent culvert installation																										
Natural Stability	II-III	Suit. for Sewage F.F.		N/A																										
Nature of Mass Movement: Debris slides and slumps		Soil Lim. to Sewage F.F.:		Method of Excav.: Blading																										
Exp. Mass Mvmt. from Man's Act.		In		Subsoil Erosion Pot.		M-H																								
Subsoil Eros. Pot.		M		TIMBER MANAGEMENT																										
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Windthrow Hazard		M		Cutbnk. Slough. & Rav. M																								
Water Yield Class		II		Susc. to Brush Reveg.		H																								
Bedrock Hydro. Charac.		II		Susc. to Alder Reveg.		M-H																								
Hydrologic Group		C		Potential for Regen.		H																								
Expect. Sed. Size	Surface-Sand, silt		Subsoil-Sand, silt		Recom. Tree Species: Douglas-fir, cedar																									
Sed. Yield Potential	M	Susc. to Soil and Other Res. Dam. by Harvest		H		Est. Cutslope Ratio ST-M																								
Water Res. Mgt. Req.	M	Type of Damage: Soil compaction, loss of structure; increased erosion and sedimentation, road waste damage		Prob. of Cutbnk. Fail. II&III																										
RECREATION		RECOM. SLASH DISPOSAL		4																										
Soil Suit. for Rec. Dev.	U	Cons. for Mgt. Pract.: High-lead or swing, minimize road construction, suspend construction during wet periods		Cons. for Cutbnk. Stab. Probs.: Drainage of cutbank, plant willow shoots																										
Soil Limits to Rec. Dev.: Steep slopes		ENGINEERING		Waste and Fill Failure H																										
Treat. Req. to Inc. Suit.:	No recommendations		Unified Class		Surface - SM-u																									
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source		U		Suit. of Cutbnk. Seeding F																								
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source		U		Lim. to Cutbnk. Seeding: High gravel and sand content, low fertility, compact subsoils restrict rooting																								
Susceptibility to Mud	N/A	Suit. as Clay Source		U		Recom. for Cutbnk. Seeding: Prepare rough cutbank to provide catch area for grass, seed, fertilize and mulch																								
Trail Suitability	M	Suitability of Bedrock for Roadrock		N/A		Suit. of Fill Seeding F																								
Limitations for Trails: Steep slopes, local wetness and muddiness		Limit of Bedrk. for Roadrk.		N/A																										
<p style="text-align: center;"><b>LEGEND</b></p> <table style="width: 100%; border: none;"> <tr> <td>F = Fair</td> <td>In = Increased</td> </tr> <tr> <td>G = Good</td> <td>T = Thin</td> </tr> <tr> <td>U = Unsuted</td> <td>Th = Thick</td> </tr> <tr> <td>S = Suted</td> <td>Gr = Greatly</td> </tr> <tr> <td>L = Low</td> <td></td> </tr> <tr> <td>M = Medium or Moderate</td> <td></td> </tr> <tr> <td>H = High</td> <td></td> </tr> <tr> <td>P = Poor</td> <td>V = Very</td> </tr> <tr> <td>W = Well</td> <td>St = Steep</td> </tr> <tr> <td>S1 = Slight</td> <td>F1 = Flat</td> </tr> <tr> <td>Se = Severe</td> <td></td> </tr> <tr> <td>Un = Unchanged</td> <td></td> </tr> </table>							F = Fair	In = Increased	G = Good	T = Thin	U = Unsuted	Th = Thick	S = Suted	Gr = Greatly	L = Low		M = Medium or Moderate		H = High		P = Poor	V = Very	W = Well	St = Steep	S1 = Slight	F1 = Flat	Se = Severe		Un = Unchanged	
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MAPPING UNIT 24  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements: Use of puncheons in wet areas, surface; restrict motor scooter & horse traffic.		Est. Roadrock Thickness	Th
Surface Eros. Potential	Se	Suit. for Sewage F.F. N/A		Cons. for Rd. Loc. & Const.: Very steep and dissected slopes, poor alignment, cutbank failure	
Natural Stability	III - IV	Soil Lim. to Sewage F.F.: N/A		Method of Excav.: Blading	
Nature of Mass Movement: Debris slides and slumps		TIMBER MANAGEMENT		Subsoil Erosion Pot. H	
Exp. Mass Mvmt. from Man's Act.	Gr In			Cutbnk. Slough. & Rav. H	
Subsoil Eros. Pot.	M-H	Windthrow Hazard	M	Est. Cutslope Ratio M	
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration; revegetate barren areas, mulch		Susc. to Brush Reveg.	M-H	Prob. of Cutbnk. Fail. III & IV	
Water Yield Class		Susc. to Alder Reveg.	M-H	Cons. for Cutbnk. Stab. Probs.: Drainage of cutbank, plant willow shoots, prepare wide ditch to serve as a catch area	
Bedrock Hydro. Charac.	II	Potential for Regen.	H	Waste and Fill Failure H	
Hydrologic Group	C	Lim. to Regen.: N/A		Suit. of Cutbnk. Seeding P	
Expect. Sed. Size	Surface-Sand, silt Subsoil-Sand, silt	Recom. Tree Species: Douglas-fir		Lim. to Cutbnk. Seeding: High gravel and sand content, low fertility, raveling	
Sed. Yield Potential	M-H	Susc. to Soil and Other Res. Dam. by Harvest	H	Recom. for Cutbnk. Seeding: Prepare rough cutbank to provide catch area for grass; seed fertilize and mulch	
Water Res. Mgt. Req.		Type of Damage: Greatly increased erosion and sedimentation, compaction and loss of soil structure		Suit. of Fill Seeding P	
RECREATION		ENGINEERING		Lim. to Fill Seeding: High gravel and sand content, raveling	
Soil Suit. for Rec. Dev.	U			Recom. Slash Disposal	1/4
Soil Limits to Rec. Dev.: Very steep slopes		Cons. for Mgt. Pract.: Highlead, or swing, limit road construction, end haul		LEGEND	
Treat. Req. to Inc. Suit.: No recommendations		Unified Class	Surface - SM-u Subsoil - SC-SM	F = Fair      In = Increased G = Good      T = Thin U = Unsited    Th = Thick S = Sited      Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor      V = Very W = Well      St = Steep Sl = Slight    Fl = Flat Se = Severe Un = Unchanged	
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	U		
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	U		
Susceptibility to Mud	N/A	Suit. as Clay Source	U		
Trail Suitability	P	Suitability of Bedrock for Roadrock	N/A		
Limitations for Trails: Very steep and dissected slopes; wetness and muddiness		Limit of Bedrk. for Roadrk.: N/A			

MAPPING UNIT 25  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements Use of puncheons in wet areas, surface, restrict motor scooter and horse tra		Est. Roadrock Thickness	Th	
Surface Eros. Potential	M	Suit. for Sewage F.F.		Cons. for Rd. Loc. & Const.: fic. Cutbank failures, wetness requires frequent culvert installation		
Natural Stability	II	Soil Lim. to Sewage F.F.: Wetness, drainage restrictions		Method of Excav.: Blading		
Nature of Mass Movement: Small debris slides		TIMBER MANAGEMENT		Subsoil Erosion Pot.		M
Exp. Mass Mvmt. from Man's Act.	Un			Cutbnk. Slough. & Rav.		M
Subsoil Eros. Pot.	M	Windthrow Hazard	M	Est. Cutslope Ratio		ST-M
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	L-M	Prob. of Cutbnk. Fail.		II-III
		Susc. to Alder Reveg.	L	Cons. for Cutbnk. Stab. Probs.: Drainage of cutbank, plant willow shoots		
Water Yield Class	II	Potential for Regen.	M	Waste and Fill Failure		M
Bedrock Hydro. Charac.	II	Lim. to Regen.: Low fertility, frost heave		Suit. of Cutbnk. Seeding		F
Hydrologic Group	C	Recom. Tree Species: Douglas-fir, true fir		Lim. to Cutbnk. Seeding: High gravel and sand content, low fertility, compacted subsoils restricts rooting		
Expect. Sed. Size		Susc. to Soil and Other Res. Dam. by Harvest		Recom. for Cutbnk. Seeding: Prepare rough cutbank to provide catch area for grass; <del>seed fertilize and mulch</del>		
		Type of Damage: Increased erosion and sedimentation, compaction and loss of soil structure		Suit. of Fill Seeding		F
Sed. Yield Potential	M	Recom. Slash Disposal		Lim. to Fill Seeding: High gravel and sand content, low fertility		
Water Res. Mgt. Req.	M	Cons. for Mgt. Pract.: Highlead, suspend road construction during excessively wet periods		Recom. for Fill Seeding: Seed, fertilize and mulch		
RECREATION		ENGINEERING				
Soil Suit. for Rec. Dev.	L	Unified Class	Surface - SM-u Subsoil - SC to SM-d			
Soil Limits to Rec. Dev.: Wetness, muddiness, restricted drainage		Suit. as Topsoil Source		LEGEND		
Treat. Req. to Inc. Suit.: Drainage		Suitability as Sand, Gravel Source		F = Fair      In = Increased G = Good      T = Thin U = Unsuitied      Th = Thick S = Suited      Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor      V = Very W = Well      St = Steep Sl = Slight      Fl = Flat Se = Severe Un = Unchanged		
Soil and Site Dam. Susc.	M	Suit. as Clay Source				
Susceptibility to Dust	L	Suitability of Bedrock for Roadrock				
Susceptibility to Mud	M-H	Limit of Bedrk. for Roadrk.				
Trail Suitability	M	N/A				
Limitations for Trails: Wetness and muddiness						

MAPPING UNIT 26  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements Use of punchons in wet areas, surface, restrict motor, scooter & horse traffic		Est. Roadrock Thickness	Th
Surface Eros. Potential	Se	Suit. for Sewage F.F.		N/A Cons. for Rd. Loc. & Const.: Cutbank failures, wetness requires frequent culvert installation	
Natural Stability	II-III	Soil Lim. to Sewage F.F.: N/A		Method of Excav.: Blading	
Nature of Mass Movement: Small debris slides and slumps					
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	M-H
Subsoil Eros. Pot.	M			Windthrow Hazard	M
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	L-M	Est. Cutslope Ratio	ST-M
		Susc. to Alder Reveg.	L	Prob. of Cutbnk. Fail.	II & III
		Potential for Regen.	M	Cons. for Cutbnk. Stab. Probs.: Drainage of cutbank, plant willow shoots	
Water Yield Class	II	Lim. to Regen.: Low fertility, climatic limitations		Waste and Fill Failure	M
Bedrock Hydro. Charac.	II	Recom. Tree Species: Douglas-fir		Suit. of Cutbnk. Seeding	F
Hydrologic Group	C	Susc. to Soil and Other Res. Dam. by Harvest		Lim. to Cutbnk. Seeding: High gravel and sand content, low fertility	
Expect. Sed. Size	Surface-Sand, silt Subsoil-Sand, silt	Type of Damage: Increased erosion and sedimentation, compaction and loss of soil structure		Recom. for Cutbnk. Seeding: Prepare rough cutbank to provide catch area for grass; seed, fertilize and mulch	
Sed. Yield Potential	M	Recom. Slash Disposal		Suit. of Fill Seeding	F
Water Res. Mgt. Req.	M	Cons. for Mgt. Pract.: High-lead or swing, minimize spur roads; suspend road construction during wet periods.		Lim. to Fill Seeding: High gravel and sand content, low fertility, raveling	
<b>RECREATION</b>		<b>ENGINEERING</b>		Recom. for Fill Seeding: Seed, fertilize and mulch; protect from road maintenance waste	
Soil Suit. for Rec. Dev.	U	Unified Class	Surface - SM-u Subsoil - SC to SM-d		
Soil Limits to Rec. Dev.: Steep slopes, muddiness		Suit. as Topsoil Source	U	<b>LEGEND</b> F = Fair            In = Increased G = Good            T = Thin U = Unsited        Th = Thick S = Suited          Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor            V = Very W = Well            St = Steep Sl = Slight        Fl = Flat Se = Severe Un = Unchanged	
Treat. Req. to Inc. Suit.:		No recommendations			
Soil and Site Dam. Susc.	N/A	Suitability as Sand, Gravel Source	U		
Susceptibility to Dust	N/A	Suit. as Clay Source	U		
Susceptibility to Mud	N/A	Suitability of Bedrock for Roadrock	N/A		
Trail Suitability	M	Limit of Bedrk. for Roadrk.: N/A			
Limitations for Trails: Wetness and muddiness					

MAPPING UNIT 29  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	Th
Surface Eros. Potential	Se	Use of puncheons in wet areas, surface, restrict motor scooter & horse traffic		Cons. for Rd. Loc. & Const.: Unstable, wetness, cutbank failures	
Natural Stability	III-IV	Suit. for Sewage F.F.	N/A		
Nature of Mass Movement: Debris slides and slumps		Soil Lim. to Sewage F.F.:		Method of Excav.:	
		N/A		Blading	
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	M
Subsoil Eros. Pot.	M			Windthrow Hazard	L-M
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	L-M	Est. Cutslope Ratio	M
		Susc. to Alder Reveg.	L	Prob. of Cutbnk. Fail.	III & IV
Water Yield Class	II	Potential for Regen.	M	Cons. for Cutbnk. Stab. Probs.:	
Bedrock Hydro. Charac.	II	Lim. to Regen.:		Drainage of cutbank; Plant willow shoots	
Hydrologic Group	C	Low fertility, frost heave			
Expect. Sed. Size	Surface-Sand, silt	Recom. Tree Species: Douglas-fir		Waste and Fill Failure	H
	Subsoil-Sand, silt	Susc. to Soil and Other Res. Dam. by Harvest		Suit. of Cutbnk. Seeding	F
Sed. Yield Potential	M-H	Type of Damage: Increased erosion and mass movement potential, compaction and sedimentation		Lim. to Cutbnk. Seeding: High gravel and sand content, low fertility, compacted subsoil limits rooting	
Water Res. Mgt. Req.	H	RECREATION		Recom. for Cutbnk. Seeding: Seed, fertilize and mulch	
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	1/4		
Soil Limits to Rec. Dev.: Steep slopes, unstable, wetness		Cons. for Mgt. Pract.:		Suit. of Fill Seeding	F
		Skyline, minimize road construction, end haul		Lim. to Fill Seeding: High gravel and sand content, low fertility, raveling	
Treat. Req. to Inc. Suit.:		<b>ENGINEERING</b>		Recom. for Fill Seeding: Seed, fertilize and mulch; protect from maintenance waste	
No recommendations		Unified Class	Surface- SM-u		
		Subsoil-SC to SW-SM			
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	U	<b>LEGEND</b>	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	U	F = Fair	In = Increased
Susceptibility to Mud	N/A	Suit. as Clay Source	U	G = Good	T = Thin
Trail Suitability	M	Suitability of Bedrock for Roadrock	P	U = Unsuitd	Th = Thick
Limitations for Trails: Wetness and muddiness		Limit of Bedrk. for Roadrk.		S = Suited	Gr = Greatly
		Breaks down rapidly under traffic.		L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor	V = Very
				W = Well	St = Steep
				S1 = Slight	Fl = Flat
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 30  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	Th-VTh	
Surface Eros. Potential	M	Surface, restrict use of horse and motor scooter		Cons. for Rd. Loc. & Const.: Wetness requires extra culverts, soils become muddy, compaction difficult		
Natural Stability	II	Suit. for Sewage F.F.	P	Method of Excav.: Blading		
Nature of Mass Movement: Small slumps		Soil Lim. to Sewage F.F.: Drainage restriction				
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	L-M	
Subsoil Eros. Pot.	M			Windthrow Hazard	L	Cutbnk. Slough. & Rav.
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration revegetate barren areas, mulch		Susc. to Brush Reveg.	H	Est. Cutslope Ratio	M	
		Susc. to Alder Reveg.	H	Prob. of Cutbnk. Fail.	II&III	
Water Yield Class	I	Potential for Regen.	H	Cons. for Cutbnk. Stab. Probs.: Drainage of cutbank, plant willow shoots		
Bedrock Hydro. Charac.	N/A	Lim. to Regen.: N/A		Waste and Fill Failure		M
Hydrologic Group	C			Suit. of Cutbnk. Seeding	G	
Expect. Sed. Size	Surface - Sand, silt Subsoil - Sand, silt	Recom. Tree Species: Douglas-fir, cedar		Lim. to Cutbnk. Seeding: Use moisture tolerant grasses		
Sed. Yield Potential	H	Susc. to Soil and Other Res. Dam. by Harvest	H	Recom. for Cutbnk. Seeding: Prepare rough cutbank to provide catch area for grass; seed, fertilize and mulch		
Water Res. Mgt. Req.	M	Type of Damage: Compaction and loss of soil structure, increased sedimentation		Suit. of Fill Seeding	G	
<b>RECREATION</b>		Recom. Slash Disposal		Lim. to Fill Seeding: No major limitations		
Soil Suit. for Rec. Dev.	L			Recom. for Fill Seeding: Seed, fertilize and mulch		
Soil Limits to Rec. Dev.: Muddiness, wetness and drainage restriction		Cons. for Mgt. Pract.: Highlead, suspend road construction during wet periods				
Treat. Req. to Inc. Suit.: Drainage; gravel surfacing of roads and trails		<b>ENGINEERING</b>				
		Unified Class	Surface-SM-u to ML Subsoil-SM-d to ML			
Soil and Site Dam. Susc.	M	Suit. as Topsoil Source	S	<b>LEGEND</b>		
Susceptibility to Dust	M	Suitability as Sand, Gravel Source	U	F = Fair	In = Increased	
Susceptibility to Mud	M-H	Suit. as Clay Source	S	G = Good	T = Thin	
Trail Suitability	M-P	Suitability of Bedrock for Roadrock	N/A	U = Unsuitable	Th = Thick	
Limitations for Trails: Wetness and muddiness		Limit of Bedrk. for Roadrk.: N/A		S = Suited	Gr = Greatly	
				L = Low	M = Medium or Moderate	
				H = High	P = Poor	
				W = Well	V = Very	
				Sl = Slight	St = Steep	
				Se = Severe	Fl = Flat	
				Un = Unchanged		

MAPPING UNIT 31  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements: Surface, restrict use of horse and motor scooter		Est. Roadrock Thickness	Th-VTh
Surface Eros. Potential	M-Se			Cons. for Rd. Loc. & Const.: Wetness requires extra culverts, soils become muddy, other resources are damaged.	
Natural Stability	III	Suit. for Sewage F.F.	N/A	Method of Excav.: Blading	
Nature of Mass Movement: Slumps and debris slides		Soil Lim. to Sewage F.F.: N/A			
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	M
Subsoil Eros. Pot.	M	Windthrow Hazard	L	Cutbnk. Slough. & Rav.	M
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	H	Est. Cutslope Ratio	M
		Susc. to Alder Reveg.	H	Prob. of Cutbnk. Fail.	III
Water Yield Class	I	Potential for Regen.	H	Cons. for Cutbnk. Stab. Probs.: Drainage of cutbank, plant willow shoots	
Bedrock Hydro. Charac.	N/A	Lim. to Regen.: N/A		Waste and Fill Failure	H
Hydrologic Group	C			Suit. of Cutbnk. Seeding	G
Expect. Sed. Size	Surface-Sand, silt Subsoil-Sand, silt	Recom. Tree Species: Douglas-fir, cedar		Lim. to Cutbnk. Seeding: Use moisture tolerant grasses	
Sed. Yield Potential	H	Susc. to Soil and Other Res. Dam. by Harvest	H	Recom. for Cutbnk. Seeding: Prepare rough cutbank to provide catch area for grass; seed, fertilize and mulch	
Water Res. Mgt. Req.	M	Type of Damage: Increased mass movement and sedimentation, compaction and loss of soil structure		Suit. of Fill Seeding	G
<b>RECREATION</b>		Recom. Slash Disposal		Lim. to Fill Seeding: Local surface slips on fill slope	
Soil Suit. for Rec. Dev.	U			Recom. for Fill Seeding: Seed, fertilize and mulch; protect from road maintenance waste	
Soil Limits to Rec. Dev.: Steep slopes, wetness and muddiness		Cons. for Mgt. Pract.: Sky-line on slopes over 50%, end haul, restrict road construction during wet periods			
Treat. Req. to Inc. Suit.: No recommendations		<b>ENGINEERING</b>			
		Unified Class	Surface-SM-u to ML Subsoil-SM-d to ML		
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	S	<b>LEGEND</b>	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	U	F = Fair	In = Increased
Susceptibility to Mud	N/A	Suit. as Clay Source	S	G = Good	T = Thin
Trail Suitability	M-P	Suitability of Bedrock for Roadrock	N/A	U = Unsited	Th = Thick
Limitations for Trails: Steep slopes, wetness		Limit of Bedrk. for Roadrk.: N/A		S = Sited	Gr = Greatly
				L = Low	M = Medium or Moderate
				H = High	P = Poor
				W = Well	V = Very
				Sl = Slight	St = Steep
				Se = Severe	Fl = Flat
				Un = Unchanged	

MAPPING UNIT 32  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements: Surface, use puncheons, restrict use of horse and motor scooter		Est. Roadrock Thickness	Th-VTh
Surface Eros. Potential	M			Cons. for Rd. Loc. & Const.: Wetness requires extra culverts, soils become muddy	
Natural Stability	II	Suit. for Sewage F.F.	P	Method of Excav.: Blading	
Nature of Mass Movement: Small slumps		Soil Lim. to Sewage F.F.: Drainage restriction			
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	M
Subsoil Eros. Pot.	M			Cutbnk. Slough. & Rav.	M
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Windthrow Hazard	L	Est. Cutslope Ratio	M
		Susc. to Brush Reveg.	M	Prob. of Cutbnk. Fail.	II & III
		Susc. to Alder Reveg.	M	Cons. for Cutbnk. Stab. Probs.:	
Water Yield Class	I	Potential for Regen.	M-H	Drainage of cutbank, plant willow shoots	
Bedrock Hydro. Charac.	N/A	Lim. to Regen.: Local high elevation causes climatic limitations		Waste and Fill Failure	
Hydrologic Group	C			Suit. of Cutbnk. Seeding	G
Expect. Sed. Size	Surface-Sand, silt		Recom. Tree Species: Douglas-fir		Lim. to Cutbnk. Seeding: Local coarse textures and compaction limits fertility and restricts rooting
	Subsoil-silt, sand				Recom. for Cutbnk. Seeding: Prepare rough cutbank to provide catch area for grass; Seed, fertilize and mulch
Sed. Yield Potential	H	Susc. to Soil and Other Res. Dam. by Harvest	H	Suit. of Fill Seeding	G
Water Res. Mgt. Req.	M	Type of Damage: Soil compaction and loss of soil structure, increased sedimentation		Lim. to Fill Seeding: No major limitations	
<b>RECREATION</b>				Recom. for Fill Seeding: Seed, fertilize and mulch	
Soil Suit. for Rec. Dev.	L	Recom. Slash Disposal	2		
Soil Limits to Rec. Dev.: Wetness and muddiness, Drainage restriction		Cons. for Mgt. Pract.: Highlead, restrict road construction during wet season			
Treat. Req. to Inc. Suit.: Drainage, gravel surfacing of roads and trails		<b>ENGINEERING</b>			
		Unified Class	Surface-SM-d to ML		
			Subsoil-SM-d to ML		
Soil and Site Dam. Susc.	M	Suit. as Topsoil Source	S	<b>LEGEND</b>	
Susceptibility to Dust	L	Suitability as Sand, Gravel Source	U	F = Fair	In = Increased
Susceptibility to Mud	H	Suit. as Clay Source	S	G = Good	T = Thin
Trail Suitability	M-P	Suitability of Bedrock for Roadrock	N/A	U = Unsuitd	Th = Thick
Limitations for Trails: Wetness and muddiness		Limit of Bedrk. for Roadrk.	N/A	S = Suited	Gr = Greatly
				L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor	V = Very
				W = Well	St = Steep
				Sl = Slight	Fl = Flat
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 33  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements: Surface, use puncheons, restrict use of horse and motor scooter		Est. Roadrock Thickness	Th-VTh
Surface Eros. Potential	M-Se			Cons. for Rd. Loc. & Const.: Wetness requires extra culverts, soils become muddy, difficult to compact	
Natural Stability	III	Suit. for Sewage F.F.	N/A	Method of Excav.: Blading	
Nature of Mass Movement: Small slides and slumps		Soil Lim. to Sewage F.F.: N/A			
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	M
Subsoil Eros. Pot.	M	Windthrow Hazard	L	Cutbnk. Slough. & Rav.	M
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	M	Est. Cutslope Ratio	M
		Susc. to Alder Reveg.	M	Prob. of Cutbnk. Fail.	III
Water Yield Class	I	Potential for Regen.	M-H	Cons. for Cutbnk. Stab. Probs.: Drainage of cutbank, plant willow shoots	
Bedrock Hydro. Charac.	N/A	Lim. to Regen.: Local high elevations cause climatic limitations		Waste and Fill Failure	
Hydrologic Group	C			Suit. of Cutbnk. Seeding	G
Expect. Sed. Size	Surface-Sand, silt Subsoil-Silt, sand	Recom. Tree Species: Douglas-fir		Lim. to Cutbnk. Seeding: Local coarse textures and compaction limits fertility and restricts rooting	
Sed. Yield Potential	H	Susc. to Soil and Other Res. Dam. by Harvest	H	Recom. for Cutbnk. Seeding: Prepare rough cutbank to provide catch area for grass; seed, fertilize and mulch	
Water Res. Mgt. Req.	M	Type of Damage: Increased mass movement and sedimentation, compaction and loss of soil structure		Suit. of Fill Seeding	G
<b>RECREATION</b>				Lim. to Fill Seeding: Local surface slides on fill slope	
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	1/4	Recom. for Fill Seeding: Seed, fertilize and mulch; protect from road maintenance waste	
Soil Limits to Rec. Dev.: Steep slopes, wetness and muddiness		Cons. for Mgt. Pract.: Sky-line on slopes over 50%, end haul, restrict road construction during wet periods		<b>ENGINEERING</b>	
Treat. Req. to Inc. Suit.: No recommendations		Unified Class	Surface-SM-d to ML Subsoil-SM-d to ML		
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	S	<b>LEGEND</b>	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	U	F = Fair	In = Increases
Susceptibility to Mud	N/A	Suit. as Clay Source	S	G = Good	T = Thin
Trail Suitability	M-P	Suitability of Bedrock for Roadrock	N/A	U = Unsuitable	Th = Thick
Limitations for Trails: Local wetness, steep slopes		Limit of Bedrk. for Roadrk.: N/A		S = Suited	Gr = Greatly
				L = Low	M = Medium or Moderate
				H = High	P = Poor
				W = Well	V = Very
				St = Steep	Se = Severe
				Sl = Slight	Fl = Flat
				Un = Unchanged	

MAPPING UNIT 34  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements Surface trails, use punch- eons, restrict use of horse and motor scooter		Est. Roadrock Thickness	VTh
Surface Eros. Potential	Sl			Cons. for Rd. Loc. & Const.: Unstable soil, high mainte- nance cost and resource dam- age; wetness, muddiness	
Natural Stability	III	Suit. for Sewage F.F.	P	Method of Excav.: Blading	
Nature of Mass Movement: Slumps		Soil Lim. to Sewage F.F.: Slow permeability, restrict- ed drainage			
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	M
Subsoil Eros. Pot.	M	Windthrow Hazard	M	Cutbnk. Slough. & Rav.	H
Recom. for Controlling Sub- soil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	M-H	Est. Cutslope Ratio	M-Fl
		Susc. to Alder Reveg.	M-H	Prob. of Cutbnk. Fail.	III &IV
Water Yield Class	I	Potential for Regen.	H	Cons. for Cutbnk. Stab. Probs.: Drainage of cutbank, plant willow shoots	
Bedrock Hydro. Charac.	N/A	Lim. to Regen.:  N/A			
Hydrologic Group	D			Waste and Fill Failure	M
Expect. Sed. Size	Surface-silt, clay	Recom. Tree Species: Douglas-fir		Suit. of Cutbnk. Seeding	G
	Subsoil-silt, clay				
Sed. Yield Potential	H	Susc. to Soil and Other Res. Dam. by Harvest	H	Recom. for Cutbnk. Seeding: Prepare rough cutbank to provide catch area for grass; seed, fertilize and mulch	
Water Res. Mgt. Req.	M-H	Type of Damage: Increased mass movement, compaction, high siltation of streams		Suit. of Fill Seeding	G
<b>RECREATION</b>				Lim. to Fill Seeding: Local surface slides on fill slope	
Soil Suit. for Rec. Dev.	L	Recom. Slash Disposal	2	Recom. for Fill Seeding: Seed, fertilize and mulch	
Soil Limits to Rec. Dev.: Wet, poorly drained, high compaction hazard, very muddy		Cons. for Mgt. Pract.: High- lead, protect soil surfaces restrict timber harvest during wet seasons			
Treat. Req. to Inc. Suit.: Surface trails, roads and other use areas; drainage		<b>ENGINEERING</b>			
		Unified Class	Surface SM-u Subsoil CL		
Soil and Site Dam. Susc.	M-H	Suit. as Topsoil Source	S	<b>LEGEND</b>	
Susceptibility to Dust	L	Suitability as Sand, Gravel Source	U	F = Fair	In = Increased
Susceptibility to Mud	H	Suit. as Clay Source	S	G = Good	T = Thin
Trail Suitability	M-P	Suitability of Bedrock for Roadrock	N/A	U = Unsited	Th = Thick
Limitations for Trails: Wetness and muddiness		Limit of Bedrk. for Roadrk.  N/A		S = Suited	Gr = Greatly
				L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor	V = Very
				W = Well	St = Steep
				Sl = Slight	Fl = Flat
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 35  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements: Surface trails, use punch-eons, restrict use of horse and motor scooter		Est. Roadrock Thickness	VTh	
Surface Eros. Potential	M-Se	Suit. for Sewage F.F.		Cons. for Rd. Loc. & Const.: Unstable soil, high road maintenance cost and re-source damage		
Natural Stability	IV-V	Soil Lim. to Sewage F.F.: N/A		Method of Excav.: Blading		
Nature of Mass Movement: Small and large slumps		<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.		M
Exp. Mass Mvmt. from Man's Act.	Gr In			Cutbnk. Slough. & Rav.		H
Subsoil Eros. Pot.	M	Windthrow Hazard	M	Est. Cutslope Ratio		M-Fl
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	M-H	Prob. of Cutbnk. Fail.		IV & V
		Susc. to Alder Reveg.	M-H	Cons. for Cutbnk. Stab. Probs.:		
Water Yield Class	I	Potential for Regen.	H	Drainage of cutbanks, plant willow shoots		
Bedrock Hydro. Charac.	N/A	Lim. to Regen.: N/A		Waste and Fill Failure		H
Hydrologic Group	D	Recom. Tree Species: Douglas-fir		Suit. of Cutbnk. Seeding		G
Expect. Sed. Size	Surface-Silt, clay Subsoil-Silt, clay			Susc. to Soil and Other Res. Dam. by Harvest		Lim. to Cutbnk. Seeding: Wetness favors moisture tolerant grasses
Sed. Yield Potential	H	Type of Damage: Greatly increased mass movement, compaction and siltation of streams		Recom. for Cutbnk. Seeding: Seed, fertilize and mulch		
Water Res. Mgt. Req.	H	<b>ENGINEERING</b>		Suit. of Fill Seeding		G
<b>RECREATION</b>				Recom. Slash Disposal		Lim. to Fill Seeding: Local surface slides on fill slope
Soil Suit. for Rec. Dev.	U	Cons. for Mgt. Pract.: Skyline, limit road construction, end haul		Recom. for Fill Seeding: Seed, fertilize and mulch; protect from road maintenance waste		
Soil Limits to Rec. Dev.: Steep slopes, unstable, wetness and muddiness		Unified Class	Surface - SM-u Subsoil - CL	<b>LEGEND</b> F = Fair      In = Increased G = Good      T = Thin U = Unsuted    Th = Thick S = Suted      Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor      V = Very W = Well      St = Steep Sl = Slight    Fl = Flat Se = Severe Un = Unchanged		
Treat. Req. to Inc. Suit.:		No recommendations				
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source				S
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source				U
Susceptibility to Mud	N/A	Suit. as Clay Source				S
Trail Suitability	P	Suitability of Bedrock for Roadrock		N/A		
Limitations for Trails: Steep slopes, wetness and muddiness		Limit of Bedrk. for Roadrk.:		N/A		

MAPPING UNIT 36  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential	M	Water bar		Cons. for Rd. Loc. & Const.:	
Natural Stability	I - II	Suit. for Sewage F.F.	M-P	Raveling, some local wetness	
Nature of Mass Movement: Small debris slides		Soil Lim. to Sewage F.F.: Compact subsoil locally restricts drainage		Method of Excav.: Blading and some ripping	
Exp. Mass Mvmt. from Man's Act.	Un	TIMBER MANAGEMENT		Subsoil Erosion Pot.	L-M
Subsoil Eros. Pot.	L			Cutbnk. Slough. & Rav.	M
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration revegetate barren areas, mulch		Windthrow Hazard	L-M	Est. Cutslope Ratio	ST
Water Yield Class		Susc. to Brush Reveg.	M	Prob. of Cutbnk. Fail.	II
Bedrock Hydro. Charac.	II	Susc. to Alder Reveg.	L	Cons. for Cutbnk. Stab. Probs.: No special considerations	
Hydrologic Group	C	Potential for Regen.	M-H	Waste and Fill Failure	L
Expect. Sed. Size	Surface Sand, silt Subsoil - Sand, gr.	Lim. to Regen.: Coarse textures, low fertility, climatic limitations		Suit. of Cutbnk. Seeding	P
Sed. Yield Potential	L	Recom. Tree Species: Douglas fir		Lim. to Cutbnk. Seeding: Coarse textures and compact subsoils limit fertility and root penetration	
Water Res. Mgt. Req.	L	Susc. to Soil and Other Res. Dam. by Harvest	L-M	Recom. for Cutbnk. Seeding: Prepare rough cutbank to provide a catch area for grass; seed, fertilize & mulch.	
RECREATION		Type of Damage: Increased erosion, soil damage from cat turning and blade action		Suit. of Fill Seeding	F
Soil Suit. for Rec. Dev.	M-H	Recom. Slash Disposal	1/3	Lim. to Fill Seeding: Coarse textures limit fertility and soil moisture.	
Soil Limits to Rec. Dev.: Local wetness		Cons. for Mgt. Pract.: Remove cat blade		Recom. for Fill Seeding: Seed, fertilize and mulch	
Treat. Req. to Inc. Suit.: Drainage where required		ENGINEERING		LEGEND	
Soil and Site Dam. Susc.		Unified Class	Surface - SM-d Subsoil - SM-d to GW		
Susceptibility to Dust	L	Suit. as Topsoil Source	U	F = Fair	In = Increased
Susceptibility to Mud	L-M	Suitability as Sand, Gravel Source	S	G = Good	T = Thin
Trail Suitability	W	Suit. as Clay Source	U	U = Unsuitd	Th = Thick
Limitations for Trails: N/A		Suitability of Bedrock for Roadrock	N/A	S = Suited	Gr = Greatly
		Limit of Bedrk. for Roadrk.		L = Low	M = Medium or Moderate
				H = High	P = Poor
				W = Well	V = Very
				St = Steep	Fl = Flat
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 37  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential	Se	Water bar		Cons. for Rd. Loc. & Const.: Steep slopes, raveling, some local wetness	
Natural Stability	II	Suit. for Sewage F.F.	N/A		
Nature of Mass Movement: Small debris slides		Soil Lim. to Sewage F.F.: N/A		Method of Excav.: Blading and some ripping	
Exp. Mass Mvmt. from Man's Act.	Un	TIMBER MANAGEMENT		Subsoil Erosion Pot.	M
Subsoil Eros. Pot.	M			Cutbnk. Slough. & Rav.	M
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Windthrow Hazard	M	Est. Cutslope Ratio	ST-M
		Susc. to Brush Reveg.	M	Prob. of Cutbnk. Fail.	II
		Susc. to Alder Reveg.	L	Cons. for Cutbnk. Stab. Probs.:	
Water Yield Class	III	Potential for Regen.	M-H	No special considerations	
Bedrock Hydro. Charac.	II	Lim. to Regen.:			
Hydrologic Group	C	Coarse textures, low fertility, climatic limitations		Waste and Fill Failure	M-H
Expect. Sed. Size	Surface - Sand, silt Subsoil - Sand, gr.	Recom. Tree Species: Douglas-fir		Suit. of Cutbnk. Seeding	P
Sed. Yield Potential	L-M	Susc. to Soil and Other Res. Dam. by Harvest	M	Lim. to Cutbnk. Seeding: Coarse textures and compact subsoils limit fertility and root penetration	
Water Res. Mgt. Req.	L-M	Type of Damage: Increased erosion and loss of soil structure		Recom. for Cutbnk. Seeding: Prepare rough cutbank to provide a catch area for grass; seed, fertilize & mulch	
RECREATION				Suit. of Fill Seeding	F
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	1/4	Lim. to Fill Seeding: Coarse textures limit fertility and soil moisture	
Soil Limits to Rec. Dev.:	Steep slopes	Cons. for Mgt. Pract.:		Recom. for Fill Seeding: Seed, fertilize and mulch; protect from maintenance waste	
Treat. Req. to Inc. Suit.:		ENGINEERING			
No recommendations		Unified Class	Surface - SM-d to GW-GM Subsoil - SM-d to GW		
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source		LEGEND	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source		F = Fair	In = Increased
Susceptibility to Mud	N/A	Suit. as Clay Source		G = Good	T = Thin
Trail Suitability	M-H	Suitability of Bedrock for Roadrock		U = Unsuitd	Th = Thick
Limitations for Trails: Steep slopes		Limit of Bedrk. for Roadrk.:		S = Suited	Gr = Greatly
		N/A		L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor	V = Very
				W = Well	St = Steep
				Sl = Slight	Fl = Flat
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 38  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	Th				
Surface Eros. Potential		Se	Water bar		Cons. for Rd. Loc. & Const.: Steep, dissected slopes; unstable, extensive raveling, poor alignment				
Natural Stability		III-IV	Suit. for Sewage F.F.				N/A		
Nature of Mass Movement: Debris slides		Soil Lim. to Sewage F.F.:		Method of Excav.:					
		N/A		Blading					
Exp. Mass Mvmt. from Man's Act.		Ia-Gr In	<b>TIMBER MANAGEMENT</b>			Subsoil Erosion Pot.	H		
Subsoil Eros. Pot.		H	Windthrow Hazard		M	Cutbnk. Slough. & Rav.	H		
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.		M	Est. Cutslope Ratio		M-ST		
		Susc. to Alder Reveg.		L-M	Prob. of Cutbnk. Fail.		III & IV		
		Potential for Regen.		M	Cons. for Cutbnk. Stab. Probs.:		Drainage of cutbanks, benching, wide ditch, plant willow shoots		
Water Yield Class		III	Lim. to Regen.:						
Bedrock Hydro. Charac.		II	Coarse textures limit fertility		Waste and Fill Failure		H		
Hydrologic Group		C	Recom. Tree Species: Douglas-fir		Suit. of Cutbnk. Seeding		P		
Expect. Sed. Size	Surface-Sand, silt		Susc. to Soil and Other Res. Dam. by Harvest		Lim. to Cutbnk. Seeding: Coarse textures limit fertility, raveling		Recom. for Cutbnk. Seeding: Prepare rough cutbank to serve as a seed catch area; seed, fertilize and mulch		
	Subsoil-Sand, gr.								M
Sed. Yield Potential		M	Type of Damage: Greatly increases mass movement and erosion; damage to resources from slidecast		Suit. of Fill Seeding		F		
Water Res. Mgt. Req.		H	RECREATION		Lim. to Fill Seeding: Coarse textures limit fertility and soil moisture		Recom. for Fill Seeding: Seed, fertilize & mulch; protect from road maintenance waste		
Soil Suit. for Rec. Dev.		U			Recom. Slash Disposal				1/4
Soil Limits to Rec. Dev.:		Cons. for Mgt. Pract.:		<b>ENGINEERING</b>		<b>LEGEND</b>			
Steep slopes, unstable		Skyline, avoid roads when possible, end haul surplus waste		Unified Class				F = Fair      In = Increased G = Good      T = Thin U = Unsited    Th = Thick S = Sited      Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor      V = Very W = Well      St = Steep S1 = Slight    Fl = Flat Se = Severe Un = Unchanged	
Treat. Req. to Inc. Suit.:		No recommendations		Surface - <sup>SM-d to</sup> GW-GM					
Soil and Site Dam. Susc.		N/A	Subsoil-SW to GW		Suit. as Topsoil Source		U		
Susceptibility to Dust		N/A	Suit. as Sand, Gravel Source		S				
Susceptibility to Mud		N/A	Suit. as Clay Source		U				
Trail Suitability		P	Suitability of Bedrock for Roadrock		N/A				
Limitations for Trails:		Limit of Bedrk. for Roadrk.:							
Very steep dissected slopes unstable		N/A							

MAPPING UNIT 41  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential	Se	Water bar		Cons. for Rd. Loc. & Const.: Steep dissected slopes, poor alignment, cutbank raveling	
Natural Stability	III	Suit. for Sewage F.F.	N/A	Method of Excav.: blading	
Nature of Mass Movement: Small debris slides		Soil Lim. to Sewage F.F.: N/A		Subsoil Erosion Pot.	
Exp. Mass Mvmt. from Man's Act.	In	TIMBER MANAGEMENT		H	
Subsoil Eros. Pot.	H			Cutbnk. Slough. & Rav.	
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration; revegetate barren areas, mulch		Windthrow Hazard	L	Est. Cutslope Ratio	
		Susc. to Brush Reveg.	L-M	Prob. of Cutbnk. Fail.	
		Susc. to Alder Reveg.	L	II& III	
Water Yield Class	II	Potential for Regen.	M	Cons. for Cutbnk. Stab. Probs.: Drainage of cutbanks in wet areas, plant willow shoots, wide ditch, bench high cutbanks	
Bedrock Hydro. Charac.	N/A	Lim. to Regen.: Coarse textures limit fertility		Waste and Fill Failure	
Hydrologic Group	B	Recom. Tree Species: Douglas-fir		H	
Expect. Sed. Size	Surface-Sand, silt Subsoil-Silt, gr.	Susc. to Soil and Other Res. Dam. by Harvest		Suit. of Cutbnk. Seeding	
Sed. Yield Potential	M	Type of Damage: Increased slide activity, road waste damage to resources		P	
Water Res. Mgt. Req.	M	RECREATION		Lim. to Cutbnk. Seeding: Raveling, coarse textures limit fertility and soil moisture	
Soil Suit. for Rec. Dev.		U	Recom. Slash Disposal	1/4	
Soil Limits to Rec. Dev.: Steep slopes		Cons. for Mgt. Pract.: Skyline on slopes over 60%, minimize spur roads, end haul		Recom. for Cutbnk. Seeding: Seed grass along with planting willow shoots, fertilize and mulch	
Treat. Req. to Inc. Suit.: No recommendations		ENGINEERING		Suit. of Fill Seeding	
		Unified Class	Surface- SM-d Subsoil- <sup>SW-SM</sup> to GW	F	
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source		Lim. to Fill Seeding: Raveling	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source		Recom. for Fill Seeding: Seed, fertilize & mulch; terrace, protect from road maintenance waste	
Susceptibility to Mud	N/A	Suit. as Clay Source		<p style="text-align: center;"><u>LEGEND</u></p> F = Fair                      In = Increased G = Good                      T = Thin U = Unsited                  Th = Thick S = Sited                      Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor                      V = Very W = Well                      St = Steep Sl = Slight                    Fl = Flat Se = Severe Un = Unchanged	
Trail Suitability	M	Suitability of Bedrock for Roadrock			
Limitations for Trails: Steep slopes		Limit of Bedrk. for Roadrk.			
		N/A			

MAPPING UNIT 43  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness		Th		
Surface Eros. Potential		VSe	Water bar, prevent over-use		Cons. for Rd. Loc. & Const.:			
Natural Stability		II-III	Suit. for Sewage F.F.		P	Steep slopes, raveling, damage to resources from sidecast waste		
Nature of Mass Movement: Small debris slides		Soil Lim. to Sewage F.F.: Primarily steep slopes, drainage restriction at depth		Method of Excav.: Blading				
Exp. Mass Mvmt. from Man's Act.		In	<b>TIMBER MANAGEMENT</b>					
Subsoil Eros. Pot.		H						
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Windthrow Hazard		M	Subsoil Erosion Pot.		H	
Water Yield Class		III	Susc. to Brush Reveg.		L	Cutbnk. Slough. & Rav.		H
Bedrock Hydro. Charac.		N/A	Susc. to Alder Reveg.		L	Est. Cutslope Ratio		ST-M
Hydrologic Group		A	Potential for Regen.		M	Prob. of Cutbnk. Fail.		III & IV
Expect. Sed. Size		Surface - Sand, silt		Cons. for Cutbnk. Stab. Probs.:				
		Subsoil - cinders		Plant willow shoots, prepare wide ditch to serve as a catch area				
Sed. Yield Potential		M	Lim. to Regen.:		Waste and Fill Failure			H
		Low fertility		Suit. of Cutbnk. Seeding				P
Water Res. Mgt. Req.		M	Recom. Tree Species: Douglas-fir, true fir		Lim. to Cutbnk. Seeding:			
<b>RECREATION</b>		Susc. to Soil and Other Res. Dam. by Harvest		H	Coarse textured cinders are droughty and very low in fertility			
		Type of Damage: Structure easily destroyed resulting in increased erosion and loss of productivity		Recom. for Cutbnk. Seeding: Seeding not recommended				
Soil Suit. for Rec. Dev.		U-M	Recom. Slash Disposal		1/4	Suit. of Fill Seeding		P
Soil Limits to Rec. Dev.: Unsuited on steep slopes, moderate on gentle slopes; fragile soils		Cons. for Mgt. Pract.:		Lim. to Fill Seeding:				
Treat. Req. to Inc. Suit.:		Skyline on slopes over 60%, end haul surplus waste on slopes over 50%		Raveling, low fertility				
No recommendations		<b>ENGINEERING</b>				Recom. for Fill Seeding:		
Soil and Site Dam. Susc.		Unified Class		Surface - SM-u		Seed, fertilize and mulch; terrace, protect from road maintenance waste		
				Subsoil - GW				
Susceptibility to Dust		M	Suit. as Topsoil Source		U	<b>LEGEND</b> F = Fair      In = Increases G = Good      T = Thin U = Unsited   Th = Thick S = Suited    Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor      V = Very W = Well      St = Steep Sl = Slight   Fl = Flat Se = Severe Un = Unchanged		
Susceptibility to Mud		M	Suitability as Sand, Gravel Source		U			
Trail Suitability		M	Suit. as Clay Source		U			
Limitations for Trails:		Suitability of Bedrock for Roadrock		N/A				
Steep slopes		Limit of Bedrk. for Roadrk.		N/A				

MAPPING UNIT 45  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	VT
Surface Eros. Potential	VSe	Water bar, rotate use		Cons. for Rd. Loc. & Const.:	
Natural Stability	II-IV	Suit. for Sewage F.F.	P	Rugged, dissected high damage to scenic areas	
Nature of Mass Movement: Debris slides, rockfall		Soil Lim. to Sewage F.F.: Shallow soils		Method of Excav.: Blasting	
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	N/A
Subsoil Eros. Pot.	H			Windthrow Hazard	N/A
Recom. for Controlling Subsoil Erosion: Prevent use concentration, water bar trails, rotate trails, re-vegetate barren areas		Susc. to Brush Reveg.	N/A	Est. Cutslope Ratio	St
Water Yield Class		Susc. to Alder Reveg.	N/A	Prob. of Cutbnk. Fail.	II-IV
		Potential for Regen.	N/A	Cons. for Cutbnk. Stab. Probs.:	
Bedrock Hydro. Charac.	N/A	Lim. to Regen.: N/A		No special considerations	
Hydrologic Group	B	Recom. Tree Species: N/A		Waste and Fill Failure	H
Expect. Sed. Size	Surface-Sand, silt Subsoil-Sand, silt			Susc. to Soil and Other Res. Dam. by Harvest	N/A
Sed. Yield Potential	M	Type of Damage: N/A		Lim. to Cutbnk. Seeding: Very shallow soil, exposed rock in cutbank, high elevation; short growing season	
Water Res. Mgt. Req.	M	<b>RECREATION</b>		Recom. for Cutbnk. Seeding: Seeding not recommended	
Soil Suit. for Rec. Dev.	M			Recom. Slash Disposal	N/A
Soil Limits to Rec. Dev.: Fragile soil; vegetation is easily destroyed by trampling and overgrazing		Cons. for Mgt. Pract.: N/A		Lim. to Fill Seeding: Low fertility, poor adaptability of available seed source, high elevation	
Treat. Req. to Inc. Suit.: Rotate use, prevent overgrazing and excessive trampling		<b>ENGINEERING</b>		Recom. for Fill Seeding: Use native species, fertilize and mulch	
Soil and Site Dam. Susc.		Unified Class	Surface - SM-u Subsoil --	<b>LEGEND</b>	
		Suit. as Topsoil Source	U		
Susceptibility to Dust	M	Suitability as Sand, Gravel Source	U	F = Fair	In = Increases
Susceptibility to Mud	L	Suit. as Clay Source	U	G = Good	T = Thin
Trail Suitability	M	Suitability of Bedrock for Roadrock	P-G	U = Unsuitable	Th = Thick
Limitations for Trails: Steep rugged slopes in many areas, damage to soil from trail use		Limit of Bedrk. for Roadrk.: variable		S = Suited	Gr = Greatly
				L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor	V = Very
				W = Well	St = Steep
				Sl = Slight	Fl = Flat
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 47  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T- Th
Surface Eros. Potential	Vse	Water bar, rotate use		Cons. for Rd. Loc. & Const.:	
Natural Stability	II- III	Suit. for Sewage F.F.	P	Frost heave potential sloughing, high damage to scenic area	
Nature of Mass Movement: Debris slides		Soil Lim. to Sewage F.F.: Restricted drainage, com- pact subsoils, subsoils freeze		Method of Excav.:	
Exp. Mass Mvmt. from Man's Act.	In	TIMBER MANAGEMENT		Blading and some ripping	
Subsoil Eros. Pot.	H	Windthrow Hazard	N/A	Subsoil Erosion Pot.	H
Recom. for Controlling Sub- soil Erosion: Water bar, prevent water concentration, rotate trails, revegetate barren areas		Susc. to Brush Reveg.	N/A	Cutbnk. Slough. & Rav.	L-M
		Susc. to Alder Reveg.	N/A	Est. Cutslope Ratio	M-St
Water Yield Class	III	Potential for Regen.	N/A	Prob. of Cutbnk. Fail.	III
Bedrock Hydro. Charac.	N/A	Lim. to Regen.:	N/A	Cons. for Cutbnk. Stab. Probs.:	
Hydrologic Group	B			No special considerations	
Expect. Sed. Size	Surface-Sand, silt	Recom. Tree Species:		Waste and Fill Failure	H
	Subsoil-Sand, gr.	N/A		Suit. of Cutbnk. Seeding	P
Sed. Yield Potential	M	Susc. to Soil and Other Res. Dam. by Harvest	N/A	Lim. to Cutbnk. Seeding: Low fertility, poor adapta- bility of available grass species, high elevation	
Water Res. Mgt. Req.	M	Type of Damage:		Recom. for Cutbnk. Seeding: Use native species, ferti- lize and mulch	
RECREATION		N/A			
Soil Suit. for Rec. Dev.	M	Recom. Slash Disposal	N/A	Suit. of Fill Seeding	P
Soil Limits to Rec. Dev.: Fragile soil, vegetation is easily destroyed by tramp- ling and overgrazing		Cons. for Mgt. Pract.:		Lim. to Fill Seeding: Low fertility, poor adaptability of available grass, high elevation	
Treat. Req. to Inc. Suit.:		ENGINEERING		Recom. for Fill Seeding:	
Rotate use, prevent over- grazing and excessive trampling		Unified Class	Surface- SM-u Subsoil- SM-d to CW	Use native species, ferti- lize and mulch	
Soil and Site Dam. Susc.	H	Suit. as Topsoil Source	U	<u>LEGEND</u>	
Susceptibility to Dust	M	Suitability as Sand, Gravel Source	U	F = Fair	In = Increased
Susceptibility to Mud	L	Suit. as Clay Source	U	G = Good	T = Thin
Trail Suitability	M	Suitability of Bedrock for Roadrock	N/A	U = Unsuitable	Th = Thick
Limitations for Trails: Damage to soils from trail erosion		Limit of Bedrk. for Roadrk.:	N/A	S = Suited	Gr = Greatly
				L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor	V = Very
				W = Well	St = Steep
				Sl = Slight	Fl = Flat
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 50  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential	N/A	No recommendations		Cons. for Rd. Loc. & Const.: Steep, rugged slopes; damage to other resources from sidecast waste	
Natural Stability	II-III	Suit. for Sewage F.F.	N/A	Method of Excav.: Blasting and ripping	
Nature of Mass Movement: Debris slides and rockfall		Soil Lim. to Sewage F.F.: N/A		Subsoil Erosion Pot.	
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		N/A	
Subsoil Eros. Pot.	N/A	Windthrow Hazard	N/A	Cutbnk. Slough. & Rav.	M
Recom. for Controlling Subsoil Erosion: N/A		Susc. to Brush Reveg.	N/A	Est. Cutslope Ratio	St
		Susc. to Alder Reveg.	N/A	Prob. of Cutbnk. Fail.	II&III
Water Yield Class	III	Potential for Regen.	N/A	Cons. for Cutbnk. Stab. Probs.: No special considerations	
Bedrock Hydro. Charac.	II	Lim. to Regen.: N/A		Waste and Fill Failure	
Hydrologic Group	N/A			M	
Expect. Sed. Size	Surface- N/A	Recom. Tree Species: N/A		Suit. of Cutbnk. Seeding	
	Subsoil- N/A			N/A	
Sed. Yield Potential	N/A	Susc. to Soil and Other Res. Dam. by Harvest	N/A	Lim. to Cutbnk. Seeding: N/A	
Water Res. Mgt. Req.	N/A	Type of Damage: N/A		Recom. for Cutbnk. Seeding: N/A	
<b>RECREATION</b>					
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	N/A	Suit. of Fill Seeding	
Soil Limits to Rec. Dev.: Steep, rock slopes		Cons. for Mgt. Pract.: N/A		N/A	
Treat. Req. to Inc. Suit.: No recommendations		<b>ENGINEERING</b>		Recom. for Fill Seeding: N/A	
		Unified Class	Surface - N/A		
			Subsoil - N/A		
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	N/A	<b>LEGEND</b>	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	N/A	F = Fair	In = Increased
Susceptibility to Mud	N/A	Suit. as Clay Source	N/A	G = Good	T = Thin
Trail Suitability	P	Suitability of Bedrock for Roadrock	F-P	U = Unsited	Th = Thick
Limitations for Trails: Steep, rock slopes		Limit of Bedrk. for Roadrk.: Graywacke portion is fair, siltstone portion is poor as it rapidly breaks down		S = Sited	Gr = Greatly
				L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor	V = Very
				W = Well	St = Steep
				Sl = Slight	F1 = Flat
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 51  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential	Se	Water bar		Cons. for Rd. Loc. & Const.: Steep slopes, side cast waste damage	
Natural Stability	II	Suit. for Sewage F.F.	N/A	Method of Excav.: Ripping and blasting	
Nature of Mass Movement: Small debris slides		Soil Lim. to Sewage F.F.: N/A		Subsoil Erosion Pot.	
Exp. Mass Mvmt. from Man's Act.	Un	<b>TIMBER MANAGEMENT</b>		N/A	
Subsoil Eros. Pot.	H	Windthrow Hazard	M-H	Cutbnk. Slough. & Rav.	
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	M	Est. Cutslope Ratio	
Water Yield Class		Susc. to Alder Reveg.	L	Prob. of Cutbnk. Fail.	
Bedrock Hydro. Charac.	II	Potential for Regen.	M	Cons. for Cutbnk. Stab. Probs.: No special considerations	
Hydrologic Group	B	Lim. to Regen.: Low fertility, climatic limitations, soil moisture limitations		Waste and Fill Failure	
Expect. Sed. Size	Surface-Sand, silt Subsoil-Sand, silt	Recom. Tree Species: Douglas-fir, true fir		Suit. of Cutbnk. Seeding	
Sed. Yield Potential	M	Susc. to Soil and Other Res. Dam. by Harvest	M	Lim. to Cutbnk. Seeding: Exposed bedrock, lack of soil	
Water Res. Mgt. Req.	L-M	Type of Damage: Increase erosion, road waste damage to resources		Recom. for Cutbnk. Seeding: Seeding not recommended	
<b>RECREATION</b>		Recom. Slash Disposal		Suit. of Fill Seeding	
Soil Suit. for Rec. Dev.	U	Cons. for Mgt. Pract.: End haul on all slopes over 60%, minimize spur road construction		Lim. to Fill Seeding: Extensive raveling, low fertility	
Soil Limits to Rec. Dev.: Steep slopes		<b>ENGINEERING</b>		Recom. for Fill Seeding: Seed, fertilize and mulch; protect from maintenance waste, terrace	
Treat. Req. to Inc. Suit.: No recommendations		Unified Class	Surface - <sup>SW-SM</sup> to SM-U Subsoil --	LEGEND	
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	U	F = Fair	In = Increased
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	U	G = Good	T = Thin
Susceptibility to Mud	N/A	Suit. as Clay Source	U	U = Unsuitd	Th = Thick
Trail Suitability	M	Suitability of Bedrock for Roadrock	F-P	S = Suited	Gr = Greatly
Limitations for Trails: Steep slopes		Limit of Bedrk. for Roadrk.: Graywacke portion is fair, siltstone portion is poor as it rapidly breaks down		L = Low	M = Medium or Moderate
				H = High	P = Poor
				W = Well	V = Very
				Sl = Slight	St = Steep
				Se = Severe	Fl = Flat
				Un = Unchanged	

MAPPING UNIT 52  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential		Water bar		Cons. for Rd. Loc. & Const.: Steep, dissected slopes, poor alignment, sidecast damage to resources	
Natural Stability		Suit. for Sewage F.F.		N/A	
Nature of Mass Movement: Debris slides; rockfall		Soil Lim. to Sewage F.F.:		Method of Excav.:	
Exp. Mass Mvmt. from Man's Act.		N/A		Ripping and blasting	
Subsoil Eros. Pot.		TIMBER MANAGEMENT		Subsoil Erosion Pot.	
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Windthrow Hazard		N/A	
Water Yield Class		Susc. to Brush Reveg.		Cutbnk. Slough. & Rav.	
Bedrock Hydro. Charac.		Susc. to Alder Reveg.		M	
Hydrologic Group		Potential for Regen.		Est. Cutslope Ratio	
Expect. Sed. Size		Lim. to Regen.: Low fertility, climatic limitations, soil moisture limitations		St	
Sed. Yield Potential		Recom. Tree Species: Douglas-fir, true fir		Prob. of Cutbnk. Fail.	
Water Res. Mgt. Req.		Susc. to Soil and Other Res. Dam. by Harvest		II & III	
RECREATION		Type of Damage: Increased erosion and slide hazard, high road waste damage to resources		Cons. for Cutbnk. Stab. Probs.:	
Soil Suit. for Rec. Dev.		Recom. Slash Disposal		No special considerations	
Soil Limits to Rec. Dev.:		Cons. for Mgt. Pract.:		Waste and Fill Failure	
Treat. Req. to Inc. Suit.:		Unified Class		H	
No recommendations		Surface-Subsoil		Suit. of Cutbnk. Seeding	
Soil and Site Dam. Susc.		Suit. as Topsoil Source		P	
Susceptibility to Dust		Suitability as Sand, Gravel Source		Lim. to Cutbnk. Seeding:	
Susceptibility to Mud		Suit. as Clay Source		Exposed bedrock, lack of soil	
Trail Suitability		Suitability of Bedrock for Roadrock		Recom. for Cutbnk. Seeding:	
Limitations for Trails:		Limit of Bedrk. for Roadrk. Graywacke portion is fair, siltstone portion is poor as it rapidly breaks down		Seeding not recommended	
		ENGINEERING		Suit. of Fill Seeding	
		Surface-Subsoil		P	
		Suit. as Topsoil Source		Lim. to Fill Seeding:	
		Suitability as Sand, Gravel Source		Extensive raveling, low fertility	
		Suit. as Clay Source		Recom. for Fill Seeding:	
		Suitability of Bedrock for Roadrock		Seed, fertilize and mulch; protect from maintenance waste, terrace	
		Limit of Bedrk. for Roadrk. Graywacke portion is fair, siltstone portion is poor as it rapidly breaks down		LEGEND	
				F = Fair                      In = Increased	
				G = Good                     T = Thin	
				U = Unsuitd                 Th = Thick	
				S = Suited                 Gr = Greatly	
				L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor                     V = Very	
				W = Well                    St = Steep	
				Sl = Slight                 Fl = Flat	
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 54  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T-Th
Surface Eros. Potential	Se	Water bar		Cons. for Rd. Loc. & Const.: Steep slopes, damage to resources from sidecast waste	
Natural Stability	II-III	Suit. for Sewage F.F.	N/A	Method of Excav.: Ripping, blasting	
Nature of Mass Movement: Debris slides		Soil Lim. to Sewage F.F.: N/A		Subsoil Erosion Pot.	
Exp. Mass Mvmt. from Man's Act.	In	TIMBER MANAGEMENT		N/A	
Subsoil Eros. Pot.	H	Windthrow Hazard	L-M	Cutbnk. Slough. & Rav.	
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	M	Est. Cutslope Ratio	
		Susc. to Alder Reveg.	L	Prob. of Cutbnk. Fail.	
Water Yield Class	II	Potential for Regen.	M-H	Cons. for Cutbnk. Stab. Probs.: No special considerations	
Bedrock Hydro. Charac.	II	Lim. to Regen.: Climatic limitations		Waste and Fill Failure	
Hydrologic Group	B			M-H	
Expect. Sed. Size	Surface-Sand, silt		Recom. Tree Species: Douglas-fir	Suit. of Cutbnk. Seeding	
	Subsoil-Sand, silt			F	
Sed. Yield Potential	M	Susc. to Soil and Other Res. Dam. by Harvest	M	Lim. to Cutbnk. Seeding: Generally much exposed bedrock	
Water Res. Mgt. Req.	L-M	Type of Damage: Increased erosion, compaction, road waste damage to resources		Recom. for Cutbnk. Seeding: Seed, fertilize and mulch	
RECREATION					
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	1/4	Suit. of Fill Seeding	
Soil Limits to Rec. Dev.: Steep slopes		Cons. for Mgt. Pract.: End haul surplus road waste on slopes over 60%		Lim. to Fill Seeding: Raveling, low fertility	
Treat. Req. to Inc. Suit.: No recommendations		ENGINEERING		Recom. for Fill Seeding: Seed, fertilize and mulch; protect from maintenance waste	
Soil and Site Dam. Susc.	N/A	Unified Class	Surface - GM-u to SM-u	LEGEND	
			Subsoil - GM-u to SM-u		
Susceptibility to Dust	N/A	Suit. as Topsoil Source	U	F = Fair	In = Increased
Susceptibility to Mud	N/A	Suitability as Sand, Gravel Source	U	G = Good	T = Thin
Trail Suitability	M	Suit. as Clay Source	U	U = Unsuitable	Th = Thick
Limitations for Trails: Steep slopes		Suitability of Bedrock for Roadrock	P	S = Suited	Gr = Greatly
		Limit of Bedrk. for Roadrk.: Rapidly breaks down under logging traffic		L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor	V = Very
				W = Well	St = Steep
				S1 = Slight	F1 = Flat
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 56  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness		Th				
Surface Eros. Potential		Se	Water bar, gravel surface, restrict use of horse and motor scooter		Cons. for Rd. Loc. & Const.: Wetness, poor alignment, unstable soils, high road maintenance cost					
Natural Stability		IV -V	Suit. for Sewage F.F.		N/A					
Nature of Mass Movement: Debris slides		Soil Lim. to Sewage F.F.:		Method of Excav.:						
		N/A		Blading						
Exp. Mass Mvmt. from Man's Act.		Gr In	TIMBER MANAGEMENT					Subsoil Erosion Pot.		H
Subsoil Eros. Pot.		M-H						Windthrow Hazard		M
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.		M		Est. Cutslope Ratio		M		
		Susc. to Alder Reveg.		L-M		Prob. of Cutbnk. Fail.		IV & V		
Water Yield Class		I	Potential for Regen.		M-H		Cons. for Cutbnk. Stab. Probs.: Cutbank drainage in wet areas, plant willow shoots, prepare wide ditch to serve as a catch area			
Bedrock Hydro. Charac.		II	Lim. to Regen.: Climatic limitations at higher elevations, surface slides					Waste and Fill Failure		H
Hydrologic Group		D	Recom. Tree Species: Douglas-fir		Suit. of Cutbnk. Seeding					F
Expect. Sed. Size	Surface-Sand, silt		Susc. to Soil and Other Res. Dam. by Harvest		H		Lim. to Cutbnk. Seeding: Raveling and cutbank failures			
Sed. Yield Potential		H	Type of Damage: Greatly increased mass movement, erosion and sedimentation					Recom. for Cutbnk. Seeding: Seed, fertilize and mulch		
Water Res. Mgt. Req.		H	RECREATION		Recom. Slash Disposal					$\frac{1}{4}$
Soil Suit. for Rec. Dev.		U	Cons. for Mgt. Pract.: Sky-line, limit road construction, end haul all surplus waste		Suit. of Fill Seeding					F
Soil Limits to Rec. Dev.: Steep slopes, unstable		ENGINEERING		Lim. to Fill Seeding: Raveling and surface slides						
Treat. Req. to Inc. Suit.:		No recommendations		Unified Class		Surface-SM-u		Recom. for Fill Seeding: Seed, fertilize and mulch; protect from road maintenance waste		
						Subsoil-SC				
Soil and Site Dam. Susc.		N/A	Suit. as Topsoil Source		U		LEGEND F = Fair            In = Increases G = Good            T = Thin U = Unsuitied      Th = Thick S = Suited          Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor            V = Very W = Well            St = Steep Sl = Slight          Fl = Flat Se = Severe Un = Unchanged			
Susceptibility to Dust		N/A	Suitability as Sand, Gravel Source		U					
Susceptibility to Mud		N/A	Suit. as Clay Source		S					
Trail Suitability		P	Suitability of Bedrock for Roadrock		N/A					
Limitations for Trails: Steep dissected slopes, unstable		Limit of Bedrk. for Roadrk.:		N/A						

MAPPING UNIT 60  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential	N/A	No recommendations		Cons. for Rd. Loc. & Const.: Steep rugged slopes, damage to other resources from side cast waste	
Natural Stability	II-IV	Suit. for Sewage F.F.	N/A	Method of Excav.: Blasting and ripping	
Nature of Mass Movement: Debris slides and rockfall		Soil Lim. to Sewage F.F.: N/A		Subsoil Erosion Pot.	
Exp. Mass Mvmt. from Man's Act.	In	TIMBER MANAGEMENT		N/A	
Subsoil Eros. Pot.	N/A			Cutbnk. Slough. & Rav.	
Recom. for Controlling Subsoil Erosion: N/A		Windthrow Hazard	N/A	Est. Cutslope Ratio	St
Water Yield Class		Susc. to Brush Reveg.	N/A	Prob. of Cutbnk. Fail.	II & III
Bedrock Hydro. Charac.	II	Susc. to Alder Reveg.	N/A	Cons. for Cutbnk. Stab. Probs.: No special considerations	
Hydrologic Group	N/A	Potential for Regen.	N/A	Waste and Fill Failure	
Expect. Sed. Size	Surface	Lim. to Regen.: N/A		M	
	Subsoil	Recom. Tree Species: N/A		Suit. of Cutbnk. Seeding	
Sed. Yield Potential	N/A	Susc. to Soil and Other Res. Dam. by Harvest		N/A	
Water Res. Mgt. Req.	N/A	Type of Damage: N/A		Lim. to Cutbnk. Seeding: N/A	
RECREATION		Recom. Slash Disposal		Recom. for Cutbnk. Seeding: N/A	
Soil Suit. for Rec. Dev.	U	Cons. for Mgt. Pract.: N/A		Suit. of Fill Seeding	
Soil Limits to Rec. Dev.: Steep, rock slopes		ENGINEERING		Lim. to Fill Seeding: N/A	
Treat. Req. to Inc. Suit.: No recommendations		Unified Class	Surface	Recom. for Fill Seeding: N/A	
Soil and Site Dam. Susc.			N/A	<p style="text-align: center;"><u>LEGEND</u></p> <p>F = Fair            In = Increased G = Good            T = Thin U = Unsited        Th = Thick S = Sited           Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor            V = Very W = Well            St = Steep Sl = Slight        Fl = Flat Se = Severe Un = Unchanged</p>	
Susceptibility to Dust		Suit. as Topsoil Source	N/A		
Susceptibility to Mud		Suitability as Sand, Gravel Source	N/A		
Trail Suitability		Suit. as Clay Source	N/A		
Limitations for Trails: Steep, rock slopes		Suitability of Bedrock for Roadrock	F		

MAPPING UNIT 61  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential	Se	Water bar		Cons. for Rd. Loc. & Const.: very steep, damage to resources from sidecast waste	
Natural Stability	II	Suit. for Sewage F.F.	N/A		
Nature of Mass Movement: Debris slides		Soil Lim. to Sewage F.F.:		Method of Excav.: Ripping and blasting	
Exp. Mass Mvmt. from Man's Act.	In	N/A		Subsoil Erosion Pot.	
Subsoil Eros. Pot.	H	TIMBER MANAGEMENT		N/A	
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Windthrow Hazard	H	Cutbnk. Slough. & Rav.	
		Susc. to Brush Reveg.	M	L-M	
		Susc. to Alder Reveg.	L	Est. Cutslope Ratio	
Water Yield Class	III	Potential for Regen.	L-M	St	
Bedrock Hydro. Charac.	II	Lim. to Regen.: Low fertility, climatic limitations at higher elevations, soil moisture limitations		Prob. of Cutbnk. Fail.	
Hydrologic Group	B			II	
Expect. Sed. Size	Surface-Sand, silt		Recom. Tree Species: Douglas-fir, true fir	Cons. for Cutbnk. Stab. Probs.:	
	Subsoil Sand, silt			No special considerations	
Sed. Yield Potential	M	Susc. to Soil and Other Res. Dam. by Harvest	M	Waste and Fill Failure	
Water Res. Mgt. Req.	L-M	Type of Damage: Increased sheet erosion and slide hazard, road waste damage to resources		M-H	
RECREATION				Suit. of Cutbnk. Seeding	
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	1/4	P	
Soil Limits to Rec. Dev.:		Cons. for Mgt. Pract.:		Lim. to Cutbnk. Seeding:	
Steep slopes		End haul surplus road waste on slopes over 60%		Low fertility, snow slough, exposed bedrock	
Treat. Req. to Inc. Suit.:		ENGINEERING		Recom. for Cutbnk. Seeding:	
No recommendations		Unified Class	Surface- SW-SM to SM-d Subsoil	Seeding not recommended	
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source		Suit. of Fill Seeding	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source		P	
Susceptibility to Mud	N/A	Suit. as Clay Source		Lim. to Fill Seeding:	
Trail Suitability	M	Suitability of Bedrock for Roadrock		Extensive raveling, low fertility	
Limitations for Trails: Steep slopes		Limit of Bedrk. for Roadrk. Bedrock is only fair quality due to age, origin and alteration		Recom. for Fill Seeding:	
				Seed, fertilize and mulch; protect from maintenance waste, terrace	

**LEGEND**

F = Fair	In = Increased
G = Good	T = Thin
U = Unsited	Th = Thick
S = Sited	Gr = Greatly
L = Low	
M = Medium or Moderate	
H = High	
P = Poor	V = Very
W = Well	St = Steep
Sl = Slight	Fl = Flat
Se = Severe	
Un = Unchanged	

MAPPING UNIT 62  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements: water bar		Est. Roadrock Thickness	T
Surface Eros. Potential	Se			Cons. for Rd. Loc. & Const.: Steep, dissected slopes; poor alignment, damage to resources from sidecast waste	
Natural Stability	II- III	Suit. for Sewage F.F.	N/A		
Nature of Mass Movement: Debris slides and rockfall		Soil Lim. to Sewage F.F.: N/A		Method of Excav.: Ripping and blasting	
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	N/A
Subsoil Eros. Pot.	H			Cutbnk. Slough. & Rav.	L-M
Recom. for Controlling Subsoil Erosion: Waterbar, prevent water concentration, revegetate barren areas, mulch		Windthrow Hazard	H	Est. Cutslope Ratio	St
		Susc. to Brush Reveg.	M	Prob. of Cutbnk. Fail.	II& III
		Susc. to Alder Reveg.	L	Cons. for Cutbnk. Stab. Probs.:	
Water Yield Class	III	Potential for Regen.	L-M	No special considerations	
Bedrock Hydro. Charac.	II	Lim. to Regen.: Low fertility, climatic limitations at higher elevations, soil moisture limitations		Waste and Fill Failure	
Hydrologic Group	B			Suit. of Cutbnk. Seeding	P
Expect. Sed. Size	Surface-Sand, silt		Recom. Tree Species: Douglas-fir, true fir		Lim. to Cutbnk. Seeding: Low fertility, snow slough, exposed bedrock
	Subsoil-Sand, silt				Recom. for Cutbnk. Seeding: Seeding not recommended
Sed. Yield Potential	M	Susc. to Soil and Other Res. Dam. by Harvest		Recom. for Cutbnk. Seeding: Seeding not recommended	
Water Res. Mgt. Req.	M	Type of Damage: Increased sheet erosion and slide hazard, road waste damage to resources		Suit. of Fill Seeding	P
<b>RECREATION</b>				Lim. to Fill Seeding: Extensive raveling, low fertility	
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	$\frac{1}{4}$	Recom. for Fill Seeding: Seed, fertilize and mulch; protect from maintenance waste, terrace	
Soil Limits to Rec. Dev.: Steep dissected slopes		Cons. for Mgt. Pract.: Sky-line on drainages, minimize spur roads, end haul surplus waste			
Treat. Req. to Inc. Suit.: No recommendations		<b>ENGINEERING</b>			
		Unified Class	Surface - SW-SM to SM-d		
			Subsoil		
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	U	<b>LEGEND</b>	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	U	F = Fair	In = Increases
Susceptibility to Mud	N/A	Suit. as Clay Source	U	G = Good	T = Thin
Trail Suitability	M	Suitability of Bedrock for Roadrock	F-P	U = Unsuitied	Th = Thick
Limitations for Trails: Steep, dissected slopes		Limit of Bedrk. for Roadrk.: Bedrock has limited value due to age, origin and alteration		S = Suited	Gr = Greatly
				L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor	V = Very
				W = Well	St = Steep
				S1 = Slight	F1 = Flat
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 66  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements: Water bar, gravel surface, restrict use of horse and motor scooter	Est. Roadrock Thickness	Th	
Surface Eros. Potential	Se	Suit. for Sewage F.F.	Cons. for Rd. Loc. & Const.:		
Natural Stability	IV-V		Very unstable, cutbank and fill failures, poor alignment, sidecast waste damage		
Nature of Mass Movement: Deep seated debris slides and slumps		Soil Lim. to Sewage F.F.:	Method of Excav.:		
		N/A	Blading		
Exp. Mass Mvmt. from Man's Act.	Gr In	TIMBER MANAGEMENT			
Subsoil Eros. Pot.	M-H	Windthrow Hazard	M	Subsoil Erosion Pot.	
Recom. for Controlling Sub- soil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	L-M	Cutbnk. Slough. & Rav.	
		Susc. to Alder Reveg.	L-M	Est. Cutslope Ratio	
Water Yield Class	I	Potential for Regen.	M	Prob. of Cutbnk. Fail.	
				IV	
Bedrock Hydro. Charac.	IV	Lim. to Regen.: Climatic limitations at higher ele- vations, surface slides		Cons. for Cutbnk. Stab. Probs.:	
Hydrologic Group	P			Use drainage on cutslopes, stabilize with willow plant- ings, prepare wide ditch to serve as catch area	
Expect. Sed. Size	Surface - Sand, silt Subsoil - Silt, clay	Recom. Tree Species: Douglas-fir		Waste and Fill Failure	
				H	
Sed. Yield Potential	H	Susc. to Soil and Other Res. Dam. by Harvest	H	Suit. of Cutbnk. Seeding	
Water Res. Mgt. Req.	H	Type of Damage: Greatly in- creased mass movement, sed- imentation and damage to resources from sidecast		F	
RECREATION				Lim. to Cutbnk. Seeding:	
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	1/4	Low fertility, raveling, cutbank failure	
Soil Limits to Rec. Dev.: Steep, unstable slopes		Cons. for Mgt. Pract.: Sky- line, limit road construc- tion, end haul surplus waste		Recom. for Cutbnk. Seeding:	
				Seed, fertilize and mulch	
Treat. Req. to Inc. Suit.:		ENGINEERING			
No recommendations		Unified Class	Surface - SM-u Subsoil - SC	Suit. of Fill Seeding	
				F	
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	U	Lim. to Fill Seeding:	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	U	Raveling, surface slides	
Susceptibility to Mud	N/A	Suit. as Clay Source	S	LEGEND	
Trail Suitability	P	Suitability of Bedrock for Roadrock	U	F = Fair	In = Increased
Limitations for Trails: Steep, unstable slopes		Limit of Bedrk. for Roadrk.:		G = Good	T = Thin
		Highly weathered and saprolitic, rapidly breaks down		U = Unsuitd	Th = Thick
				S = Suited	Gr = Greatly
				L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor	V = Very
				W = Well	St = Steep
				Sl = Slight	Fl = Flat
				Se = Severe	
				Un = Unchanged	



MAPPING UNIT 71  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential	Se	Water bar		Cons. for Rd. Loc. & Const.: Steep slopes, high damage from sidecast waste	
Natural Stability	II	Suit. for Sewage F.F.	N/A	Method of Excav.: Ripping and blasting	
Nature of Mass Movement: Debris slides and rockfall		Soil Lim. to Sewage F.F.: N/A		Subsoil Erosion Pot.	
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		N/A	
Subsoil Eros. Pot.	H	Windthrow Hazard	H	Cutbnk. Slough. & Rav.	L-M
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	L-M	Est. Cutslope Ratio	St
		Susc. to Alder Reveg.	L	Prob. of Cutbnk. Fail.	II
		Potential for Regen.	L-M	Cons. for Cutbnk. Stab. Probs.: No special considerations	
Water Yield Class	III	Lim. to Regen.: Low fertility, climatic limitations at higher elevations, soil moisture limitations		Waste and Fill Failure	
Bedrock Hydro. Charac.	II			M-H	
Hydrologic Group	B			Suit. of Cutbnk. Seeding	
Expect. Sed. Size	Surface-Sand, silt Subsoil-Sand, silt	Recom. Tree Species: Douglas-fir, true fir		Lim. to Cutbnk. Seeding: Exposed rock, lack of soil	
Sed. Yield Potential	M	Susc. to Soil and Other Res. Dam. by Harvest	M	Recom. for Cutbnk. Seeding: Seeding not recommended	
Water Res. Mgt. Req.	L-M	Type of Damage: Increased compaction, loss of soil structure, erosion, and road waste damage		Suit. of Fill Seeding	
<b>RECREATION</b>				Recom. Slash Disposal	
Soil Suit. for Rec. Dev.	U	Cons. for Mgt. Pract.: End haul surplus road waste on slopes over 60%		Lim. to Fill Seeding: Raveling, snow slough, low fertility	
Treat. Req. to Inc. Suit.: No recommendations		<b>ENGINEERING</b>		Recom. for Fill Seeding: Seed, fertilize and mulch; protect from road maintenance waste, terrace	
		Unified Class	Surface- Subsoil	SW-SM to SM-d --	
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	U	<b>LEGEND</b>	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	U	F = Fair	In = Increased
Susceptibility to Mud	N/A	Suit. as Clay Source	U	G = Good	T = Thin
Trail Suitability	M	Suitability of Bedrock for Roadrock	F-P	U = Unsuitable	Th = Thick
Limitations for Trails: Steep slopes		Limit of Bedrk. for Roadrk.: Rock breaks down under logging traffic after a few years use		S = Suited	Gr = Greatly
				L = Low	M = Medium or Moderate
				H = High	P = Poor
		W = Well	St = Steep	Se = Severe	Fl = Flat
		Un = Unchanged			

MAPPING UNIT 72  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential	Se	Water bar		Cons. for Rd. Loc. & Const.: very steep, dissected slopes	
Natural Stability	II-III	Suit. for Sewage F.F.	N/A	frequent rock outcrops, sidecast waste damage	
Nature of Mass Movement: Debris slides and rockfall		Soil Lim. to Sewage F.F.: N/A		Method of Excav.: Ripping and blasting	
Exp. Mass Mvmt. from Man's Act.	In	TIMBER MANAGEMENT		Subsoil Erosion Pot.	N/A
Subsoil Eros. Pot.	H			Windthrow Hazard	M
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	L-M	Est. Cutslope Ratio	St
Water Yield Class	III	Susc. to Alder Reveg.	L	Prob. of Cutbnk. Fail.	II&III
Bedrock Hydro. Charac.	II	Potential for Regen.	L-M	Cons. for Cutbnk. Stab. Probs.: No special considerations	
Hydrologic Group	B	Lim. to Regen.: Low fertility, climatic limitations at higher elevations, soil moisture limitations		Waste and Fill Failure	H
Expect. Sed. Size	Surface-Sand, silt Subsoil-Sand, silt	Recom. Tree Species: Douglas-fir, true fir		Suit. of Cutbnk. Seeding	P
Sed. Yield Potential	M	Susc. to Soil and Other Res. Dam. by Harvest	H	Lim. to Cutbnk. Seeding: Exposed bedrock, lack of soil	
Water Res. Mgt. Req.	M	Type of Damage: Increased compaction, loss of soil structure, erosion and slide hazard		Recom. for Cutbnk. Seeding: Seeding not recommended	
RECREATION		Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	$\frac{1}{4}$
Soil Limits to Rec. Dev.: Steep, dissected slopes		Cons. for Mgt. Pract.: Sky-line, minimize road construction, end haul surplus waste		Suit. of Fill Seeding	P
Treat. Req. to Inc. Suit.: No recommendations		ENGINEERING		Lim. to Fill Seeding: Raveling, snow slough, low fertility	
Soil and Site Dam. Susc.	N/A	Unified Class	Surface - SW-SM to SM-d	Recom. for Fill Seeding: Seed, fertilize and mulch; protect from road maintenance waste, terrace	
			Subsoil ---	LEGEND	
Susceptibility to Dust	N/A	Suit. as Topsoil Source	U	F = Fair	In = Increases
Susceptibility to Mud	N/A	Suitability as Sand, Gravel Source	U	G = Good	T = Thin
Trail Suitability	M	Suit. as Clay Source	U	U = Unsuitd	Th = Thick
Limitations for Trails: Steep, dissected slopes		Suitability of Bedrock for Roadrock	F-P	S = Suited	Gr = Greatly
		Limit of Bedrk. for Roadrk.: Rock breaks down after a few years use		L = Low	M = Medium or Moderate
				H = High	V = Very
				P = Poor	St = Steep
				W = Well	Fl = Flat
				Sl = Slight	
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 73  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	Th
Surface Eros. Potential	M	Water bar		Cons. for Rd. Loc. & Const.:	
Natural Stability	II	Suit. for Sewage F.F.	P	No special considerations	
Nature of Mass Movement: Small debris slides		Soil Lim. to Sewage F.F.:		Method of Excav.:	
Exp. Mass Mvmt. from Man's Act.		Shallow soils		Ripping and some blasting	
Subsoil Eros. Pot.	M	<b>TIMBER MANAGEMENT</b>			
Recom. for Controlling Sub- soil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Windthrow Hazard	L	Subsoil Erosion Pot.	M
Water Yield Class	II	Susc. to Brush Reveg.	H	Cutbnk. Slough. & Rav.	M
Bedrock Hydro. Charac.	II	Susc. to Alder Reveg.	H	Est. Cutslope Ratio	St-M
Hydrologic Group	B	Potential for Regen.	H	Prob. of Cutbnk. Fail.	II
Expect. Sed. Size	Surface-Sand, silt	Lim. to Regen.:		Cons. for Cutbnk. Stab. Probs.:	
	Subsoil-Sand, silt	N/A		No special considerations	
Sed. Yield Potential	M	Recom. Tree Species: Douglas-fir		Waste and Fill Failure	L
Water Res. Mgt. Req.	M	Susc. to Soil and Other Res. Dam. by Harvest	L	Suit. of Cutbnk. Seeding	F-G
<b>RECREATION</b>		Type of Damage: Soil compaction, damage to soil from cat blade		Lim. to Cutbnk. Seeding:	
Soil Suit. for Rec. Dev.	M	Recom. Slash Disposal	$\frac{2}{3}$	Exposed bedrock locally	
Soil Limits to Rec. Dev.: Moderate muddiness, shallowness restricts filter field use		Cons. for Mgt. Pract.: Remove cat blade when not needed		Recom. for Cutbnk. Seeding:	
Treat. Req. to Inc. Suit.:		<b>ENGINEERING</b>			
No recommendations		Unified Class	Surface- SM-u	Seed, fertilize and mulch	
Soil and Site Dam. Susc.	M		Subsoil- SM-u	Suit. of Fill Seeding	
Susceptibility to Dust	M	Suit. as Topsoil Source	U	Lim. to Fill Seeding:	
Susceptibility to Mud	M	Suitability as Sand, Gravel Source	U	None	
Trail Suitability	W	Suit. as Clay Source	U	Recom. for Fill Seeding:	
Limitations for Trails: N/A		Suitability of Bedrock for Roadrock	P	Seed, fertilize and mulch	
		Limit of Bedrk. for Roadrk. Bedrock is low quality schist that rapidly breaks down		<b>LEGEND</b>	
				F = Fair	In = Increased
				G = Good	T = Thin
				U = Unsited	Th = Thick
				S = Sited	Gr = Greatly
				L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor	V = Very
				W = Well	St = Steep
				Sl = Slight	Fl = Flat
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 74  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	Th
Surface Eros. Potential	Se	Water bar		Cons. for Rd. Loc. & Const.: Steep slopes, damage to resources from sidecast waste	
Natural Stability	II-III	Suit. for Sewage F.F.	N/A	Method of Excav.:	
Nature of Mass Movement: Small debris slides		Soil Lim. to Sewage F.F.:		Ripping and blasting	
Exp. Mass Mvmt. from Man's Act.	In	TIMBER MANAGEMENT		Subsoil Erosion Pot.	M
Subsoil Eros. Pot.	H			Cutbnk. Slough. & Rav.	M
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Windthrow Hazard	L-M	Est. Cutslope Ratio	ST-M
		Susc. to Brush Reveg.	H	Prob. of Cutbnk. Fail.	II & III
		Susc. to Alder Reveg.	H	Cons. for Cutbnk. Stab. Probs.:	
Water Yield Class	II	Potential for Regen.	H	No special considerations	
Bedrock Hydro. Charac.	II	Lim. to Regen.:			
Hydrologic Group	B	N/A		Waste and Fill Failure	H
Expect. Sed. Size	Surface-Sand, silt Subsoil-Sand, silt	Recom. Tree Species: Douglas-fir		Suit. of Cutbnk. Seeding	F
Sed. Yield Potential	M	Susc. to Soil and Other Res. Dam. by Harvest	M-H	Lim. to Cutbnk. Seeding: Much exposed bedrock	
Water Res. Mgt. Req.	M	Type of Damage: Increased compaction, loss of soil structure, erosion and sedimentation		Recom. for Cutbnk. Seeding: Seed, fertilize and mulch	
RECREATION		Recom. Slash Disposal	4		
Soil Suit. for Rec. Dev.	U	Cons. for Mgt. Pract.:		Suit. of Fill Seeding	F
Soil Limits to Rec. Dev.:	Steep slopes	End haul surplus road waste on all slopes over 60%		Lim. to Fill Seeding: Raveling	
Treat. Req. to Inc. Suit.:	No recommendations	ENGINEERING		Recom. for Fill Seeding: Protect from road maintenance waste; seed fertilize, and mulch	
		Unified Class	Surface SM-u Subsoil SM-u		
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	U	<p style="text-align: center;"><u>LEGEND</u></p> F = Fair                      In = Increases G = Good                      T = Thin U = Unsited                    Th = Thick S = Sited                      Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor                      V = Very W = Well                      St = Steep Sl = Slight                    Fl = Flat Se = Severe Un = Unchanged	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	U		
Susceptibility to Mud	N/A	Suit. as Clay Source	U		
Trail Suitability	M	Suitability of Bedrock for Roadrock	P		
Limitations for Trails:	Steep slopes	Limit of Bedrk. for Roadrk. Bedrock is low quality schist that rapidly breaks down			

MAPPING UNIT 75  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	Th
Surface Eros. Potential	M	Water bar		Cons. for Rd. Loc. & Const.: No special considerations	
Natural Stability	II	Suit. for Sewage F.F.	N/A		
Nature of Mass Movement: Small debris slides		Soil Lim. to Sewage F.F.: N/A		Method of Excav.: Ripping and some blasting	
Exp. Mass Mvmt. from Man's Act.	Un	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	M
Subsoil Eros. Pot.	M	Windthrow Hazard	L	Cutbnk. Slough. & Rav.	L-M
Recom. for Controlling Sub- soil Erosion: Water bar, prevent water concentration; revegetate barren areas, mulch		Susc. to Brush Reveg.	M	Est. Cutslope Ratio	St-M
		Susc. to Alder Reveg.	L	Prob. of Cutbnk. Fail.	II
		Potential for Regen.	M	Cons. for Cutbnk. Stab. Probs.: No special considerations	
Water Yield Class	II	Lim. to Regen.: Low fertility, climatic limitations at higher elevations		Waste and Fill Failure	L
Bedrock Hydro. Charac.	II	Recom. Tree Species: Douglas-fir		Suit. of Cutbnk. Seeding	G
Hydrologic Group	B			Susc. to Soil and Other Res. Dam. by Harvest	L
Expect. Sed. Size	Surface-Sand, silt Subsoil-Sand, silt	Type of Damage: Loss of soil structure, compaction, damage from cat blade		Recom. for Cutbnk. Seeding: Seed, fertilize and mulch	
Sed. Yield Potential	M	Recom. Slash Disposal	2 2	Suit. of Fill Seeding	G
Water Res. Mgt. Req.	M	<b>ENGINEERING</b>		Lim. to Fill Seeding: None	
RECREATION				Unified Class	Surface SM-u Subsoil SM-u
Soil Suit. for Rec. Dev.	M	Suit. as Topsoil Source		<b>LEGEND</b> F = Fair      In = Increased G = Good      T = Thin U = Unsited    Th = Thick S = Sited      Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor      V = Very W = Well      St = Steep Sl = Slight    Fl = Flat Se = Severe Un = Unchanged	
Soil Limits to Rec. Dev.: Moderate muddiness, shallowness restricts filter field use		Suitability as Sand, Gravel Source			
Treat. Req. to Inc. Suit.:		Suit. as Clay Source			
No recommendations		Suitability of Bedrock for Roadrock			
Soil and Site Dam. Susc.	M	Limit of Bedrk. for Roadrk.: Bedrock is low quality schist that rapidly breaks down			
Susceptibility to Dust	M				
Susceptibility to Mud	M				
Trail Suitability	W				
Limitations for Trails: N/A					

MAPPING UNIT 76  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T				
Surface Eros. Potential		Se	Water bar		Cons. for Rd. Loc. & Const.: Steep slopes, damage to resources from sidecast waste				
Natural Stability		II-III	Suit. for Sewage F.F.	N/A					
Nature of Mass Movement: Debris slides		Soil Lim. to Sewage F.F.: N/A		Method of Excav.: Ripping and some blasting					
Exp. Mass Mvmt. from Man's Act.		In	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	M			
Subsoil Eros. Pot.		M			Windthrow Hazard	M	Cutbnk. Slough. & Rav.	M	
Recom. for Controlling Subsoil Erosion; Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.		L-M	Est. Cutslope Ratio	St-M			
Water Yield Class		II	Susc. to Alder Reveg.		L	Prob. of Cutbnk. Fail.	II&III		
Bedrock Hydro. Charac.		II	Potential for Regen.		M	Cons. for Cutbnk. Stab. Probs.: No special considerations			
Hydrologic Group		B	Lim. to Regen.: Low fertility, climatic limitations at higher elevations		Waste and Fill Failure			M-H	
Expect. Sed. Size	Surface-Sand, silt		Recom. Tree Species: Douglas-fir, true fir		Suit. of Cutbnk. Seeding			F	
	Subsoil-Sand, silt		Susc. to Soil and Other Res. Dam. by Harvest		M-H	Lim. to Cutbnk. Seeding: Much exposed bedrock in many areas			
Sed. Yield Potential		M	Type of Damage: Loss of soil structure, increased compaction, erosion and sedimentation		Recom. for Cutbnk. Seeding: Seed, fertilize and mulch				
Water Res. Mgt. Req.		M	RECREATION		Seed, fertilize and mulch				
Soil Suit. for Rec. Dev.		U	Recom. Slash Disposal		$\frac{1}{4}$	Suit. of Fill Seeding			F
Soil Limits to Rec. Dev.: Steep slopes		Cons. for Mgt. Pract.: Minimize road construction, end haul surplus waste on slopes over 60%		Lim. to Fill Seeding: Raveling, snow slough					
Treat. Req. to Inc. Suit.: No recommendations		<b>ENGINEERING</b>		Recom. for Fill Seeding: Seed, fertilize and mulch; protect from road maintenance waste					
Soil and Site Dam. Susc.		N/A	Unified Class	Surface - SM-u to SW-SM	<p style="text-align: center;"><b>LEGEND</b></p> F = Fair                      In = Increased G = Good                      T = Thin U = Unsited                  Th = Thick S = Sited                      Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor                      V = Very W = Well                      St = Steep Sl = Slight                      Fl = Flat Se = Severe Un = Unchanged				
Susceptibility to Dust		N/A		Subsoil - SM-u to SW-SM					
Susceptibility to Mud		N/A	Suit. as Topsoil Source	U					
Trail Suitability		M	Suitability as Sand, Gravel Source	U					
Limitations for Trails: Steep slopes		Limit of Bedrk. for Roadrk. Bedrock is low quality schist that rapidly breaks down		Suit. as Clay Source	U				
		Suitability of Bedrock for Roadrock		P					

MAPPING UNIT 78  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements: Water bar, surface and use puncheons through wet areas, restrict traffic		Est. Roadrock Thickness	Th
Surface Eros. Potential	Se	Suit. for Sewage F.F. N/A		Cons. for Rd. Loc. & Const.: Unstable, dissected and steep; high damage to resources from sidecast	
Natural Stability	III -IV			Method of Excav.: Blading and some ripping	
Nature of Mass Movement: Debris slides and slumps		Soil Lim. to Sewage F.F.: N/A		Subsoil Erosion Pot. M	
Exp. Mass Mvmt. from Man's Act.	GR In	<b>TIMBER MANAGEMENT</b> Windthrow Hazard M-H Susc. to Brush Reveg. M Susc. to Alder Reveg. L-M Potential for Regen. M-H		Cutbnk. Slough. & Rav. H	
Subsoil Eros. Pot.	M			Est. Cutslope Ratio M	
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration revegetate barren areas, mulch		Lim. to Regen.: Climatic limitations at higher elevations		Prob. of Cutbnk. Fail. III & IV	
Water Yield Class	II	Recom. Tree Species: Douglas-fir		Cons. for Cutbnk. Stab. Probs.: Drainage of cutbanks, stabilize with willow shoots, provide a wide ditch to serve as a catch area	
Bedrock Hydro. Charac.	II	Susc. to Soil and Other Res. Dam. by Harvest H		Waste and Fill Failure H	
Hydrologic Group	B	Type of Damage: Greatly increased mass movement, erosion and sedimentation		Suit. of Cutbnk. Seeding P-F	
Expect. Sed. Size	Surface-Sand, silt Subsoil-Silt, sand	Recom. Slash Disposal 1/4		Lim. to Cutbnk. Seeding: Much exposed bedrock locally	
Sed. Yield Potential	M-H	ENGINEERING		Recom. for Cutbnk. Seeding: Seed, fertilize and mulch on soil areas	
Water Res. Mgt. Req.	H	Unified Class Surface SM-u Subsoil SM-u to ML		Suit. of Fill Seeding F	
<b>RECREATION</b>		Cons. for Mgt. Pract.: Skyline, limit road construction, end haul surplus waste		Lim. to Fill Seeding: Raveling and failures	
Soil Suit. for Rec. Dev.	U	Suit. as Topsoil Source U		Recom. for Fill Seeding: Seed, fertilize and mulch; protect from road maintenance waste	
Soil Limits to Rec. Dev.: Unstable, steep slopes		Suitability as Sand, Gravel Source U		<b>LEGEND</b> F = Fair      In = Increased G = Good      T = Thin U = Unsited    Th = Thick S = Sited      Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor      V = Very W = Well      St = Steep Sl = Slight    Fl = Flat Se = Severe Un = Unchanged	
Treat. Req. to Inc. Suit.: No recommendations		Suit. as Clay Source U			
Soil and Site Dam. Susc.	N/A	Suitability of Bedrock for Roadrock U			
Susceptibility to Dust	N/A	Limit of Bedrk. for Roadrk.: Bedrock is weathered and soft			
Susceptibility to Mud	N/A				
Trail Suitability	M-P				
Limitations for Trails: Steep, unstable and dissected slopes; wetness locally					

MAPPING UNIT 79  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements: Gravel surface, water bar and culvert, restrict use of horse and motor scooter		Est. Roadrock Thickness	VTh
Surface Eros. Potential	Se			Cons. for Rd. Loc. & Const.: Very unstable, high damage to resources, poor alignment	
Natural Stability	V	Suit. for Sewage F.F.	N/A	Method of Excav.: Blading	
Nature of Mass Movement: Small and large slumps and debris slides		Soil Lim. to Sewage F.F.: N/A			
Exp. Mass Mvmt. from Man's Act.	Gr In	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	M
Subsoil Eros. Pot.	M-H	Windthrow Hazard	M	Cutbnk. Slough. & Rav.	H
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	M	Est. Cutslope Ratio	M-Fl
		Susc. to Alder Reveg.	L-M	Prob. of Cutbnk. Fail.	V
Water Yield Class	I	Potential for Regen.	H-M	Cons. for Cutbnk. Stab. Probs.: Drainage of cutbanks, stabilize with willow shoots, provide a wide ditch to serve as catch area	
Bedrock Hydro. Charac.	IV	Lim. to Regen.: Climatic limitations at higher elevations		Waste and Fill Failure	H
Hydrologic Group	D			Suit. of Cutbnk. Seeding	F-G
Expect. Sed. Size	Surface-silt, sand Subsoil-silt, clay	Recom. Tree Species: Douglas-fir		Lim. to Cutbnk. Seeding: Raveling and cutbank failures	
Sed. Yield Potential	H	Susc. to Soil and Other Res. Dam. by Harvest	H	Recom. for Cutbnk. Seeding: Seed, fertilize and mulch	
Water Res. Mgt. Req.	H	Type of Damage: High landscape damage, greatly increases mass movement and sedimentation		Suit. of Fill Seeding	
<b>RECREATION</b>		Recom. Slash Disposal	1/4	Lim. to Fill Seeding: Raveling and failures	
Soil Suit. for Rec. Dev.	U	Cons. for Mgt. Pract.: Skyline, minimize road construction, end haul all surplus waste		Recom. for Fill Seeding: Seed, fertilize and mulch; protect from road maintenance waste	
Soil Limits to Rec. Dev.: Unstable, steep slopes		<b>ENGINEERING</b>			
Treat. Req. to Inc. Suit.: No recommendations		Unified Class	Surface- SM-u Subsoil- SC to SM-SC		
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	U	<b>LEGEND</b>	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	U	F = Fair	In = Increased
Susceptibility to Mud	N/A	Suit. as Clay Source	S	G = Good	T = Thin
Trail Suitability	P	Suitability of Bedrock for Roadrock	N/A	U = Unsuitd	Th = Thick
Limitations for Trails: Steep, unstable slopes; wetness and muddiness		Limit of Bedrk. for Roadrk.	N/A	S = Suited	Gr = Greatly
				L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor	V = Very
				W = Well	St = Steep
				Sl = Slight	Fl = Flat
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 80  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential	N/A	No recommendations		Cons. for Rd. Loc. & Const.: Steep rugged slopes, damage to other resources from sidecast waste	
Natural Stability	II-III	Suit. for Sewage F.F.	N/A	Method of Excav.:	
Nature of Mass Movement: Debris slides and rockfall		Soil Lim. to Sewage F.F.:		Blasting	
Exp. Mass Mvmt. from Man's Act.	In	N/A		Subsoil Erosion Pot.	
Subsoil Eros. Pot.	N/A	<b>TIMBER MANAGEMENT</b>			
Recom. for Controlling Subsoil Erosion: N/A		Windthrow Hazard	N/A	Cutbnk. Slough. & Rav.	L-M
		Susc. to Brush Reveg.	N/A	Est. Cutslope Ratio	St
		Susc. to Alder Reveg.	N/A	Prob. of Cutbnk. Fail.	II&III
Water Yield Class	III	Potential for Regen.	N/A	Cons. for Cutbnk. Stab. Probs.:	
Bedrock Hydro. Charac.	III	Lim. to Regen.:		No special considerations	
Hydrologic Group	N/A	N/A		Waste and Fill Failure	M
Expect. Sed. Size	Surface	Recom. Tree Species:		Suit. of Cutbnk. Seeding	N/A
	Subsoil	N/A		Lim. to Cutbnk. Seeding:	
Sed. Yield Potential	N/A	Susc. to Soil and Other Res. Dam. by Harvest	N/A	N/A	
Water Res. Mgt. Req.	N/A	Type of Damage:		Recom. for Cutbnk. Seeding:	
<b>RECREATION</b>		N/A		N/A	
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	N/A	Suit. of Fill Seeding	N/A
Soil Limits to Rec. Dev.: Steep, rock slopes		Cons. for Mgt. Pract.:		Lim. to Fill Seeding:	
		N/A		N/A	
Treat. Req. to Inc. Suit.:		<b>ENGINEERING</b>			
No recommendations		Unified Class	Surface	Recom. for Fill Seeding:	
			Subsoil	N/A	
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	N/A	<p style="text-align: center;"><b>LEGEND</b></p> <p>F = Fair      In = Increased  G = Good      T = Thin  U = Unsited    Th = Thick  S = Sited      Gr = Greatly  L = Low  M = Medium or Moderate  H = High  P = Poor      V = Very  W = Well      St = Steep  S1 = Slight    F1 = Flat  Se = Severe  Un = Unchanged</p>	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	N/A		
Susceptibility to Mud	N/A	Suit. as Clay Source	N/A		
Trail Suitability	P	Suitability of Bedrock for Roadrock	F-G		
Limitations for Trails: Steep, rock slopes		Limit of Bedrk. for Roadrk.: May be hard to crush, weathers down to small gravel size particles			

MAPPING UNIT 81  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential	Se	Water bar		Cons. for Rd. Loc. & Const.: Steep slopes, damage to re- sources from sidecast waste	
Natural Stability	II	Suit. for Sewage F.F.	N/A		
Nature of Mass Movement: Debris slides and rockfall		Soil Lim. to Sewage F.F.: N/A		Method of Excav.: Blasting	
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	N/A
Subsoil Eros. Pot.	H			Cutbnk. Slough. & Rav.	M
Recom. for Controlling Sub- soil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch				Windthrow Hazard	H
		Susc. to Brush Reveg.	L-M	Prob. of Cutbnk. Fail.	II
		Susc. to Alder Reveg.	L	Cons. for Cutbnk. Stab. Probs.:	
Water Yield Class	III	Potential for Regen.	L-M	No special considerations	
Bedrock Hydro. Charac.	III	Lim. to Regen.: Low fertility, frost heave, soil moisture limitations		Waste and Fill Failure	H
Hydrologic Group	B			Suit. of Cutbnk. Seeding	P
Expect. Sed. Size	Surface-sand, silt Subsoil-sand, silt	Recom. Tree Species: Douglas-fir, true fir		Lim. to Cutbnk. Seeding: Exposed rock, thin soils, coarse textured soils of low fertility	
Sed. Yield Potential	L	Susc. to Soil and Other Res. Dam. by Harvest	M	Recom. for Cutbnk. Seeding: Seeding not recommended	
Water Res. Mgt. Req.	L-M	Type of Damage: Compaction, loss of soil structure, damage to resources from sidecast waste		Suit. of Fill Seeding	
<b>RECREATION</b>				Lim. to Fill Seeding: Raveling, low fertility, snow slough	
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	1/4	Recom. for Fill Seeding: Seed, fertilize and mulch; protect from road mainte- nance waste, terrace	
Soil Limits to Rec. Dev.: Steep slopes		Cons. for Mgt. Pract.: End haul surplus road waste on slopes over 60%		<b>LEGEND</b> F = Fair            In = Increased G = Good            T = Thin U = Unsuitable    Th = Thick S = Suited          Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor            V = Very W = Well            St = Steep Sl = Slight          Fl = Flat Se = Severe Un = Unchanged	
Treat. Req. to Inc. Suit.: No recommendations		<b>ENGINEERING</b>			
		Unified Class	Surface- SW-SM to SM-d Subsoil ---		
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	U		
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	U		
Susceptibility to Mud	N/A	Suit. as Clay Source	U		
Trail Suitability	M	Suitability of Bedrock for Roadrock	F-G		
Limitations for Trails: Steep, rocky slopes		Limit of Bedrk. for Roadrk.: May be hard to crush, weathers down to small gravel size particles			

MAPPING UNIT 82  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T-Th
Surface Eros. Potential	Se	Water bar		Cons. for Rd, Loc. & Const.: Steep dissected slopes, poor alignment, high damage to resources from sidecast	
Natural Stability	II-III	Suit. for Sewage F.F.	N/A	Method of Excav.: Blasting	
Nature of Mass Movement: Debris slides and rockfall		Soil Lim. to Sewage F.F.: N/A		Subsoil Erosion Pot.	
Exp. Mass Mvmt. from Man's Act.	In	TIMBER MANAGEMENT		N/A	
Subsoil Eros. Pot.	H			Cutbnk. Slough. & Rav.	
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren area, mulch		Windthrow Hazard	H	Est. Cutslope Ratio	
Water Yield Class		Susc. to Brush Reveg.		St	
		Susc. to Alder Reveg.		Prob. of Cutbnk. Fail.	
Bedrock Hydro. Charac.		Potential for Regen.		II & III	
Hydrologic Group		Lim. to Regen.:		Cons. for Cutbnk. Stab. Probs.:	
Expect. Sed. Size		Low fertility, frost heave, soil moisture limitations		Maintain adequate ditch size, provide adequate clean out	
Sed. Yield Potential		Recom. Tree Species: Douglas-fir, true fir		Waste and Fill Failure	
Water Res. Mgt. Req.		Susc. to Soil and Other Res. Dam. by Harvest		H	
RECREATION		Type of Damage: Compaction, loss of soil structure, stream sedimentation		Suit. of Cutbnk. Seeding	
		Recom. Slash Disposal		F	
Soil Suit. for Rec. Dev.		Cons. for Mgt. Pract.:		Lim. to Cutbnk. Seeding:	
Soil Limits to Rec. Dev.:		Sky-line, minimize spur roads; end haul surplus waste on slopes over 60%		Much exposed bedrock, coarse textured soils, low fertility, thin soils	
Treat. Req. to Inc. Suit.:		ENGINEERING		Recom. for Cutbnk. Seeding:	
No recommendations		Unified Class		Seeding not recommended	
Soil and Site Dam. Susc.		Surface- SW-SM to SM-d		Suit. of Fill Seeding	
Susceptibility to Dust		Subsoil --		P	
Susceptibility to Mud		Suit. as Topsoil Source		Lim. to Fill Seeding:	
Trail Suitability		Suitability as Sand, Gravel Source		Raveling, low fertility, snow slough	
Limitations for Trails:		Suit. as Clay Source		Recom. for Fill Seeding:	
Steep, dissected and rocky slopes		Suitability of Bedrock for Roadrock		Seed, fertilize and mulch; protect from road maintenance waste, terrace	
		Limit of Bedrk. for Roadrk.:		<p style="text-align: center;"><u>LEGEND</u></p> F = Fair                      In = Increased G = Good                     T = Thin U = Unsuitable              Th = Thick S = Suited                  Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor                      V = Very W = Well                      St = Steep S1 = Slight                  Fl = Flat Se = Severe Un = Unchanged	
		May be hard to crush; weathers down to small gravel size particles			

MAPPING UNIT 83  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	Th
Surface Eros. Potential	Se	Gravel surface through wet areas, water bar		Cons. for Rd. Loc. & Const.: Steep, dissected unstable slopes; poor alignment, cutbank failures	
Natural Stability	III -IV	Suit. for Sewage F.F.	N/A	Method of Excav.: Ripping and some blasting	
Nature of Mass Movement: Debris slides and slumps		Soil Lim. to Sewage F.F.: N/A		Subsoil Erosion Pot.	
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		Cutbnk. Slough. & Rav.	
Subsoil Eros. Pot.	H	Windthrow Hazard	M	Est. Cutslope Ratio	
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.	L-M	Prob. of Cutbnk. Fail.	
Water Yield Class	II	Susc. to Alder Reveg.	L	Cons. for Cutbnk. Stab. Probs.: Drainage of cutbank, stabilize with willow shoots, provide a wide ditch for a catch area	
Bedrock Hydro. Charac.	II	Potential for Regen.	L-M	Waste and Fill Failure	
Hydrologic Group	B	Lim. to Regen.: Low fertility, climatic limitations		Suit. of Cutbnk. Seeding	
Expect. Sed. Size	Surface-Sand, silt	Recom. Tree Species: Douglas-fir, true fir		Lim. to Cutbnk. Seeding: Raveling, low fertility, snow slough	
	Subsoil-Silt, clay	Susc. to Soil and Other Res. Dam. by Harvest	H	Recom. for Cutbnk. Seeding: Seed, fertilize and mulch	
Sed. Yield Potential	M-H	Type of Damage: High landscape damage, greatly increased mass movement and sedimentation		Suit. of Fill Seeding	
Water Res. Mgt. Req.	H	RECREATION		Lim. to Fill Seeding: Raveling, low fertility, snow slough	
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	1/4	Recom. for Fill Seeding: Seed fertilize and mulch; protect from road maintenance waste, terrace	
Soil Limits to Rec. Dev.: Steep, dissected slopes; unstable.		Cons. for Mgt. Pract.: Sky-line, limit road construction, end haul surplus waste		<p style="text-align: center;"><b>LEGEND</b></p> F = Fair            In = Increased G = Good            T = Thin U = Unsuitable    Th = Thick S = Suited        Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor            V = Very W = Well            St = Steep Sl = Slight        Fl = Flat Se = Severe Un = Unchanged	
Treat. Req. to Inc. Suit.: No recommendations		<b>ENGINEERING</b>			
Soil and Site Dam. Susc.	N/A	Unified Class	Surface - SW-SM to SM-d Subsoil - ML to SM-u	Suit. as Topsoil Source	
				U	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source		U	
Susceptibility to Mud	N/A	Suit. as Clay Source		U	
Trail Suitability	P	Suitability of Bedrock for Roadrock		P-U	
Limitations for Trails: Steep, dissected slopes; unstable, local wetness		Limit of Bedrk. for Roadrk.: Rock is generally weathered and rapidly breaks down			

MAPPING UNIT 85  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements: No recommendations		Est. Roadrock Thickness	T-Th
Surface Eros. Potential	N/A			Cons. for Rd. Loc. & Const.: Steep rugged slopes, damage to other resources from sidecast waste	
Natural Stability	III	Suit. for Sewage F.F.	N/A	Method of Excav.: Blasting and ripping	
Nature of Mass Movement: Rockfall and debris slides		Soil Lim. to Sewage F.F.: N/A			
Exp. Mass Mvmt. from Man's Act.	In	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	N/A
Subsoil Eros. Pot.	N/A	Windthrow Hazard	N/A	Cutbnk. Slough. & Rav.	M
Recom. for Controlling Subsoil Erosion: N/A		Susc. to Brush Reveg.	N/A	Est. Cutslope Ratio	St
		Susc. to Alder Reveg.	N/A	Prob. of Cutbnk. Fail.	II-IV
Water Yield Class	III	Potential for Regen.	N/A	Cons. for Cutbnk. Stab. Probs.: No special considerations	
Bedrock Hydro. Charac.	II	Lim. to Regen.: N/A		Waste and Fill Failure	M
Hydrologic Group	N/A			Suit. of Cutbnk. Seeding	N/A
Expect. Sed. Size	Surface	Recom. Tree Species: N/A		Lim. to Cutbnk. Seeding: N/A	
	Subsoil				
Sed. Yield Potential	N/A	Susc. to Soil and Other Res. Dam. by Harvest	N/A	Recom. for Cutbnk. Seeding: N/A	
Water Res. Mgt. Req.	N/A	Type of Damage: N/A		Suit. of Fill Seeding	N/A
<b>RECREATION</b>				Lim. to Fill Seeding: N/A	
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	N/A	Recom. for Fill Seeding: N/A	
Soil Limits to Rec. Dev.: Steep, rock slopes		Cons. for Mgt. Pract.: N/A			
Treat. Req. to Inc. Suit.: No recommendations		<b>ENGINEERING</b>			
		Unified Class	Surface	N/A	
			Subsoil	N/A	
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source	N/A	<p style="text-align: center;"><b>LEGEND</b></p> <p>F = Fair                      In = Increased  G = Good                      T = Thin  U = Unsited                  Th = Thick  S = Sited                      Gr = Greatly  L = Low  M = Medium or Moderate  H = High  P = Poor                      V = Very  W = Well                      St = Steep  Sl = Slight                  Fl = Flat  Se = Severe  Un = Unchanged</p>	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source	N/A		
Susceptibility to Mud	N/A	Suit. as Clay Source	N/A		
Trail Suitability	P	Suitability of Bedrock for Roadrock	P		
Limitations for Trails: Steep, rock slopes		Limit of Bedrk. for Roadrk.: Rock is serpentinized and is of low quality			

MAPPING UNIT 86  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T-Th
Surface Eros. Potential	Se	Water bar		Cons. for Rd. Loc. & Const.:	
Natural Stability	II-III	Suit. for Sewage F.F.	N/A	Steep slopes, damage to resources from sidecast waste	
Nature of Mass Movement: Debris slides and rockfall		Soil Lim. to Sewage F.F.:		Method of Excav.:	
Exp. Mass Mvmt. from Man's Act.		N/A		Ripping and blasting	
Subsoil Eros. Pot.	H	<b>TIMBER MANAGEMENT</b>			
Recom. for Controlling Subsoil Erosion: Water bar, Prevent water concentration, revegetate barren areas, mulch		Windthrow Hazard	H	Subsoil Erosion Pot.	N/A
Water Yield Class	III	Susc. to Brush Reveg.	M	Cutbnk. Slough. & Rav.	M
Bedrock Hydro. Charac.	II	Susc. to Alder Reveg.	L	Est. Cutslope Ratio	St
Hydrologic Group	B	Potential for Regen.	L	Prob. of Cutbnk. Fail.	II <sup>1</sup> / <sub>2</sub> III
Expect. Sed. Size	Surface-Sand, silt Subsoil-Sand, silt	Lim. to Regen.:	No special considerations		
Sed. Yield Potential	M	Low fertility, climatic limitations, soil moisture limitations	Cons. for Cutbnk. Stab. Probs.:		
Water Res. Mgt. Req.	M	Recom. Tree Species: Douglas-fir, true fir	Waste and Fill Failure		
<b>RECREATION</b>		Susc. to Soil and Other Res. Dam. by Harvest	M-H	Suit. of Cutbnk. Seeding	F
Soil Suit. for Rec. Dev.	U	Type of Damage: Increased slide activity and sedimentation	Lim. to Cutbnk. Seeding:		
Soil Limits to Rec. Dev.:	Steep slopes	Recom. Slash Disposal	1/4	Exposed bedrock, thin soils	
Treat. Req. to Inc. Suit.:	No recommendations	<b>ENGINEERING</b>			
Soil and Site Dam. Susc.	N/A	Cons. for Mgt. Pract.:	Recom. for Cutbnk. Seeding:		
Susceptibility to Dust	N/A	Skyline on dissected slopes, end haul surplus waste	Seeding not recommended		
Susceptibility to Mud	N/A	<b>Unified Class</b>			
Trail Suitability	M	Surface SM-u	Suit. of Fill Seeding		
Limitations for Trails: Steep slopes		Subsoil SM-u	Lim. to Fill Seeding:		
		Suit. as Topsoil Source	U	Raveling, snow slough, frost heave, low fertility	
		Suitability as Sand, Gravel Source	U	Recom. for Fill Seeding:	
		Suit. as Clay Source	U	Seed, fertilize and mulch, protect from road maintenance waste, terrace	
		Suitability of Bedrock for Roadrock	P	<b>LEGEND</b>	
		Limit of Bedrk. for Roadrk.:	F = Fair      In = Increased		
		Rock is serpentinized and is of low quality	G = Good      T = Thin		
			U = Unsited    Th = Thick		
			S = Sited      Gr = Greatly		
			L = Low		
			M = Medium or Moderate		
			H = High		
			P = Poor      V = Very		
			W = Well      St = Steep		
			Sl = Slight    Fl = Flat		
			Se = Severe		
			Un = Unchanged		

MAPPING UNIT 90  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential		N/A	No recommendations		Cons. for Rd. Loc. & Const.: Steep rugged slopes, damage to other resources from sidecast waste
Natural Stability		II-III	Suit. for Sewage F.F.	N/A	Method of Excav.: Blasting and some ripping
Nature of Mass Movement: Debris slides and rockfall		Soil Lim. to Sewage F.F.: N/A		Subsoil Erosion Pot.	
Exp. Mass Mvmt. from Man's Act.		In	TIMBER MANAGEMENT		N/A
Subsoil Eros. Pot.		N/A			Cutbnk. Slough. & Rav.
Recom. for Controlling Subsoil Erosion: N/A		Windthrow Hazard		N/A	Est. Cutslope Ratio
		Susc. to Brush Reveg.		N/A	Prob. of Cutbnk. Fail.
		Susc. to Alder Reveg.		N/A	II&III
Water Yield Class		III	Potential for Regen.	N/A	Cons. for Cutbnk. Stab. Probs.:
Bedrock Hydro. Charac.		I	Lim. to Regen.: N/A		No special considerations
Hydrologic Group		N/A			Waste and Fill Failure
Expect. Sed. Size	Surface	N/A	Recom. Tree Species:		M
	Subsoil	N/A	N/A		Suit. of Cutbnk. Seeding
Sed. Yield Potential		N/A	Susc. to Soil and Other Res. Dam. by Harvest		N/A
Water Res. Mgt. Req.		N/A	Type of Damage: N/A		Lim. to Cutbnk. Seeding: N/A
RECREATION				Recom. for Cutbnk. Seeding: N/A	
Soil Suit. for Rec. Dev.		U	Recom. Slash Disposal		N/A
Soil Limits to Rec. Dev.: Steep, rock slopes		Cons. for Mgt. Pract.:		N/A	
Treat. Req. to Inc. Suit.:		ENGINEERING		Suit. of Fill Seeding	
No recommendations		Unified Class	Surface	N/A	N/A
			Subsoil	N/A	Lim. to Fill Seeding: N/A
Soil and Site Dam. Susc.		N/A	Suit. as Topsoil Source		N/A
Susceptibility to Dust		N/A	Suitability as Sand, Gravel Source		N/A
Susceptibility to Mud		N/A	Suit. as Clay Source		N/A
Trail Suitability		P	Suitability of Bedrock for Roadrock		F-G
Limitations for Trails: Steep, rock slopes		Limit of Bedrk. for Roadrk. Some portions of bedrock are highly altered and break down after a few yrs. use		LEGEND	
				F = Fair      In = Increased G = Good      T = Thin U = Unsuitd    Th = Thick S = Suitd      Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor      V = Very W = Well      St = Steep Sl = Slight    Fl = Flat Se = Severe Un = Unchanged	

MAPPING UNIT 91  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness		T		
Surface Eros. Potential		Se	Water bar		Cons. for Rd. Loc. & Const.: Steep slopes, damage to resources from sidecast waste			
Natural Stability		II	Suit. for Sewage F.F.	N/A	Method of Excav.:			
Nature of Mass Movement: Debris slides		Soil Lim. to Sewage F.F.:		Blasting and some ripping				
Exp. Mass Mvmt. from Man's Act.		In	N/A		Subsoil Erosion Pot.		N/A	
Subsoil Eros. Pot.		H	TIMBER MANAGEMENT				Cutbnk. Slough. & Rav.	L-M
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration revegetate barren areas, mulch		Windthrow Hazard		H	Est. Cutslope Ratio		St	
Water Yield Class		III	Susc. to Brush Reveg.		L-M	Prob. of Cutbnk. Fail.		II
Bedrock Hydro. Charac.		I	Susc. to Alder Reveg.		L	Cons. for Cutbnk. Stab. Probs.:		No special considerations
Hydrologic Group		B	Potential for Regen.		L-M	Waste and Fill Failure		F
Expect. Sed. Size	Surface-Sand, silt	Lim. to Regen.:		Low fertility, climatic limitations at higher elevations, soil moisture limitations				
	Subsoil-Sand, silt	Recom. Tree Species:		Douglas-fir, true fir				
Sed. Yield Potential		M	Susc. to Soil and Other Res. Dam. by Harvest		M	Suit. of Cutbnk. Seeding		F
Water Res. Mgt. Req.		L-M	Type of Damage: Loss of soil structure, increase compaction and sedimentation		Lim. to Cutbnk. Seeding: Exposed bedrock, thin soils			
RECREATION		RECOM. FOR CUTBNK. SEEDING:		Seeding not recommended				
Soil Suit. for Rec. Dev.		U	Recom. Slash Disposal		$\frac{1}{4}$	Suit. of Fill Seeding		F
Soil Limits to Rec. Dev.: Steep slopes		Cons. for Mgt. Pract.:		End haul surplus waste on slopes				
Treat. Req. to Inc. Suit.:		No recommendations		ENGINEERING				
Soil and Site Dam. Susc.		N/A	Unified Class	Surface	SM-d	Recom. for Fill Seeding:		Seed, fertilize and mulch; protect from road maintenance waste, terrace
				Subsoil	---	LEGEND		
Susceptibility to Dust		N/A	Suit. as Topsoil Source		U	F = Fair	In = Increases	
Susceptibility to Mud		N/A	Suitability as Sand, Gravel Source		U	G = Good	T = Thin	
Trail Suitability		M	Suit. as Clay Source		U	U = Unsuitable	Th = Thick	
Limitations for Trails: Steep slopes			Suitability of Bedrock for Roadrock		F-G	S = Suited	Gr = Greatly	
			Limit of Bedrk. for Roadrk.:		Some portions of bedrock are highly altered and break down after a few years use			
						L = Low	M = Medium or Moderate	
						H = High	P = Poor	V = Very
						W = Well	St = Steep	
						S1 = Slight	F1 = Flat	
						Se = Severe	Un = Unchanged	

MAPPING UNIT 92  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential	Se	Water bar		Cons. for Rd. Loc. & Const.: Steep dissected slopes, poor alignment, damage to resources from sidecast waste	
Natural Stability	II-III	Suit. for Sewage F.F.	N/A	Method of Excav.:	
Nature of Mass Movement: Small debris slides and rockfall		Soil Lim. to Sewage F.F.:		Blasting and some ripping	
Exp. Mass Mvmt. from Man's Act.	In	N/A		Subsoil Erosion Pot.	
Subsoil Eros. Pot.	H	<b>TIMBER MANAGEMENT</b>		N/A	
Recom. for Controlling Sub- soil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Windthrow Hazard	H	Cutbnk. Slough. & Rav.	
		Susc. to Brush Reveg.	L-M	Est. Cutslope Ratio	
		Susc. to Alder Reveg.	L	Prob. of Cutbnk. Fail.	
Water Yield Class	III	Potential for Regen.	L-M	Cons. for Cutbnk. Stab. Probs.:	
Bedrock Hydro. Charac.	I	Lim. to Regen.: Low fertility, climatic limitations at higher elevations, soil moisture limitation		No special considerations	
Hydrologic Group	B			Waste and Fill Failure	
Expect. Sed. Size	Surface-Sand, silt Subsoil-Sand, silt	Recom. Tree Species: Douglas-fir, true fir		Suit. of Cutbnk. Seeding	
Sed. Yield Potential	M	Susc. to Soil and Other Res. Dam. by Harvest	H	Lim. to Cutbnk. Seeding:	
Water Res. Mgt. Req.	M	Type of Damage: Increased sheet erosion slide hazard, and sedimentation		Exposed bedrock, thin soils	
<b>RECREATION</b>				Recom. for Cutbnk. Seeding:	
Soil Suit. for Rec. Dev.	U	Recom. Slash Disposal	$\frac{1}{4}$	Seeding not recommended	
Soil Limits to Rec. Dev.:		Cons. for Mgt. Pract.:		Suit. of Fill Seeding	
Steep, dissected slopes		Skyline on drainages, minimize spur roads, end haul surplus waste		Lim. to Fill Seeding:	
Treat. Req. to Inc. Suit.:		<b>ENGINEERING</b>		Raveling, snow slough, frost heave	
No recommendations		Unified Class	Surface SM-d Subsoil ---	Recom. for Fill Seeding:	
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source		Seed, fertilize and mulch; protect from road mainte- nance waste, terrace	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source		<b>LEGEND</b>	
Susceptibility to Mud	N/A	Suit. as Clay Source		F = Fair                      In = Increased	
Trail Suitability	M	Suitability of Bedrock for Roadrock		G = Good                     T = Thin	
Limitations for Trails:		Limit of Bedrk. for Roadrk.		U = Unsuitd                Th = Thick	
Steep, dissected slopes		Some portions of bedrock are highly altered and break down after a few years		S = Suited                 Gr = Greatly	
				L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor                    V = Very	
				W = Well                    St = Steep	
				Sl = Slight                 Fl = Flat	
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 95  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	T
Surface Eros. Potential	N/A	No recommendations		Cons. for Rd. Loc. & Const.: Steep rugged slopes, damage to other resources from sidecast waste	
Natural Stability	II-IV	Suit. for Sewage F.F.	N/A	Method of Excav.: Blasting	
Nature of Mass Movement: Debris slides and rockfall		Soil Lim. to Sewage F.F.: N/A		Subsoil Erosion Pot.	
Exp. Mass Mvmt. from Man's Act.	In	TIMBER MANAGEMENT		N/A	
Subsoil Eros. Pot.	N/A	Windthrow Hazard	N/A	Cutbnk. Slough. & Rav.	
Recom. for Controlling Subsoil Erosion: N/A		Susc. to Brush Reveg.	N/A	Est. Cutslope Ratio	
		Susc. to Alder Reveg.	N/A	Prob. of Cutbnk. Fail.	
Water Yield Class	III	Potential for Regen.	N/A	Cons. for Cutbnk. Stab. Probs.: No special considerations	
Bedrock Hydro. Charac.	I	Lim. to Regen.: N/A		Waste and Fill Failure	
Hydrologic Group	N/A	Recom. Tree Species: N/A		M	
Expect. Sed. Size	Surface - N/A	Susc. to Soil and Other Res. Dam. by Harvest		Suit. of Cutbnk. Seeding	
	Subsoil - N/A	Type of Damage: N/A		N/A	
Sed. Yield Potential	N/A	RECREATION		Lim. to Cutbnk. Seeding: N/A	
Water Res. Mgt. Req.	N/A	Soil Suit. for Rec. Dev.		Recom. for Cutbnk. Seeding: N/A	
		U		Suit. of Fill Seeding	
Soil Limits to Rec. Dev.: Steep, rock slopes		Recom. Slash Disposal		N/A	
Treat. Req. to Inc. Suit.: No recommendations		Cons. for Mgt. Pract.: N/A		Lim. to Fill Seeding: N/A	
		ENGINEERING		Recom. for Fill Seeding: N/A	
		Unified Class	Surface - N/A		
			Subsoil - N/A		
Soil and Site Dam. Susc.	N/A	Suit. as Topsoil Source		LEGEND	
Susceptibility to Dust	N/A	Suitability as Sand, Gravel Source		F = Fair      In = Increases	
Susceptibility to Mud	N/A	Suit. as Clay Source		G = Good      T = Thin	
Trail Suitability	P	Suitability of Bedrock for Roadrock		U = Unsited    Th = Thick	
Limitations for Trails: Steep, rock slopes		Limit of Bedrk. for Roadrk. Andesites and basalts are good, pyroclastic rock is poor		S = Suited     Gr = Greatly	
				L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor      V = Very	
				W = Well      St = Steep	
				Sl = Slight    Fl = Flat	
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 96  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	VT
Surface Eros. Potential	M	No recommendations		Cons. for Rd. Loc. & Const.:	
Natural Stability	I	Suit. for Sewage F.F.	N/A	Area is very bouldery	
Nature of Mass Movement: N/A		Soil Lim. to Sewage F.F.: N/A		Method of Excav.: Blasting and ripping	
Exp. Mass Mvmt. from Man's Act.	Un	<b>TIMBER MANAGEMENT</b>		Subsoil Erosion Pot.	N/A
Subsoil Eros. Pot.	M			Windthrow Hazard	H
Recom. for Controlling Subsoil Erosion: Water bar; prevent water concentration revegetate barren areas		Susc. to Brush Reveg.	L-M	Est. Cutslope Ratio	St
		Susc. to Alder Reveg.	L	Prob. of Cutbnk. Fail.	I
Water Yield Class	III	Potential for Regen.	L	Cons. for Cutbnk. Stab. Probs.:	
Bedrock Hydro. Charac.	I	Lim. to Regen.: Droughty, shallow soils, rocky, low fertility, frost heave, soil moisture limitations		No considerations	
Hydrologic Group	B			Waste and Fill Failure	L
Expect. Sed. Size	Surface-Sand,silt Subsoil-Sand,silt	Recom. Tree Species: Douglas-fir, true fir		Suit. of Cutbnk. Seeding	P
Sed. Yield Potential	L	Susc. to Soil and Other Res. Dam. by Harvest	L	Lim. to Cutbnk. Seeding: Exposed bedrock, thin soils	
Water Res. Mgt. Req.	L	Type of Damage: Increased erosion		Recom. for Cutbnk. Seeding: Seeding not recommended	
<b>RECREATION</b>		Recom. Slash Disposal	$\frac{1}{3}$	Suit. of Fill Seeding	P
Soil Suit. for Rec. Dev.		Cons. for Mgt. Pract.:		Lim. to Fill Seeding: Primarily rock fill slopes	
Soil Limits to Rec. Dev.: Shallow soil restricts filter field use		No special considerations			
Treat. Req. to Inc. Suit.:		<b>ENGINEERING</b>		Recom. for Fill Seeding: Seed only on soil areas, fertilize and mulch	
No recommendations		Unified Class	Surface- SM-d Subsoil ---		
Soil and Site Dam. Susc.	L-M	Suit. as Topsoil Source	U	<b>LEGEND</b>	
Susceptibility to Dust	L	Suitability as Sand, Gravel Source	U	F = Fair	In = Increased
Susceptibility to Mud	L	Suit. as Clay Source	U	G = Good	T = Thin
Trail Suitability	M	Suitability of Bedrock for Roadrock	G	U = Unsuitable	Th = Thick
Limitations for Trails: Rocky areas are frequent		Limit of Bedrk. for Roadrk. None		S = Suited	Gr = Greatly
				L = Low	
				M = Medium or Moderate	
				H = High	
				P = Poor	V = Very
				W = Well	St = Steep
				Sl = Slight	Fl = Flat
				Se = Severe	
				Un = Unchanged	

MAPPING UNIT 97  
SUMMARY OF MANAGEMENT INTERPRETATIONS

EROSION AND SOME HYDROLOGIC INTERPRETATIONS		Cons. for Trail Improvements		Est. Roadrock Thickness	VT	
Surface Eros. Potential	Se	No recommendations		Cons. for Rd. Loc. & Const.: Steep slopes, damage to resources from road maintenance sidecast waste		
Natural Stability	II	Suit. for Sewage F.F.	N/A	Method of Excav.: Blasting		
Nature of Mass Movement: Small debris slides and rockfall		Soil Lim. to Sewage F.F.:  N/A		Subsoil Erosion Pot.		
Exp. Mass Mvmt. from Man's Act.	In	TIMBER MANAGEMENT		N/A		
Subsoil Eros. Pot.	H			Windthrow Hazard		Cutbnk. Slough. & Rav.
Recom. for Controlling Subsoil Erosion: Water bar, prevent water concentration, revegetate barren areas, mulch		Susc. to Brush Reveg.		Est. Cutslope Ratio		
Water Yield Class		Susc. to Alder Reveg.		Prob. of Cutbnk. Fail.		
Bedrock Hydro. Charac.	I	Potential for Regen.		Cons. for Cutbnk. Stab. Probs.:		
Hydrologic Group	B	Lim. to Regen.: Climatic limitations, soil moisture limitations		No considerations		
Expect. Sed. Size	Surface - Sand, silt		Recom. Tree Species: Douglas-fir, true fir		Waste and Fill Failure	
Sed. Yield Potential		Susc. to Soil and Other Res. Dam. by Harvest		Suit. of Cutbnk. Seeding		
Water Res. Mgt. Req.		Type of Damage: Increase erosion, road waste damage to resources		Lim. to Cutbnk. Seeding:		
RECREATION		Recom. Slash Disposal		Exposed bedrock, thin soils		
Soil Suit. for Rec. Dev.	U	Cons. for Mgt. Pract.: Skyline on drainages, end haul surplus waste on slopes over 60%		Recom. for Cutbnk. Seeding: Seeding not recommended		
Soil Limits to Rec. Dev.: Steep slopes		ENGINEERING		Suit. of Fill Seeding		
Treat. Req. to Inc. Suit.:		Unified Class		Lim. to Fill Seeding:		
No recommendations		Surface - SM-u		Raveling, frost heave, snow slough		
Soil and Site Dam. Susc.		Subsoil ---		Recom. for Fill Seeding: Seed, fertilize and mulch; protect from road maintenance sidecast waste		
Susceptibility to Dust	N/A	Suit. as Topsoil Source		<p style="text-align: center;"><b>LEGEND</b></p> <p>F = Fair                      In = Increased G = Good                      T = Thin U = Unsuitied                Th = Thick S = Suitied                    Gr = Greatly L = Low M = Medium or Moderate H = High P = Poor                      V = Very W = Well                      St = Steep Sl = Slight                    Fl = Flat Se = Severe Un = Unchanged</p>		
Susceptibility to Mud	N/A	Suitability as Sand, Gravel Source				
Trail Suitability	M	Suit. as Clay Source				
Limitations for Trails:		Suitability of Bedrock for Roadrock				
Steep slopes		Limit of Bedrk. for Roadrk.:				
		None				

APPENDIX III

TERMS AND DEFINITIONS OF MAPPING UNIT CRITERIA 1/

Following is a list of terms and definitions used in Soil Resource Inventories. These terms and definitions are used in compiling information for the Table of Soil Characteristics of Modal Sites; Table of Some Mapping Unit Characteristics, Features and Qualities; Table of Bedrock Characteristics of Mapping Units; and the Mapping Unit Descriptions.

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1/ Unless otherwise noted, the following definitions were developed for use in Soil Resource Inventories, R-6.

## SOIL CHARACTERISTICS

These terms are found in the Table of Soil Characteristics of Modal Sites. They describe morphological properties of the soil.

Soil - Any and all loose, unconsolidated, weathered material on the earth's surface resting on solid, consolidated, unweathered bedrock, regardless of origin, mode of formation, or type of weathering or deposition. Generally includes any material that may be manipulated by hand tools or heavy equipment without the need of blasting except soft unweathered bedrock. In soil horizon designation, soil materials included "A", "B", and "C" horizons.

Depth of Soil to Bedrock - Distance from soil surface to consolidated, unweathered bedrock. Depth is in feet.

Shallow - less than 3 feet.

Moderately deep - 3 to 6 feet.

Deep - 6 to 12 feet.

Very deep - greater than 12 feet.

Depth to Restrictive Layer in the Soil - Distance from soil surface to a layer in the soil that is highly restrictive to drainage, water transmission or root growth. Usually this is a discontinuity or stratification layer, but it may be bedrock. If it is bedrock, depth must be the same as recorded under depth to bedrock. A restrictive layer is generally not a genetic soil horizon, except in old soils that have developed claypan, hardpan, or cemented horizons. Depth is in feet.

Litter - Total depth in inches of decomposed and undecomposed organic matter.

Soil Layer - Each soil layer is a homogeneous layer of soil material. Soil layers are described when soil characteristics change significantly and have definite effects on management. Layers are usually at least 12 inches thick, unless material is very contrasting. Each layer may result from stratification or soil formation processes.

Soil Layer Thickness - Thickness of each soil layer in inches.

Soil Layer Thickness Classes - Thickness is in feet.

Thin - less than 3 feet.

Moderately thick - 3 to 6 feet.

Thick - 6 to 10 feet.

Very thick - greater than 10 feet.

Color - Stated in narrative Munsel notations for each soil layer. Colors are taken of moist crushed soil. Mottling is noted, if present, especially in subsoil layers.

Texture - Relative proportions of sand (2.0 mm.-.05mm.), silt (.05 mm. - .002 mm.), and clay (less than .002 mm.). Standard USDA textural classes are used for each soil layer.

Textural Classes\*- These classes apply when general textural terms are used for the profile sketch in the mapping unit descriptions.

Coarse-textured soils - Sands, loamy sands.

Moderately coarse-textured soils - Sandy loam, fine sandy loam.

Medium-textured soils - Very fine sandy loam, loam, silt loam, silt.

Moderately fine-textured soils - Clay loam, sandy clay loam, silty clay loam.

Fine-textured soils - Sandy clay, silty clay, clay.

Rock Fragment Quantity, Size, and Shape\*- Percent by volume occupied by consolidated fragments larger than sand size (larger 2 mm.)

Size Classes - gravel, 2 mm. - 3 inches; cobbles, 3 inches to 10 inches; stones, greater than 10 inches.

Shape Classes - round, thin, flat, subangular, subround, angular, blocky, etc.

\* Standard USDA Handbook 18 Definitions.

Rock Fragment Classes - Used as an adjective to textural classes.  
Includes gravel, cobble and stone sizes.

- 0 - 35% - not noted.
- 35 - 50% - gravelly, cobbly or stony.
- 50 - 80% - very gravelly, very cobbly or very stony.
- 80%+ - extremely gravelly, extremely cobbly or extremely stony.

Soil Structure\* - Includes grade, size and type of structure for each soil layer. If no structure exists, then the soil is massive or single-grained. Concretions or shot are recorded, if present. Applies to aggregate structural units (aggregates and peds).

Grade - Degree of aggregation and expression of the differential between cohesion within aggregates and adhesion between aggregates.

Weak - Indistinct peds, barely observable in place.

Moderate - Distinct peds, moderately durable and evident.

Strong - Distinct peds in place, durable.

Size - Refers to size of aggregates according to five size classes:

Very Fine - less than 5 mm.

Fine - 5 mm. to 10 mm.

Medium - 10 mm. to 20 mm.

Coarse - 20 mm. to 50 mm.

Very coarse - greater than 50 mm.

Type - Refers to relative shape of individual aggregates. There are four primary basic shapes:

Platy - Soil particles arranged around a plane, generally horizontal.

Prism-like - Soil particles arranged around a vertical line and bounded by relatively flat surface (Prismatic, Columnar).

Block-like - Soil particles arranged around a point and bounded by flat or rounded surfaces (Angular Blocky, Subangular Blocky).

\* Standard USDA Handbook 18 Definitions.

Type (Continued)

Spheroidal - Soil particles arranged around a point and bounded by curved or very irregular surfaces (Granular, Crumb).

Structureless - No observable aggregation or no definite orderly arrangement of natural lines of weakness.

Massive - The soil material is coherent.

Single Grain - The soil material is incoherent.

Cementation\* - Includes degree of cementation and the agent of cementation (Ca, Fe, Al, Si). Cementation is generally caused by a chemical process.

Degree of Cementation

Weak - Soil aggregates can be easily broken by hand, and usually nonrestrictive to water and roots. Example: fragipan.

Strong - Soil aggregates are difficult to break by hand or hand tools and resist movement and penetration of water and roots. Water may be perched or ponded for short periods. Aggregates can be penetrated by hand tools.

Indurated - Soil aggregates are insoluble in water and cannot be broken by hand tools. Aggregates are totally restrictive to water and roots, and usually require ripping or blasting.

Compaction - Relative increase in bulk density which is caused by natural pedogenic processes.

Degree of Compaction

Weak - Soil aggregates are easily broken by hand and are usually nonrestrictive to water and roots.

Moderate - Soil aggregates are difficult to break by hand and resist movement and penetration of water and roots. Water may be perched or ponded for short periods of time.

Strong - Soil aggregates cannot be broken by hand. The soil exhibits nearly total restriction to water and root penetration, and usually requires ripping or blasting.

\* Standard USDA Handbook 18 Definitions.

Permeability - water or air movement in and through the soil material. The classes are based on soil texture, rock fragment content, porosity and bulk density.

Class:

Very slow - very little if any water transmission. Generally fine-textured soils - clay. Less than .05 inch/hr.

Slow - little water transmission. Generally moderately fine-textured soils - clay loams and silty clay loams. .05 inch/hr to 1 inch/hr.

Moderate - good water transmission. Generally medium-textured soils - loams, silt loams. 1 inch/hr. to 5 inches/hr.

Rapid - water transmission too great for optimum growth. Generally moderately coarse-textured soils, sandy loams, gravelly loams. 5 inches/hr. to 10 inches/hr.

Very rapid - excessive water transmission; soil never becomes saturated. Very porous soils. Generally coarse-textured soils - sands and gravels. Greater than 10 inches/hr.

Consistence\*- degree of cohesion and adhesion as indicated by the resistance of the soil aggregate to deformation or rupture under various moisture conditions.

Dry:

Loose - noncoherent

Soft - easily crushes to powder or single grain.

Slightly hard - easily broken between thumb and forefinger.

Hard - can be broken in the hands without difficulty but difficult to break between thumb and forefinger.

Very hard - can be broken in hands without difficulty.

Extremely hard - cannot be broken in hands.

Moist:

Loose - noncoherent.

Very friable - crushes under gentle pressure.

Friable - crushes easily under gentle to moderate pressure between thumb and forefinger.

\* Standard USDA Handbook 18 Definitions.

Firm - crushes under moderate pressure between thumb and forefinger.

Very firm - crushes under strong pressure, barely crushable between thumb and forefinger.

Extremely firm - crushes under very strong pressure, cannot be crushed between thumb and forefinger.

Wet:

Stickiness is measured by pressing wet soil between fingers.

Nonsticky - practically no adherence when pressure is released.

Slightly sticky - after pressure, soil adheres to both thumb and finger but comes off one rather cleanly. Does not appreciably stretch.

Sticky - after pressure, soil adheres to both thumb and finger and tends to stretch somewhat before pulling apart from either digit.

Very sticky - After pressure, soil adheres strongly to both digits and is markedly stretched when they are separated.

Plasticity is measured by rolling wet soil and observing wire.

Nonplastic - no wire is formable.

Slightly plastic - wire forms, but soil mass easily deformed.

Plastic - wire forms, moderate pressure required to deform soil mass.

Very plastic - wire forms, much pressure required to deform soil mass.

Soil pH - intensity of soil acidity or alkalinity expressed on a scale from 1 to 14:

	<u>pH</u>		
<u>Extremely acid</u>	- Below 4.5	Slightly alkaline	7.4-8.4
<u>Strongly acid</u>	- 4.6 - 5.5	Strongly alkaline	8.5-9.0
<u>Slightly acid</u>	- 5.6 - 6.4	Very strongly alkaline	Above 9.0

Classification - estimated 7th approximation classification at family level.

MAPPING UNIT CHARACTERISTICS,  
FEATURES AND QUALITIES

These terms are found in the Table of Some Mapping Unit Characteristics, Features and Qualities. They describe properties of the mapping unit that result from soil characteristics, bedrock characteristics, topography and site.

Infiltration Rate - Rate of entry of water into soil surface. The rate is dependent upon the type of surface soil texture, rock fragment content, structure, porosity, bulk density and organic matter content.

Infiltration Rate Classes

Slow - Water stands on surface for long periods. Soils are fine-textured, poorly aggregated and puddle easily.

Moderate - Water enters soil at commensurated rates of normal rainfall or water application. Water may pond for short periods (a few days) following very intensive rainfall. Soils are medium-textured and well aggregated.

Rapid - Water rarely ponds, enters soil surface very rapidly. Soils are coarse-textured, porous, loose and usually single-grained.

Drainage Class<sup>2/</sup> - The rapidity and extent of removal of water from the soil. Based on soil permeability, infiltration, internal drainage and topographic position.

Poorly Drained - Water table at or near the surface a considerable part of the time. Soils of this class usually occupy level or depressed sites and are frequently ponded. Water is removed so slowly that soil remains wet almost all the time.

Imperfectly Drained - Water removed so slowly that the soil remains wet for significant periods, but not all the time.

Moderately Well Drained - Soil remains wet for a period somewhat longer (up to one month) than the wet season; may be due in part to a slowly permeable layer, high water table or lateral seepage.

Well Drained - Water is removed from soil readily and these soils are saturated only during the wet season for short periods.

Excessively Drained - Water is removed from soil rapidly and these soils are rarely ever saturated. Commonly, these soils are coarse-textured or shallow, stony and/or occur on steep slopes.

<sup>2/</sup> Very poorly drained and somewhat excessively drained classes are not used.

Surface Drainage Intensity and Pattern - Number of drainage miles per square mile and dominant drainage pattern.

Intensity Classes

Few - 0 to 1 drainage miles per square mile.

Common - 1 to 3 drainage miles per square mile.

Many - 3 to 5 drainage miles per square mile.

Abundant - Greater than 5 drainage miles per square mile.

Patterns

Dendritic - Drainages branch in random directions.

Parallel - Drainages are relatively parallel.

Productivity - Combined evaluation of measured and observed production of timber and forage types. Site classes are to be used for timber types and range condition ratings for range types.

Site Class - Class limits correspond to height (site index) of Douglas-fir at 100 years.

Class I - greater than 185 S.I.

Class II - 185 S.I. to 155 S.I.

Class III - 155 S.I. to 125 S.I.

Class IV - 125 S.I. to 95 S.I.

Class V - less than 95 S.I.

Fertility - Estimated inherent soil fertility and availability of plant nutrients. This rating is derived by correlating measured productivity with soil factors such as texture, pH, color and organic matter content.

High - These soils generally have medium to fine texture, dark surface colors; are slightly acid to slightly alkaline and have abundant incorporated organic matter. Nutrient quantities are adequate and readily available. Productivity is high as evidenced by timber site classes of I and II.

Moderate - These soils generally have one or more soil factors that limit nutrient quantity and/or availability. Productivity is moderate as evidenced by timber site classes of low II to high IV.

Low - These soils generally have several factors that are limiting. They may be coarse textured, strongly acid or strongly alkaline, and lacking in sufficient organic matter. Nutrient quantity and/or availability is seriously limiting. Productivity is low as evidenced by timber site classes IV and V.

Percent Vegetative Cover - Evaluation of total vegetative cover and the cover of three distinct levels of vegetation above the soil surface. Overstory consists of the timber stand canopy. Understory consists of woody shrubs, and timber regeneration. Ground cover consists of ferns, grasses, sedges, and mosses.

Total Ground Cover - Estimated percent of total vegetative cover with overstory, understory and ground cover combined. Maximum of 100 percent.

Vegetative Cover by Each Level - Estimated percent vegetative cover according to species composition, with overstory, understory, and ground cover estimated separately. Maximum of 100 percent for each level.

Root Distribution\* - Includes root size, abundance and depth to zone of rooting.

Size

Very Fine - 0.075 mm.

Fine - 1 to 2 mm.

Medium - 2 to 5 mm.

Coarse - Over 5 mm.

Abundance

Very Few - less than 1/unit <sup>3/</sup>

Few - 1 to 3/unit.

Plentiful - 4 to 14/unit.

Abundant - More than 14.

Depth

Recorded depth in inches of zone of rooting. Distance is measured from soil surface to depth of majority of roots.

\* Standard USDA Handbook 18 Definitions.

<sup>3/</sup> Unit is a square inch for fine to very fine; a square yard for medium and coarse roots.

Landform - Refers to the shape and configuration of a specific, identifiable part of the landscape common to the mapping unit.

Slope - Range of slope of mapping unit.

Aspect - Direction of slope exposure.

Elevation - Altitude above mean sea level expressed in feet.

#### BEDROCK CHARACTERISTICS

These terms are found in the Table of Bedrock Characteristics of Mapping Units.

Bedrock - Consolidated, competent rock which upon weathering produces loose or unconsolidated soil material. In terminology of soil horizon designation, bedrock is designated at the "R" layer. Bedrock material usually required ripping and/or blasting. Includes soft materials that are unweathered such as some sedimentary rock which can be bladed. (Example: Sandstone).

Composition - Bedrock components and percentage. (Example: Sandstone (20), Conglomerates (70), Mudstone (10)).

Color - Color is in narrative terms for fresh unweathered surfaces.

Hardness - Relative rating based on ease of breaking rock with geology hammer.

Hard - Rock cannot be broken or only with great difficulty.

Moderately Hard - Rock can readily be broken with hammer but not by hand.

Soft - Rock can be broken by hand.

Degree of Fracturing - Based on the number or frequency of fractures and joints in a rock unit.

Highly fractured - Entire rock unit is completely dissected by fractures and joints less than 1 foot apart.

Moderately fractured - Fractures divide rock unit into units or blocks generally from 1 foot to 5 feet apart.

Slightly fractured - Only occasional fractures noted.

Massive - No fractures or very few fractures noted.

Fracture System - Pattern which the rock fractures follow. Example: horizontal, platy, vertical, blocky, random, etc.

Fracture Surface - Indicates the characteristics of the fracture surface and void space within fractures.

Regular - Smooth, distinct, sharp, clean-fractured surfaces.

Irregular - Rough, irregular, fragmented fracture surfaces.

Competency - Relative inherent strength of rock as it occurs on the landscape. Based on degree of weathering, fracturing, hardness, stability and failures observed.

Competent - No failures within rock unit observed. Rocks of unit are stable and have strong resistance to mass movement.

Moderately competent - Some failures are noted. Rocks of the unit are moderately stable and have some resistance to mass movement.

Incompetent - Failures are common to rock unit. Rocks of the unit are soft, deeply weathered and have high potential for mass movement.

## APPENDIX IV

### DEFINITIONS AND DESCRIPTIONS OF MAPPING UNITS

This section contains the identifying descriptions of numbers and symbols found on the soil maps. The numbers identify mapping units. The symbols represent land features which are too small to delineate but are important in land management. The symbols used in this survey are listed below:

✓	Rock outcrop
T	Talus
X	Unstable area
⚡	Wet spot and small marshes
⤴	Slump or slide scarp
⤵	Slump
M	Modal site location
S	Sample location
↘	Avalanche track

Mapping units<sup>1/</sup> are shown on the soil maps as numbers. Mapping units contain a dominant soil which accounts for at least 70 percent of the soil delineation.

The dominant soil of the mapping unit is described in the mapping unit description and identified by the same number as used for the mapping unit. Within the mapping unit other soils occur. Those most commonly associated with the dominant soil of the mapping unit are included in the descriptions as inclusions. These inclusions of other soils account for not more than 30 percent of the mapping unit.

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<sup>1/</sup>Mapping units contain a dominant taxonomic unit with inclusions of other taxonomic units.

Most of the mapping units are described in detail and have a general profile sketch to depict the dominant soil, ranges of soil layer thicknesses and total depth, and the bedrock type. These soils have a definable range of characteristics that can be represented by a soil profile description. The dominant soils of Mapping Units 1 through 9 are limited in extent or quite variable in composition and have not been described in detail. Mapping Units 50, 60, 70, 80, 85, 90 and 95 are composed of rock outcrop and also have not been described in detail. These sixteen mapping units are described by a short narrative description.

The management interpretations presented in the Atlas apply only to the dominant soil in each mapping unit. The interpretations for most inclusions within any mapping unit are listed on the interpretative tables according to the appropriate soil number. The Tables of Some Mapping Unit Characteristics, Features and Qualities, and Table of Bedrock Characteristics of Mapping Units are also numbered according to the dominant soil in the mapping unit and apply to that dominant soil.

Many symbols shown on the maps have three digits and are called "Mapping Unit Complexes." These are mapping units used in areas where two or more defined mapping units are present in an arrangement too complex to separate. The vast majority of mapping unit complexes used in this survey are composed of two defined mapping units. However, a few complexes composed of three defined mapping units were also used. The following legend indicates the mapping unit components of the complex and the percentage of each component. For identification and management interpretations for areas that have been mapped with complexes, refer to the descriptions and interpretative information given for the individual mapping units. For example, Mapping Unit Complex 789 is composed of approximately 60 percent Mapping Unit 78 and 40 percent Mapping Unit 79. Refer to each mapping unit description for the soil, bedrock, and landform characteristics, and to the Tables for the interpretative information.

LEGEND OF COMPLEXES

<u>Mapping Unit Number</u>	<u>Mapping Unit Components</u>
358	50 percent Unit 35 and 50 percent Unit 18
457	50 percent Unit 45 and 50 percent Unit 47
505	50 percent Unit 50, 25 percent Unit 45, and 25 percent Unit 5
508	50 percent Unit 50 and 50 percent Unit 8
510	60 percent Unit 51 and 40 percent Unit 50
517	60 percent Unit 51 and 40 percent Unit 37
520	60 percent Unit 52 and 40 percent Unit 50
605	50 percent Unit 60, 25 percent Unit 45, and 25 percent Unit 5
608	50 percent Unit 60 and 50 percent Unit 8
610	60 percent Unit 61 and 40 percent Unit 60
611	70 percent Unit 61 and 30 percent Unit 41
612	60 percent Unit 61 and 40 percent Unit 26
613	60 percent Unit 61 and 40 percent Unit 31
617	50 percent Unit 61 and 50 percent Unit 37
620	60 percent Unit 62 and 40 percent Unit 60
628	60 percent Unit 62 and 40 percent Unit 38
662	60 percent Unit 66 and 40 percent Unit 62
705	50 percent Unit 70, 25 percent Unit 45, and 25 percent Unit 5
708	50 percent Unit 70 and 50 percent Unit 8
710	60 percent Unit 71 and 40 percent Unit 70
712	60 percent Unit 71 and 40 percent Unit 26
713	60 percent Unit 71 and 40 percent Unit 13
714	60 percent Unit 71 and 40 percent Unit 24
717	60 percent Unit 71 and 40 percent Unit 37
720	60 percent Unit 72 and 40 percent Unit 70
728	60 percent Unit 72 and 40 percent Unit 38
732	60 percent Unit 73 and 40 percent Unit 22
743	60 percent Unit 74 and 40 percent Unit 23
755	60 percent Unit 75 and 40 percent Unit 25
760	60 percent Unit 76 and 40 percent Unit 70
766	60 percent Unit 76 and 40 percent Unit 26
780	60 percent Unit 78 and 40 percent Unit 70
789	60 percent Unit 78 and 40 percent Unit 79
805	50 percent Unit 80, 25 percent Unit 45, and 25 percent Unit 5
808	50 percent Unit 80 and 50 percent Unit 8
810	60 percent Unit 81 and 40 percent Unit 80
811	70 percent Unit 81 and 30 percent Unit 21
812	70 percent Unit 81 and 30 percent Unit 41
817	60 percent Unit 81 and 40 percent Unit 37
820	60 percent Unit 82 and 40 percent Unit 80
821	60 percent Unit 82 and 40 percent Unit 21
822	60 percent Unit 82 and 40 percent Unit 41

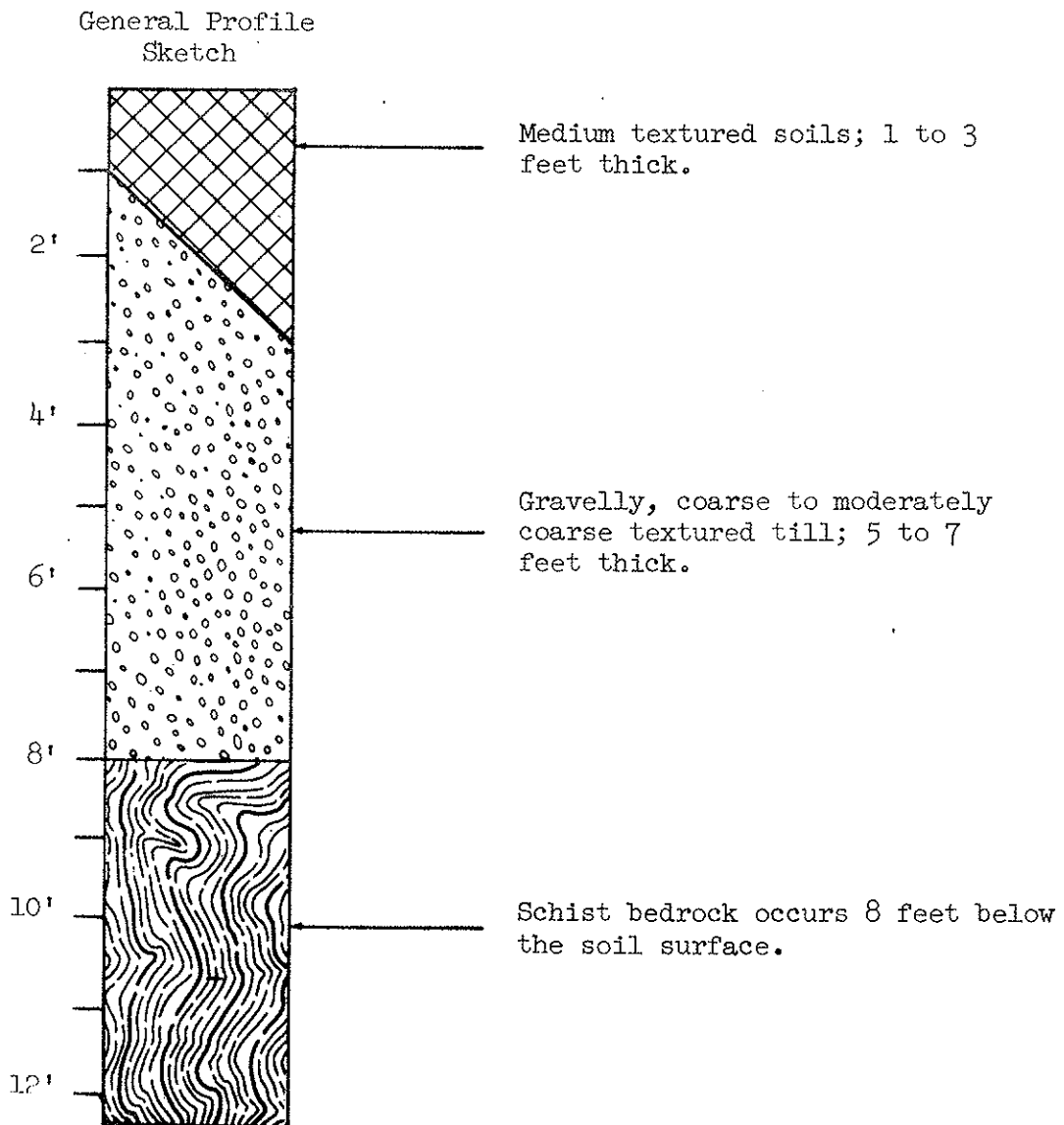
LEGEND OF COMPLEXES (Cont.)

<u>Mapping Unit Number</u>	<u>Mapping Unit Components</u>
830	60 percent Unit 83 and 40 percent Unit 80
855	50 percent Unit 85, 25 percent Unit 45 and 25 percent Unit 5
865	60 percent Unit 86 and 40 percent Unit 85
866	60 percent Unit 86 and 40 percent Unit 26
905	50 percent Unit 90, 25 percent Unit 45 and 25 percent Unit 5
908	50 percent Unit 90 and 50 percent Unit 8
910	60 percent Unit 91 and 40 percent Unit 90
911	70 percent Unit 91 and 30 percent Unit 41
916	60 percent Unit 91 and 40 percent Unit 26
917	60 percent Unit 91 and 40 percent Unit 37
920	60 percent Unit 92 and 40 percent Unit 90
921	70 percent Unit 92 and 30 percent Unit 41
928	60 percent Unit 92 and 40 percent Unit 38
955	50 percent Unit 95, 25 percent Unit 45 and 25 percent Unit 5
958	50 percent Unit 95 and 50 percent Unit 8
975	60 percent Unit 97 and 40 percent Unit 95

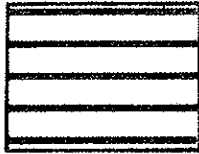
LEGEND FOR GENERAL PROFILE SKETCH

A general profile sketch is a schematic representation of the soil and bedrock materials of mapping units. It depicts the ranges of soil texture, rock fragment content, thickness, depth to bedrock and kind of bedrock. The sketch does not show such factors as soil structure, compaction or permeability. The patterns used are shown and defined on the Legend for General Profile Sketch.

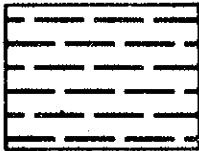
The following example illustrates how a general profile sketch is used.



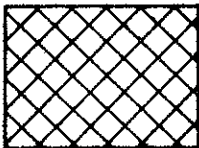
SOIL MATERIALS



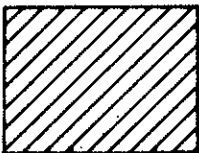
Coarse Textured Soils: Sands, Loamy Sands



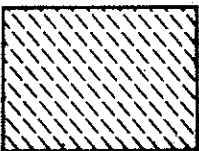
Moderately Coarse Textured Soils: Sandy Loam, Fine Sandy Loam



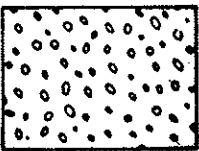
Medium Textured Soils: Very Fine Sandy Loam, Loam, Silt Loam, Silt



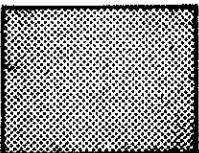
Moderately Fine Textured Soils: Clay Loam, Sandy Clay Loam, Silty Clay Loam



Fine Textured Soils: Sandy Clay, Silty Clay, Clay

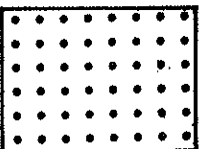


Gravelly Coarse to Moderately Coarse Textured Till: Loamy Sand, Sandy Loam, Fine Sandy Loam

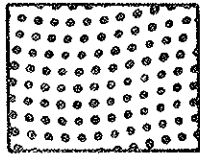


Gravelly Medium Textured Till: Very Fine Sandy Loam, Silt Loam, Loam

TEXTURAL MODIFIERS

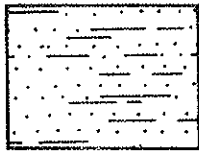


Gravel

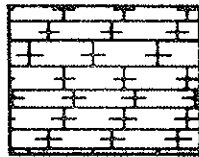


Cobbles

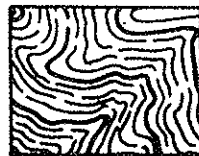
BEDROCK MATERIALS



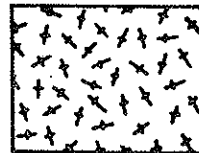
Nonmarine Sedimentary Rocks



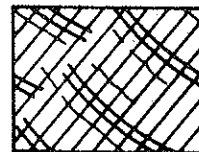
Meta-Sedimentary and Meta-Volcanic Rocks



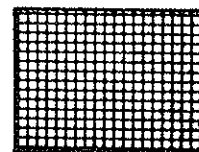
Schist Rocks



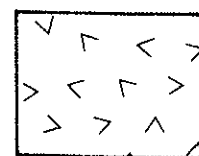
Granitic Intrusive Igneous and Gneissic Rocks



Serpentized Rocks



Mesozoic Extrusive Igneous Rocks



Recent Andesite, Basalt and Pyroclastic Rocks

KEY TO MAPPING UNITS

Mapping Units 1 thru 9 are miscellaneous units and are not included on this key.	Type of Material					Dominant Profile Textural Class					Site Class Range					Percent Slope			Natural Stability						
	Soil Unit	Till	Till and Colluvium	Colluvium	Stratified Till and Lacustrine	Lacustrine	Alluvium	Coarse	Moderately Coarse	Medium	Moderately Fine	Fine	I	II	III	IV	V	Less Than 35 Percent	Greater Than 35 Percent	Other Percent Slope Breaks	I	II	III	IV	V
Very Deep Transported Soils of Glacial, Alluvial, Colluvial, Glacialfluvial, or Lacustrine Origin.	10					X	X												0-10	X					
	11	X					X												0-15	X					
	12	X					X											X							
	13	X					X											X			X				
	17						X	X										X			X				
	18						X	X										X							
	19	X																	20-60						
	20		X					X										X							
	21		X					X										X							
	22	X																X			X				
	23	X																	35-50						
	24	X																	50-75						
	25	X																X			X				
	26	X																	35-50						
	29	X							X										25-65						
	30					X												X			X				
	31					X												X				X			
	32					X												X			X				
	33					X												X				X			
	34					X					X							X				X			
35					X					X							X								
36	X						X										X								
37	X						X											35-50		X					
38	X						X											50-70							
41			X				X										X				X				
Unique Soils	43	Deep Cinders and Ash																							
	45	Shallow Alpine Soil over Various Types of Bedrock																							
	47	Deep Alpine Soil																							

KEY TO MAPPING UNITS (cont.)

	Bedrock Material	Soil Unit	Depth of Soil to Bedrock					Landform					Natural Stability							
			Rock Outcrop	Shallow	Moderately Deep	Deep	Very Deep	Steep, Nondissected to Slightly Dissected Slopes	Steep, Highly Dissected, Relatively Stable Slopes	Highly Dissected Unstable Drainages and Steep Depressions	Smooth, Slightly Dissected Slopes of Less Than 35 Percent	I	II	III	IV	V				
Shallow to Very Deep, Residual and Colluvial Soil Derived From Bedrock	Nonmarine Sedimentary Rocks	50	X					X	X											
		51		X				X								X				
		52		X					X							X				
		54			X				X											
		56									X									
	Meta-Sedimentary and Meta-Volcanic Rocks	60	X					X	X											
		61		X				X								X				
		62		X					X											
		66									X									
	Schist Rocks	70	X					X	X											
		71		X				X								X				
		72		X					X											
		73 1/											X		X					
		74 1/						X												
		75 2/											X		X					
		76 2/						X												
		78									X									
		79									X									X
	Granitic Intrusive Igneous and Gneissic Rocks	80	X					X	X											
		81		X				X								X				
		82		X					X											
		83									X									
	Serpentinized Rocks	85	X					X	X									X		
		86						X												
	Mesozoic Extrusive Igneous Rocks	90	X					X	X											
		91						X								X				
		92							X											
	Recent Andesite, Basalt and Pyroclastic Rocks	95	X					X	X											
96			X								X		X							
97			X				X								X					

Remarks

- 1/ Soil Units 73 and 74 support Site Class II and III Douglas fir.
- 2/ Soil Units 75 and 76 support Site Class IV and V Douglas fir.

## MAPPING UNIT DESCRIPTIONS <sup>1/</sup>

- Mapping Unit 1 - Stream-deposited fresh sands and gravels. This mapping unit consists of fresh sands and gravels occurring along streams. It is barren of vegetation and is frequently flooded. The most common inclusion is Soil 10.
- Mapping Unit 2 - Glacial-deposited fresh sands and gravels. This mapping unit consists of fresh sands and gravels recently deposited by glaciers. It is barren of vegetation and is unstable. Slopes range from 20 to 80 percent. The most common inclusion is Soil 8.
- Mapping Unit 3 - Marshland and wet meadows. This mapping unit consists of depressional areas that are seasonably ponded. The soils are slowly permeable, imperfectly to poorly drained, and normally support sedges, rushes, grasses, tag alder and willow. The most common inclusions are Soils 30, 32, 34, 12 and 36.
- Mapping Unit 4 - Boulder deposits. This mapping unit consists of deep colluvial boulder deposits in valley bottoms on slopes of less than 35 percent. Many boulders are visible at the surface. Soils are very shallow, very gravelly loams and very gravelly sandy loams. Vegetation is usually scrub alder, willow, vine maple, devils club and associated species. The most common inclusions are Soils 3 and 20.
- Mapping Unit 5 - Talus slopes. This mapping unit consists of steep, gravelly and bouldery sideslopes. The mapping unit may be devoid of soil or may contain very shallow, very gravelly loams and very gravelly sandy loams. Vegetation, when present, is usually scrub alder, willow, vine maple, devils club and associated species. Common inclusions are Soils 50, 51, 52, 60, 61, 62, 70, 71, 72, 80, 81, 82, 85, 86, 90, 91, 92, 95 and 97.
- Mapping Unit 6 <sup>2/</sup> - Pumice and ash, gentle slopes. This mapping unit consists of thin to very thick volcanic pumice and ash over very thick lava flows. Pumice ranges from ½ to 3 inches in diameter. The pumice and ash may be reworked and highly stratified by ancient and existing streams. Soils are well to excessively drained and support Site Class IV and V Douglas-fir, along with true fir and mountain hemlock. This mapping unit occurs in broad valley bottoms and on lava terrain of less than 35 percent slope.

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<sup>1/</sup>Mapping Units 1 through 9 and 50, 60, 70, 80, 85, 90 and 95 are miscellaneous units and were not described in detail.

<sup>2/</sup>Mapping Units 6 and 7 were not observed on the ground but were inferred from information found in the following: Tabor, R. W. and D. F. Crowder, On Batholiths and Volcanoes, Geological Survey Professional Paper 604, Washington 1969.

MAPPING UNIT DESCRIPTIONS (Cont.)

- Mapping Unit 7 - Pumice and ash, steep slopes. This mapping unit consists of thin to very thick volcanic pumice and ash overlying various kinds of bedrock. Pumice ranges from  $\frac{1}{2}$  to 3 inches in diameter. The pumice and ash may be reworked and highly stratified by ancient and existing streams. Soils are well to excessively drained and support Site Class IV and V Douglas-fir along with true fir and mountain hemlock. This mapping unit occurs on steep, slightly to highly dissected sideslopes of greater than 35 percent slope.
- Mapping Unit 8 - Perpetual snow and ice. This mapping unit consists of the perpetual snow and ice that occurs at high elevations.
- Mapping Unit 9 - Eroded glacial materials. This mapping unit consists of very steep eroded edges of glacial materials occurring along deeply-incised streams in glacial valleys. It is often highly dissected and contains numerous slides. The most common inclusions are Soils 35 and 38.

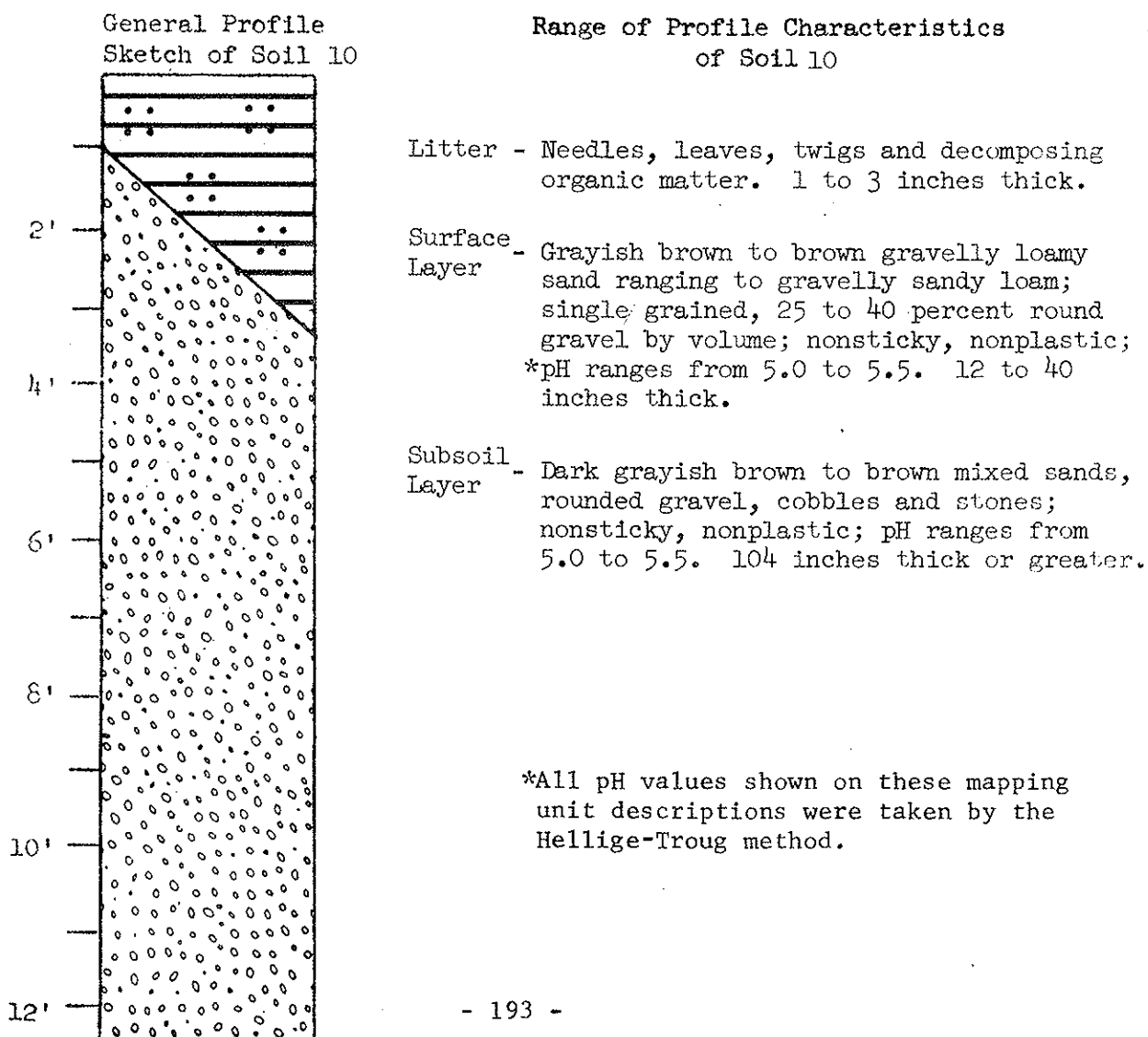
## MAPPING UNIT 10

Mapping Unit 10 consists of Soil 10 and inclusions of other soils. The most common inclusions are Soils 1 and 12.

Soil 10 is a very deep, nonplastic soil derived from alluvium. Surface soils are generally thin gravelly loamy sands. Subsoils are generally very thick, very gravelly and cobbly sand.

Bedrock is sedimentary, igneous, or metamorphic and occurs 12 feet or more beneath the soil surface.

Typically Soil 10 occurs on river flood plains. This soil ranges in elevation from 500 to 2500 feet and supports Site Class II and III Douglas-fir along with alder, bigleaf maple, cottonwood and cedar. This soil is well to moderately well drained. Permeability is rapid.



## MAPPING UNIT 11

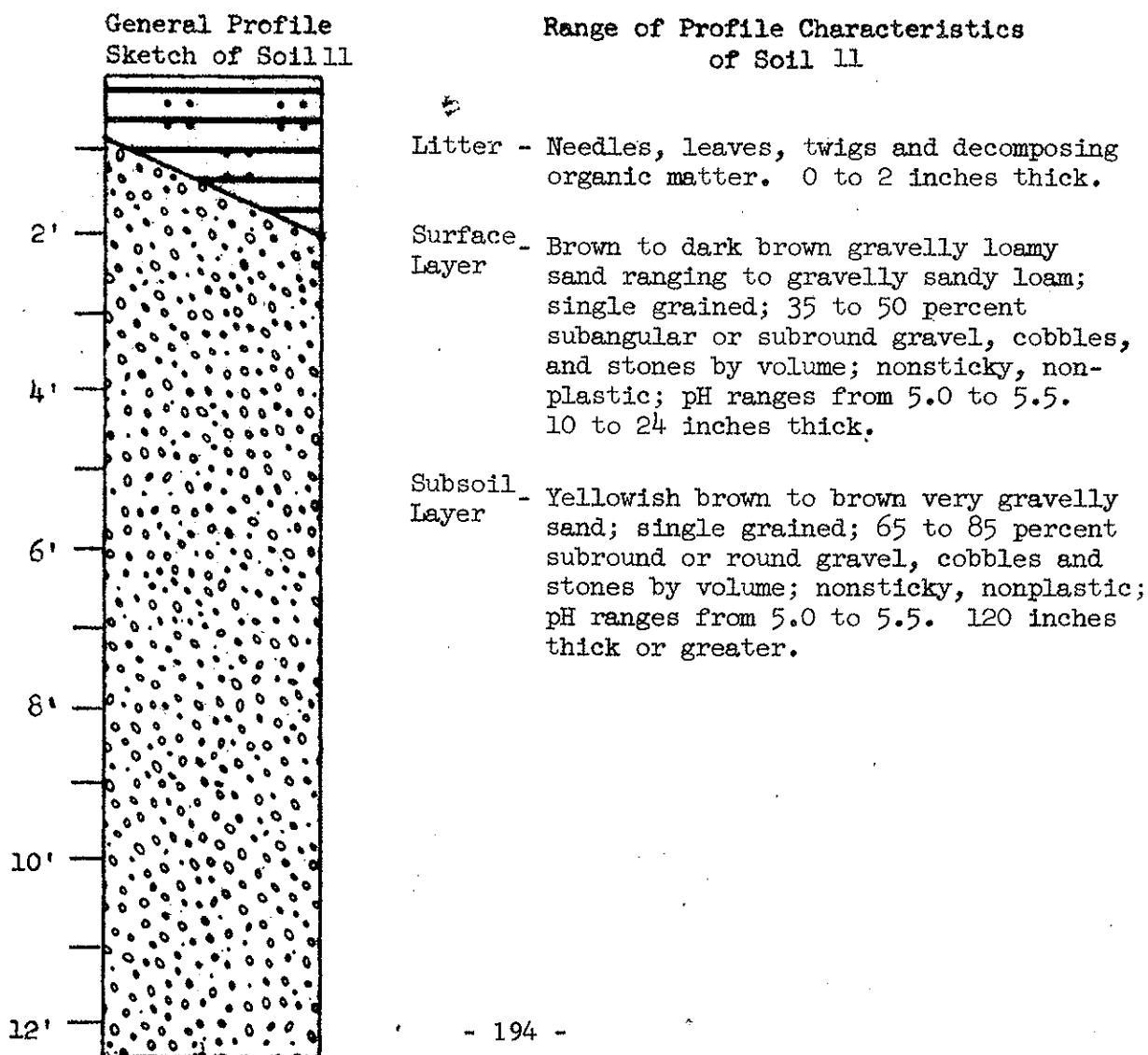
Mapping Unit 11 consists of Soil 11 and inclusions of other soils. The most common inclusions are Soils 10 and 12.

Mapping Unit 11 is similar to Mapping Unit 12 with the exception of vegetation, texture, drainage and inclusions.

Soil 11 is a very deep nonplastic soil derived from glacial outwash. Surface soils are generally thin gravelly loamy sands. Subsoils are generally very thick, very gravelly sands.

Bedrock is sedimentary, igneous, or metamorphic and occurs 12 feet or more beneath the soil surface.

Typically Soil 11 occurs on outwash plains in large glacial valleys on slopes of less than 15 percent. This soil ranges in elevation from 500 to 1500 feet and supports Site Class IV and V Douglas-fir along with hemlock and lodgepole pine. This soil is excessively drained. Permeability is very rapid.



## MAPPING UNIT 12

Mapping Unit 12 consists of Soil 12 and inclusions of other soils. The most common inclusions are Soils 10, 11, 13 and 30.

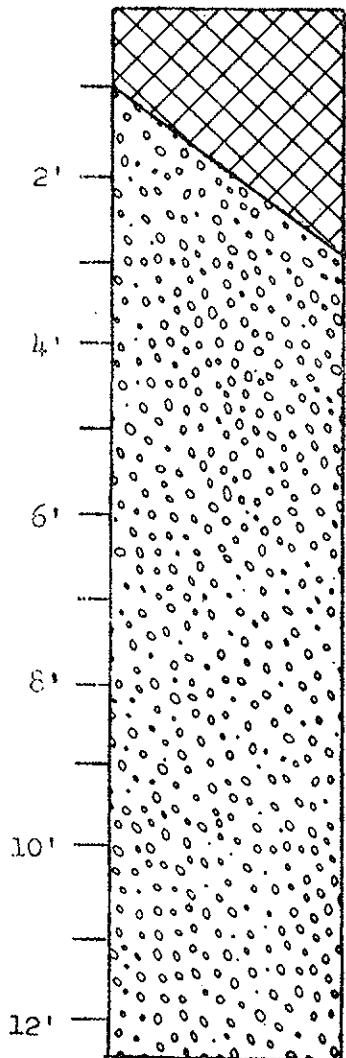
Mapping Unit 12 is similar to Mapping Unit 13 with the exception of landform and inclusions, and Mapping Unit 36 with the exception of Site Class and inclusions.

Soil 12 is a very deep nonplastic soil derived from glacial drift. Surface soils are generally thin loams. Subsoils are generally very thick, very gravelly loamy sands.

Bedrock is sedimentary, igneous, or metamorphic and occurs 12 feet or more beneath the soil surface.

Typically Soil 12 occurs on glacially modified valley bottoms and toeslopes of less than 35 percent. This soil ranges in elevation from 500 to 2500 feet and supports Site Class I, II and high III Douglas-fir along with hemlock and cedar. This soil is generally well drained but is moderately well drained locally. Permeability is rapid in the surface soils and rapid to moderate in the subsoils.

General Profile  
Sketch of Soil 12



Range of Profile Characteristics  
of Soil 12

- Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.
- Surface Layer - Brown to dark brown loam; weak fine subangular blocky structure; 20 to 35 percent subround gravel by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 5.0 to 5.5. 12 to 35 inches thick.
- Subsoil Layer - Dark yellowish brown to dark gray very gravelly loamy sand ranging to very gravelly sandy loam with thin discontinuous lenses of gravelly silt loam locally; single grained; 50 to 75 percent subround gravel and cobbles by volume; weakly to moderately compact; nonsticky, nonplastic; pH ranges from 5.5 to 6.0. 109 inches thick or greater.

### MAPPING UNIT 13

Mapping Unit 13 consists of Soil 13 and inclusions of other soils. The most common inclusions are Soils 12 and 38.

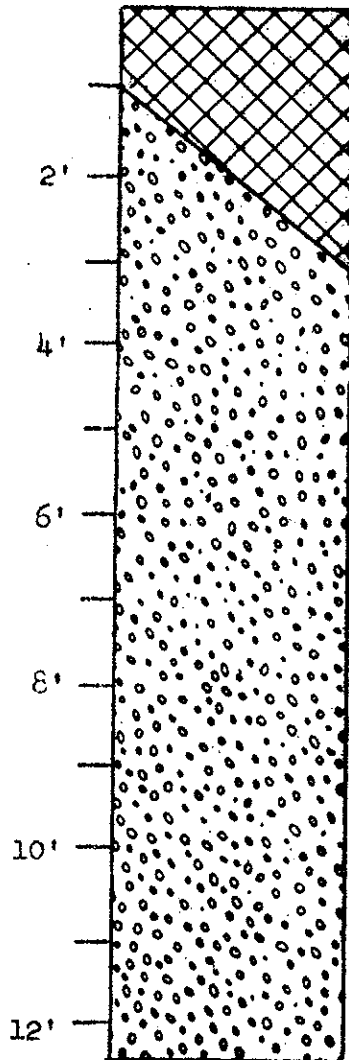
Mapping Unit 13 is similar to Mapping Unit 12 with the exception of landform and inclusions, and Mapping Unit 37 with the exception of Site Class and inclusions.

Soil 13 is a very deep nonplastic soil derived from glacial drift. Surface soils are generally thin loams. Subsoils are generally very thick very gravelly loamy sands.

Bedrock is sedimentary, igneous, or metamorphic and occurs 12 feet or more beneath the soil surface.

Typically Soil 13 occurs on sideslopes and toeslopes of greater than 35 percent. This soil ranges in elevation from 500 to 2500 feet and supports Site Class II and high III Douglas-fir along with hemlock and cedar. This soil is well drained. Permeability is rapid.

General Profile  
Sketch of Soil 13



Range of Profile Characteristics  
of Soil 13

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Surface Layer - Dark brown to dark yellowish brown loam ranging to sandy loam; weak fine sub-angular blocky structure; 20 to 35 percent subround gravel and cobbles by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 5.0 to 5.5. 12 to 36 inches thick.

Subsoil Layer - Dark grayish brown to reddish brown very gravelly fine sandy loam ranging to very gravelly sand; single grained; 50 to 75 percent subround gravel and cobbles by volume; weakly to moderately compact; nonsticky, nonplastic; pH ranges from 5.5 to 6.0. 108 inches thick or greater.

## MAPPING UNIT 17

Mapping Unit 17 consists of Soil 17 and inclusions of other soils. The most common inclusions are Soils 18, 32, 34 and 36.

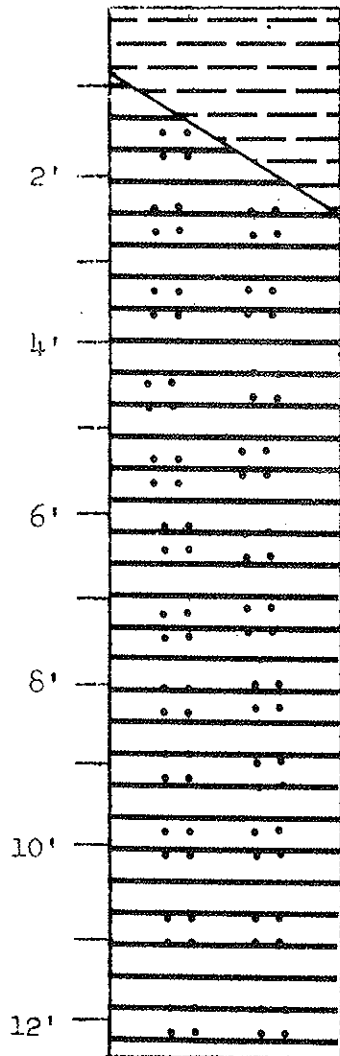
Mapping Unit 17 is similar to Mapping Unit 18 with the exception of landform and inclusions.

Soil 17 is a very deep nonplastic soil derived from alluvial and marginal lake deposits. Surface soils are generally thin loams. Subsoils are generally very thick, loose, gravelly sands.

Bedrock is sedimentary or metamorphic and occurs 12 feet or more beneath the soil surface.

Typically Soil 17 occurs on flat outwash and marginal lake terrain of less than 35 percent slope. This soil ranges in elevation from 1000 to 3000 feet and supports Site Class III and IV Douglas-fir along with hemlock, cedar and true fir. This soil is generally well drained. Permeability is rapid.

General Profile  
Sketch of Soil 17



Range of Profile Characteristics  
of Soil 17

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Surface Layer - Brown to dusky red loam ranging to sandy loam; weak very fine subangular blocky structure; 20 to 40 percent subround gravel and cobbles by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 5.0 to 5.5. 10 to 30 inches thick.

Subsoil Layer - Reddish brown to very dark gray gravelly sand; single grained; loose; 35 to 60 percent round gravel and cobbles by volume; nonsticky, nonplastic; pH ranges from 5.0 to 5.5. 114 inches thick or greater.

## MAPPING UNIT 18

Mapping Unit 18 consists of Soil 18 and inclusions of other soils. The most common inclusions are Soils 17, 33, 35 and 37.

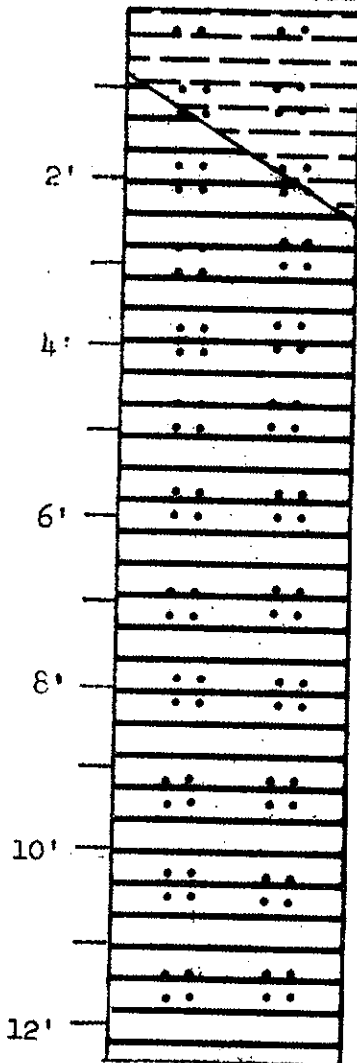
Mapping Unit 18 is similar to Mapping Unit 17 with the exception of landform and inclusions.

Soil 18 is a very deep nonplastic soil derived from alluvial and marginal lake deposits. Surface soils are thin gravelly sandy loams. Subsoils are generally very thick, loose, gravelly sands.

Bedrock is sedimentary or metamorphic and occurs 12 feet or more beneath the soil surface.

Typically Soil 18 occurs on slightly to moderately dissected sideslopes and toeslopes of greater than 35 percent slope. This soil ranges in elevation from 1000 to 3000 feet and supports Site Class III and IV Douglas-fir along with hemlock, cedar and true fir. This soil is well drained. Permeability is rapid.

General Profile  
Sketch of Soil 18



Range of Profile Characteristics  
of Soil 18

- Litter - Needles, leaves, twigs and decomposing organic matter. 1 to 2 inches thick.
- Surface Layer - Brown to dusky red gravelly sandy loam ranging to gravelly loam; weak very fine subangular blocky structure; 30 to 45 percent subround gravel and cobbles by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 5.0 to 5.5. 10 to 30 inches thick.
- Subsoil Layer - Reddish brown to very dark gray gravelly loamy sand ranging to gravelly sand; single grained; local lenses of gravel or silt; loose; 35 to 70 percent round gravel and cobbles by volume; nonsticky, nonplastic; pH ranges from 5.0 to 5.5. 114 inches thick or greater.

## MAPPING UNIT 19

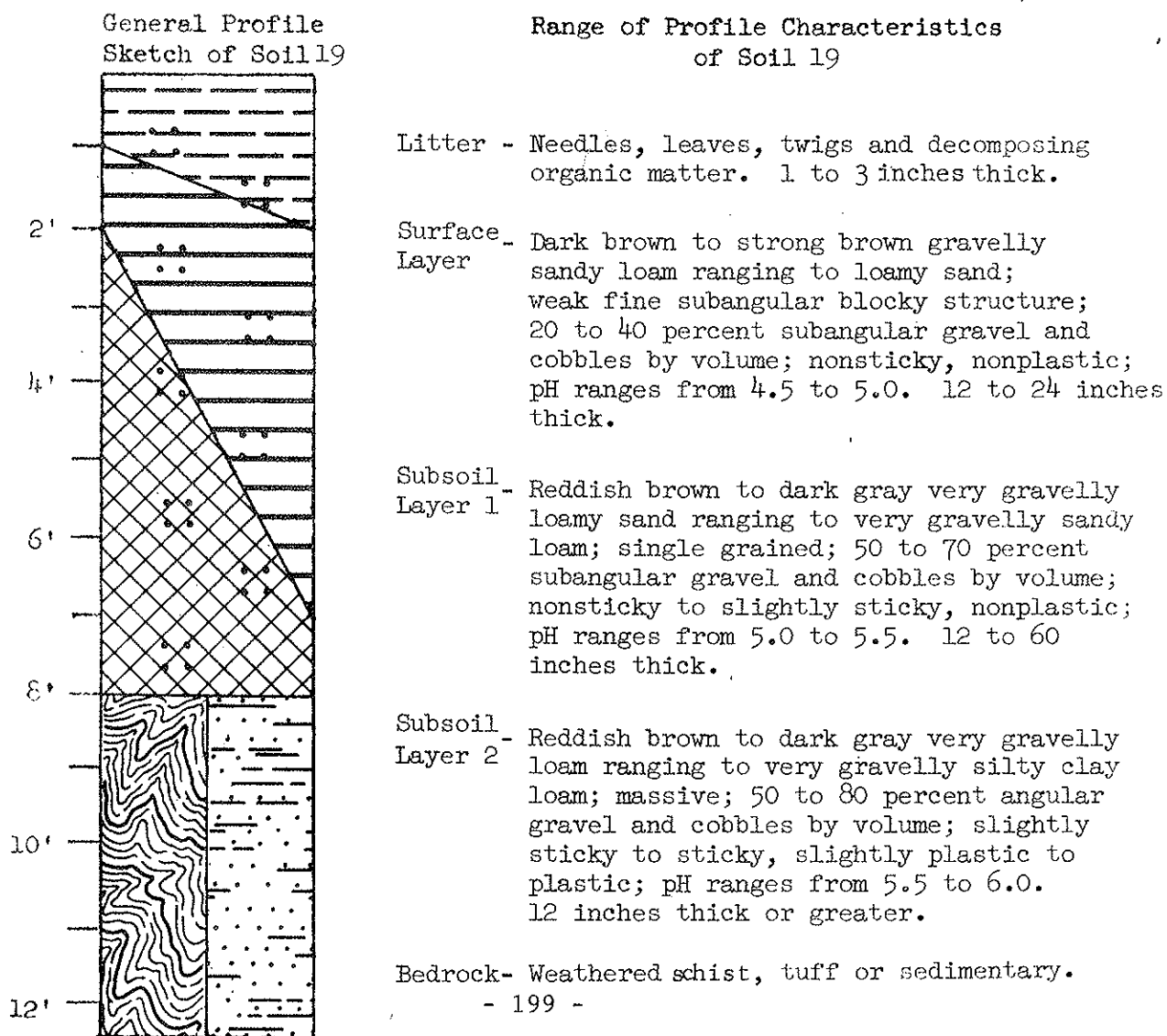
Mapping Unit 19 consists of Soil 19 and inclusions of other soils. The most common inclusions are Soils 13, 36 and 37.

Mapping Unit 19 is similar to Mapping Unit 29 with the exception of texture, drainage and inclusions.

Soil 19 is a deep nonplastic to slightly plastic soil derived from glacial drift. Surface soils are generally thin gravelly sandy loams. Subsoils are generally moderately thick, gravelly sandy loams grading to gravelly silty clay loam at depth.

Bedrock is highly weathered schist, tuffs, or sedimentary and generally occurs 8 feet or more beneath the soil surface.

Typically Soil 19 occurs on uneven, hummocky and slightly to somewhat dissected slopes of 20 to 60 percent. This soil ranges in elevation from 1500 to 3000 feet and supports Site Class IV and low III Douglas-fir along with hemlock, true fir and cedar. This soil is generally well drained. Permeability is rapid in the surface soils and rapid to moderate in the subsoils.



## MAPPING UNIT 20

Mapping Unit 20 consists of Soil 20 and inclusions of other soils. The most common inclusions are Soils 21 and 36.

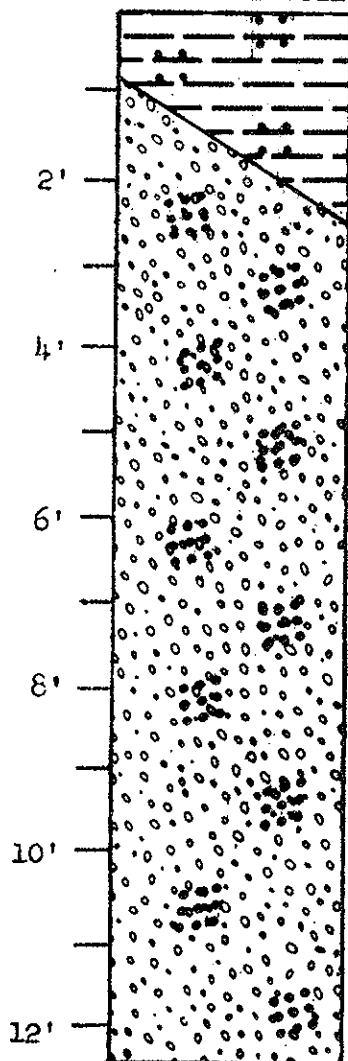
Mapping Unit 20 is similar to Mapping Unit 21 with the exception of landform and inclusions.

Soil 20 is a very deep nonplastic soil derived from glacial till of granite origin. Surface soils are generally thin gravelly and cobbly sandy loams. Subsoils are generally very thick moderately compact, very gravelly and cobbly sandy loams.

Bedrock is intrusive igneous or gneissic and occurs 12 feet or more beneath the soil surface.

Typically Soil 20 occurs on uneven and somewhat dissected sideslopes and valley bottoms of less than 35 percent slope. Large granite boulders are frequently present on the soil surface. This soil ranges in elevation from 1500 to 3000 feet and supports Site Class IV and V Douglas-fir along with true fir, hemlock and cedar. This soil is well to moderately well drained. Permeability is rapid in the surface soils and moderate in the subsoils.

General Profile  
Sketch of Soil 20



Range of Profile Characteristics  
of Soil 20

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 4 inches thick.

Surface Layer - Light gray to very dark brown gravelly and cobbly sandy loam; weak fine subangular structure ranging to single grained; 30 to 55 percent angular and subround granitic or gneissic gravel and cobbles; nonsticky, nonplastic; pH ranges from 4.5 to 5.0. 10 to 30 inches thick.

Subsoil Layer - Dark yellowish brown to dark brown very gravelly and cobbly very fine sand ranging to very gravelly sandy loam; single grained; 50 to 80 percent subround granitic or gneissic gravel, cobbles and stones by volume; weakly to moderately compact; nonsticky, nonplastic; pH ranges from 5.5 to 6.0. 114 inches thick or greater.

## MAPPING UNIT 21

Mapping Unit 21 consists of Soil 21 and inclusions of other soils. The most common inclusions are Soils 20, 37, 38, 81 and 82.

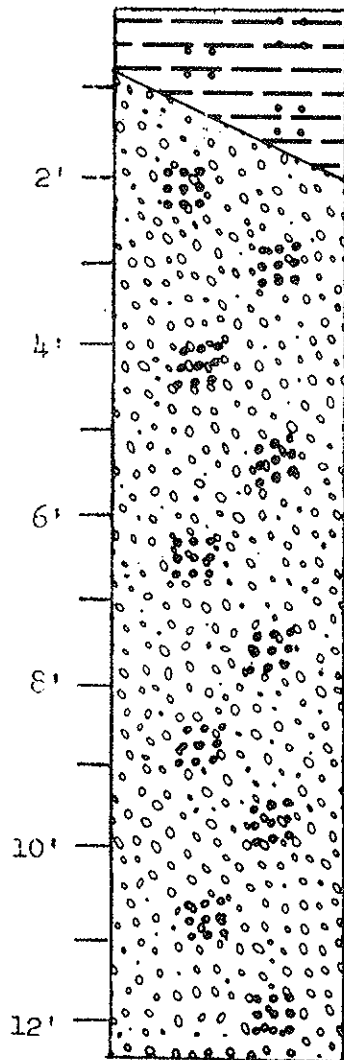
Mapping Unit 21 is similar to Mapping Unit 20 with the exception of landform and inclusions.

Soil 21 is a very deep nonplastic soil derived from glacial till of granitic origin. Surface soils are generally thin very gravelly and cobbly sandy loams. Subsoils are generally very thick, weakly to moderately compact, very gravelly and cobbly sandy loams.

Bedrock is intrusive igneous or gneissic and occurs 12 feet or more beneath the soil surface.

Typically Soil 21 occurs on uneven and somewhat dissected sideslopes of greater than 35 percent slope. Large boulders are frequently present on the soil surface. This soil ranges in elevation from 1500 to 3500 feet and supports Site Class IV and V Douglas-fir along with true fir, hemlock and cedar. This soil is well to moderately well drained. Permeability is rapid in the surface soils and rapid to moderate in the subsoils.

General Profile  
Sketch of Soil 21



Range of Profile Characteristics  
of Soil 21

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Surface Layer - Reddish brown to dark brown very gravelly and cobbly loamy sand ranging to very gravelly and cobbly loam; weak very fine subangular blocky structure ranging to single grained; 45 to 75 percent angular and granitic or gneissic subround gravel and cobbles by volume; nonsticky, nonplastic; pH ranges from 4.5 to 5.0. 10 to 24 inches thick.

Subsoil Layer - Dark reddish brown to brown very gravelly and cobbly very fine sand ranging to very gravelly and cobbly sandy loam; single grained; 50 to 80 percent angular and subround granitic or gneissic gravel, cobbles and stones by volume; weakly to moderately compact; nonsticky, nonplastic; pH ranges from 5.5 to 6.0. 120 inches thick or greater.

## MAPPING UNIT 22

Mapping Unit 22 consists of Soil 22 and inclusions of other soils. The most common inclusions are Soils 12, 23 and 30.

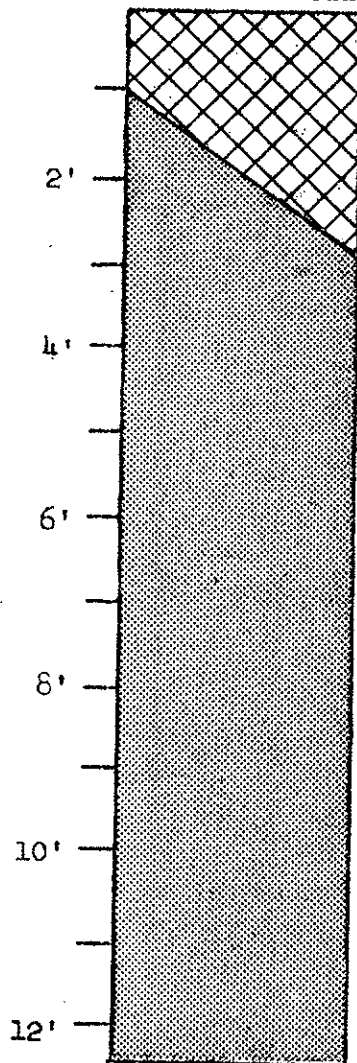
Mapping Unit 22 is similar to Mapping Unit 23 with the exception of landform and inclusions, and Mapping Unit 25 with the exceptions of Site Class and inclusions.

Soil 22 is a very deep slightly plastic to plastic soil derived from glacial till. Surface soils are generally thin loams or silt loams. Subsoils are generally very thick, moderately compact, gravelly loams or gravelly sandy clay loams.

Bedrock is generally schist or metasedimentary and occurs 12 feet or more beneath the soil surface.

Typically Soil 22 occurs on slightly to moderately dissected slopes of less than 35 percent slope. This soil ranges in elevation from 1000 to 2500 feet and supports Site Class II and high III Douglas-fir along with hemlock and cedar. This soil is moderately well drained. Permeability is rapid in the surface soils and moderate to slow in the subsoils.

General Profile  
Sketch of Soil 22



Range of Profile Characteristics  
of Soil 22

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Surface Layer - Dark brown to reddish brown loam ranging to silt loams; weak very fine subangular blocky structure; 15 to 35 percent angular and subround gravel by volume; slightly sticky to nonsticky, nonplastic; pH ranges from 5.0 to 6.0. 12 to 35 inches thick.

Subsoil Layer - Yellowish brown to reddish brown gravelly loam ranging to gravelly sandy clay loam; massive; 35 to 50 percent subround gravel and cobbles by volume; moderately compact; slightly sticky to sticky, slightly plastic to plastic; pH ranges from 5.0 to 6.0. 109 inches thick or greater.

## MAPPING UNIT 23

Mapping Unit 23 consists of Soil 23 and inclusions of other soils. The most common inclusions are Soils 22, 24, 37, 74 and 71.

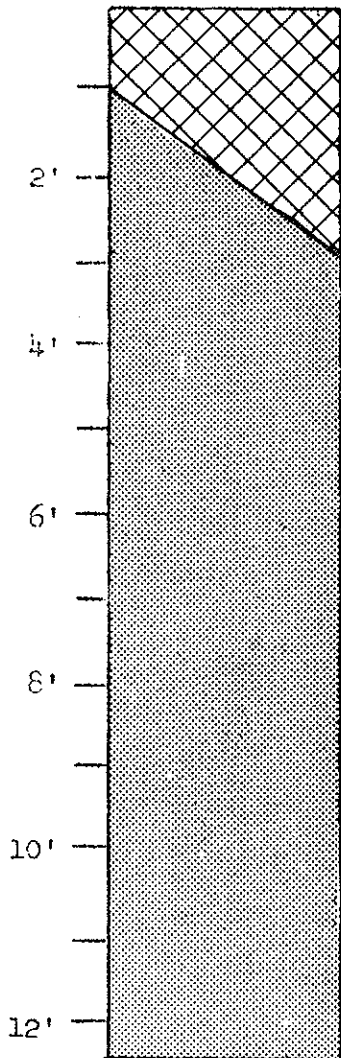
Mapping Unit 23 is similar to Mapping Unit 22 with the exception of landform and inclusions, and Mapping Unit 26 with the exception of Site Class and inclusions.

Soil 23 is a very deep slightly plastic to plastic soil derived from glacial till. Surface soils are generally thin loams or silt loams. Subsoils are generally very thick, moderately compact, very gravelly loams or gravelly sandy clay loams.

Bedrock is generally schist or metasedimentary and occurs 12 feet or more beneath the soil surface.

Typically Soil 23 occurs on slightly to moderately dissected slopes between 35 and 50 percent slopes. This soil ranges in elevation from 1000 to 2500 feet and supports Site Class II and high III Douglas-fir along with hemlock, true fir and cedar. This soil is moderately well to well drained. Permeability is rapid in the surface soils and moderate to slow in the subsoils.

General Profile  
Sketch of Soil 23



Range of Profile Characteristics  
of Soil 23

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Surface Layer - Dark brown to reddish brown loam ranging to silt loam; weak very fine subangular blocky structure; 15 to 35 percent angular and subround gravel by volume; slightly sticky, nonplastic; pH ranges from 5.5 to 6.0. 12 to 35 inches thick.

Subsoil Layer - Yellowish brown to reddish brown gravelly loam ranging to gravelly sandy clay loam; massive; 35 to 55 percent subround gravel and cobbles by volume; moderately compact; slightly sticky to sticky, slightly plastic to plastic; pH ranges from 5.0 to 6.0. 109 inches thick or greater.

## MAPPING UNIT 24

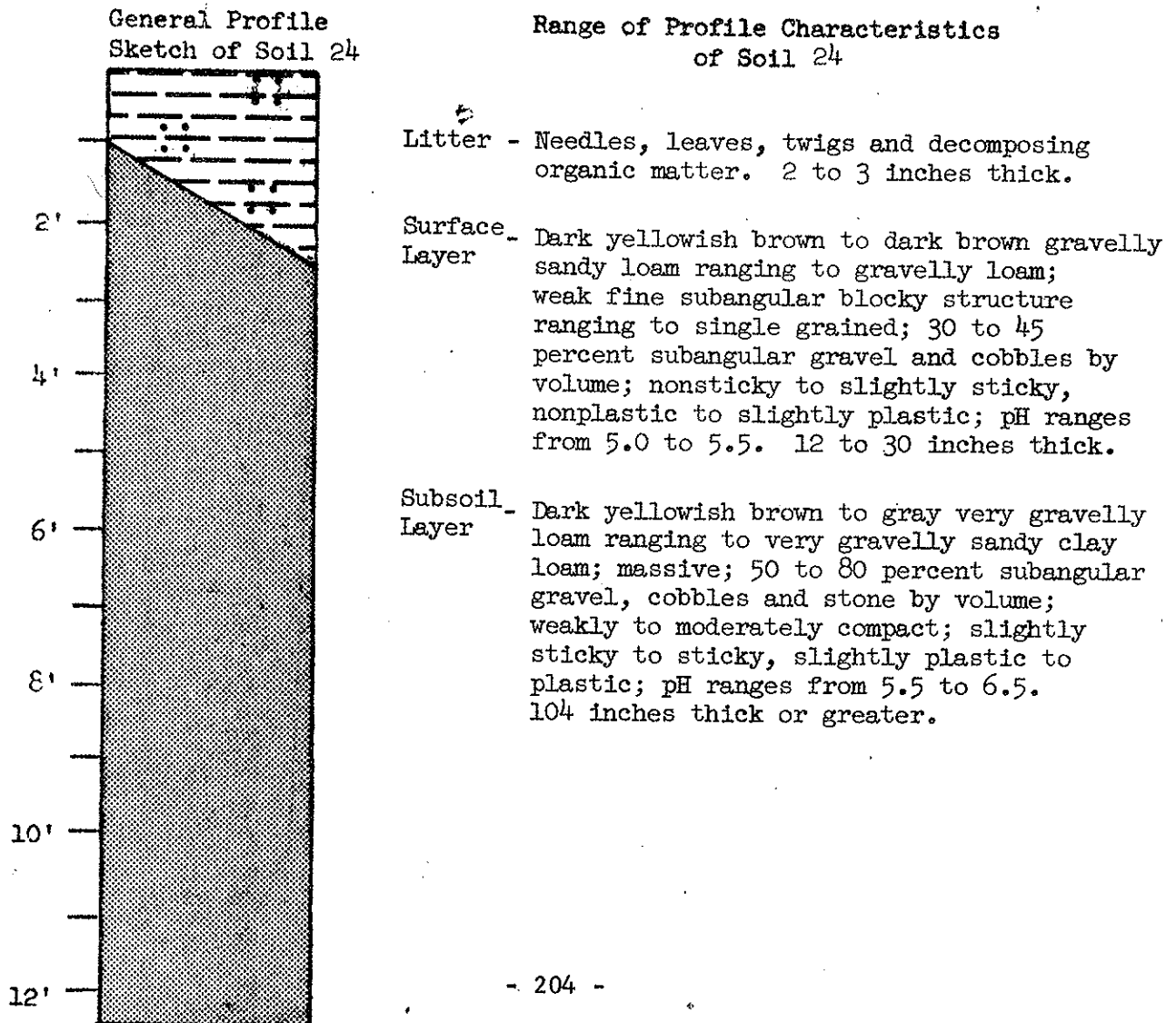
Mapping Unit 24 consists of Soil 24 and inclusions of other soils. The most common inclusions are Soils 23, 26 and 78.

Mapping Unit 24 is similar to Mapping Units 23 and 26 with the exception of landform and inclusions and to Mapping Unit 38 with the exception of texture and inclusions.

Soil 24 is a very deep slightly plastic to plastic soil derived from glacial till. Surface soils are generally thin gravelly loams or gravelly sandy loams. Subsoils are generally very thick very gravelly loams or very gravelly sandy clay loams.

Bedrock is generally schist or metasedimentary and occurs 12 feet or more beneath the soil surface.

Typically Soil 24 occurs on steep, highly dissected sideslopes and in drainages of greater than 50 percent slope. This soil ranges in elevation from 1000 to 3500 feet and supports Site Class III and IV Douglas-fir along with true fir, hemlock and cedar. This soil is well to moderately well drained. Permeability is rapid in the surface soils and moderate to slow in the subsoils.



## MAPPING UNIT 25

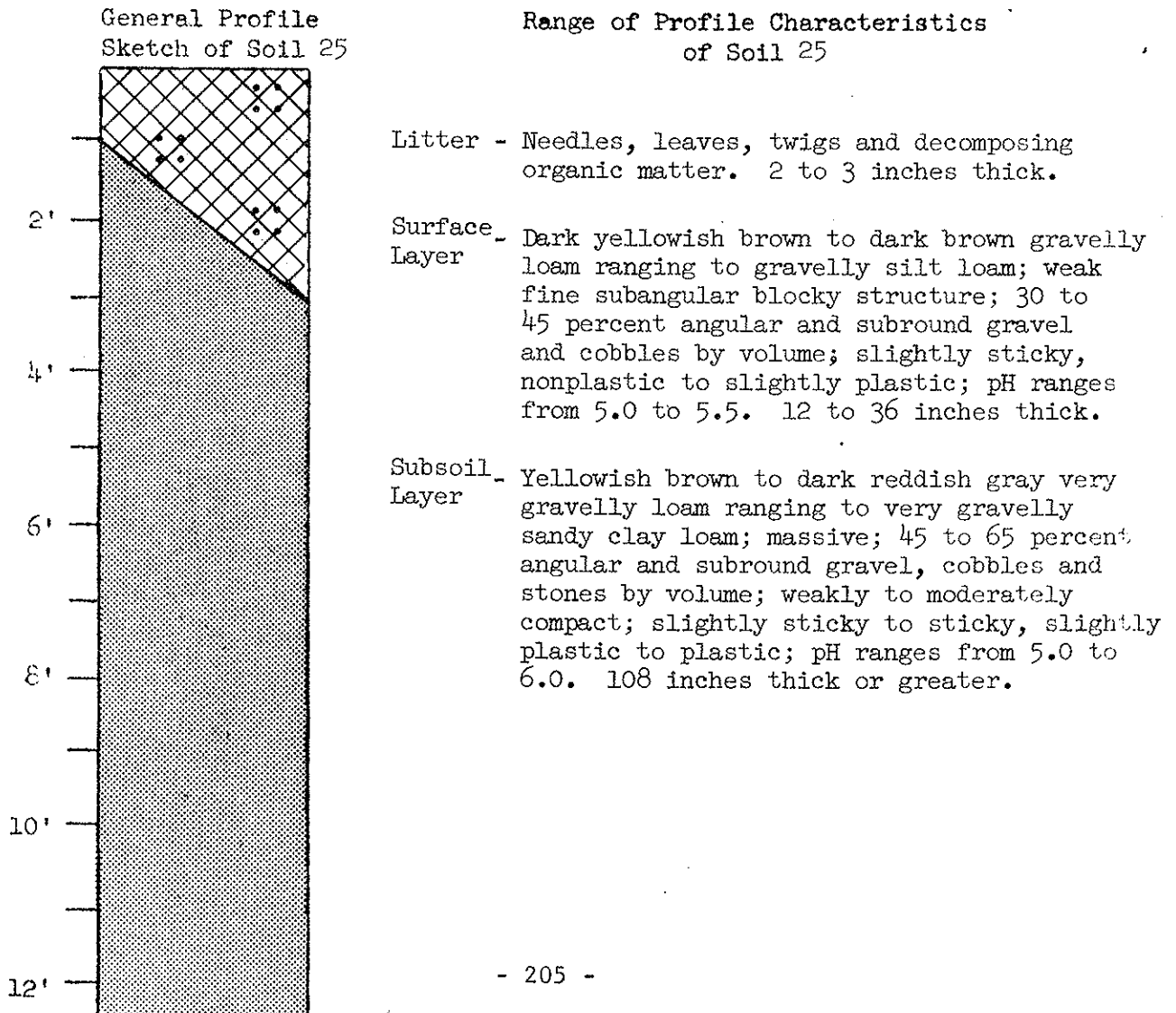
Mapping Unit 25 consists of Soil 25 and inclusions of other soils. The most common inclusions are Soils 26, 32 and 36.

Mapping Unit 25 is similar to Mapping Unit 26 with the exception of landform and inclusions, and Mapping Unit 22 with the exception of Site Class and inclusions.

Soil 25 is a very deep slightly plastic to plastic soil derived from glacial till. Surface soils are generally thin gravelly loams. Subsoils are generally very thick, moderately compact, very gravelly loams or very gravelly sandy clay loams.

Bedrock is generally schist or metasedimentary and occurs 12 feet or more beneath the soil surface.

Typically Soil 25 occurs on slightly to moderately dissected slopes of less than 35 percent slope. This soil ranges in elevation from 2500 to 4000 feet and supports Site Class IV, V and low III Douglas-fir along with hemlock, true fir and cedar. This soil is moderately well drained. Permeability is rapid in the surface and moderate to slow in the subsoils.



## MAPPING UNIT 26

Mapping Unit 26 consists of Soil 26 and inclusions of other soils. The most common inclusions are Soils 25, 33, 37 and 76.

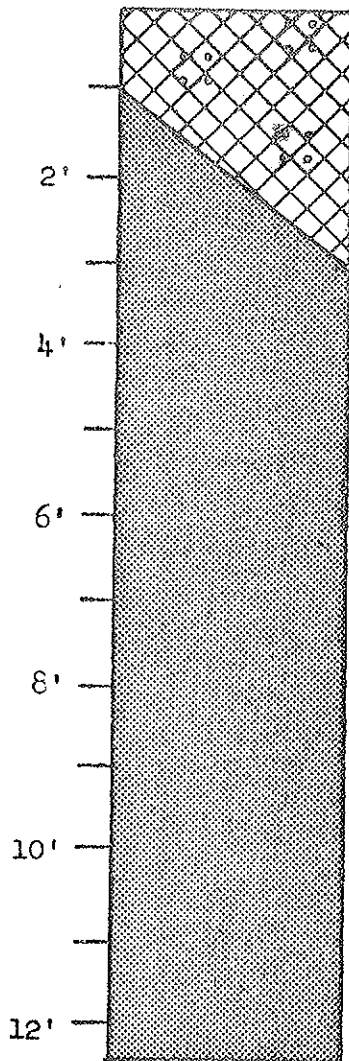
Mapping Unit 26 is similar to Mapping Unit 25 with the exception of landform and inclusions, and Mapping Unit 23 with the exception of Site Class and inclusions.

Soil 26 is a very deep slightly plastic to plastic soil derived from glacial till. Surface soils are generally thin gravelly loams. Subsoils are generally very thick moderately compact, very gravelly loams or very gravelly sandy clay loams.

Bedrock is generally schist or metasedimentary and occurs 12 feet or more beneath the soil surface.

Typically Soil 26 occurs on slightly to moderately dissected slopes between 35 and 50 percent. This soil ranges in elevation from 2500 to 4000 feet and supports Site Class IV, V and low III Douglas-fir along with hemlock, true fir and cedar. This soil is well to moderately well drained. Permeability is rapid in the surface soils and moderate to slow in the subsoils.

General Profile  
Sketch of Soil 26



Range of Profile Characteristics  
of Soil 26

Litter - Needles, leaves, twigs and decomposing organic matter. 1 to 3 inches thick.

Surface Layer - Dark yellowish brown to dark brown gravelly loam ranging to gravelly silt loam; weak fine subangular blocky structure; 30 to 45 percent angular and subround gravel and cobbles by volume; slightly sticky, nonplastic to slightly plastic; pH ranges from 5.0 to 5.5. 12 to 36 inches thick.

Subsoil Layer - Yellowish brown to dark reddish gray very gravelly loam ranging to very gravelly sandy clay loam; massive; 45 to 65 percent angular and subround gravel, cobbles and stones by volume; weakly to moderately compact; slightly sticky to sticky, slightly plastic to plastic; pH ranges from 5.0 to 6.0. 108 inches thick or greater.

## MAPPING UNIT 29

Mapping Unit 29 consists of Soil 29 and inclusions of other soils. The most common inclusions are Soils 26, 76 and 78.

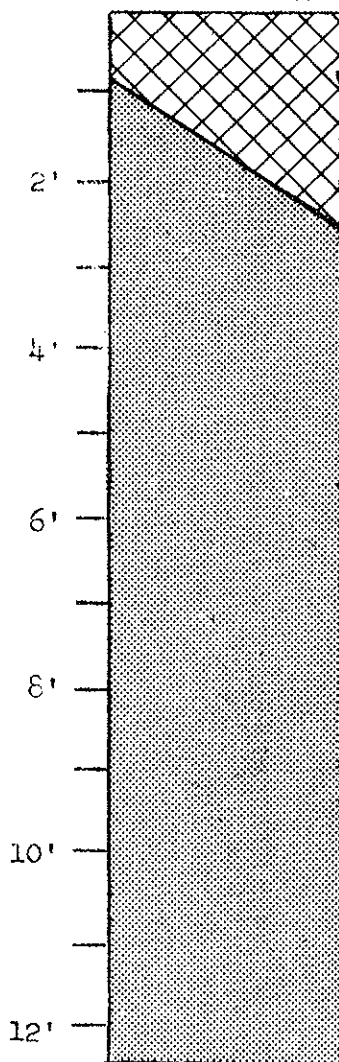
Mapping Unit 29 is similar to Mapping Unit 26 with the exception of landform and inclusions.

Soil 29 is a very deep slightly plastic to plastic soil derived from glacial till. Surface soils are generally thin loams. Subsoils are generally very thick gravelly sandy clay loams.

Bedrock is weathered schist or metasedimentary and occurs 12 feet or more beneath the soil surface.

Typically Soil 29 occurs on slightly to moderately dissected, uneven and hummocky landforms of greater than 25 percent slope. This soil ranges in elevation from 2000 to 4000 feet and supports Site Class III and IV Douglas-fir along with hemlock, true fir and cedar. This soil is moderately well drained. Permeability is rapid in the surface soils and moderate to slow in the subsoils.

General Profile  
Sketch of Soil 29



Range of Profile Characteristics  
of Soil 29

- Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.
- Surface Layer - Reddish brown to yellowish red silt loam ranging to very fine sandy loam; weak fine subangular blocky structure; 15 to 35 percent subangular gravel by volume; slightly sticky, nonplastic to slightly plastic; pH ranges from 4.5 to 5.0. 10 to 30 inches thick.
- Subsoil Layer - Brown to reddish brown gravelly sandy clay loam; massive; 35 to 55 percent subangular or subround gravel, cobbles and stones by volume; weakly to moderately compact; slightly sticky to sticky, slightly plastic to plastic; pH ranges from 5.5 to 6.0. 114 inches thick or greater.

### MAPPING UNIT 30

Mapping Unit 30 consists of Soil 30 and inclusions of other soils. The most common inclusions are Soils 12, 22, 31 and 34.

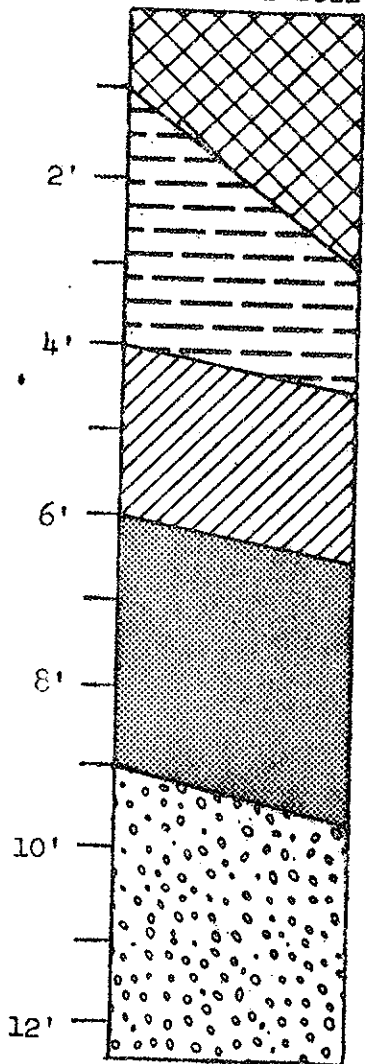
Mapping Unit 30 is similar to Mapping Unit 31 with the exception of landform and inclusions, and Mapping Unit 32 with the exception of Site Class and inclusions.

Soil 30 is a very deep nonplastic to plastic soil derived from interbedded glaciolacustrine, alluvial and till deposits. Surface soils are generally thin loams or silt loams. Subsoils are generally very thick, weakly to moderately compact, and consist of alternating sublayers of sands, silts, sandy loams, and silty clay loams. Sublayers may range from nongravelly to very gravelly.

Bedrock is sedimentary, igneous, or metamorphic and occurs 12 feet or more beneath the soil surface.

Typically Soil 30 occurs on somewhat uneven, slightly to moderately dissected toeslopes of less than 35 percent slope. This soil ranges in elevation from 500 to 2500 feet and supports Site Class II and high III Douglas-fir along with cedar and hemlock. This soil is moderately well to imperfectly drained. Permeability is rapid in the surface soils and moderate to slow in the subsoils.

General Profile  
Sketch of Soil 30



Range of Profile Characteristics  
of Soil 30

- Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 4 inches thick.
- Surface Layer - Reddish brown to dark brown silt loam ranging to loam; weak very fine sub-angular blocky structure; 5 to 40 percent subround gravel by volume; slightly sticky, nonplastic to slightly plastic; pH ranges from 5.0 to 5.5. 10 to 36 inches thick.
- Subsoil Layer - Pale brown to dark brown, stratified sublayers of sands, silt loams, sandy loams and silty clay loams ranging from nongravelly to very gravelly. Sublayers may not be all represented at any given location; massive; weakly to moderately compact; 20 to 60 percent subround gravel and cobbles by volume; nonsticky to sticky, nonplastic to plastic; pH ranges from 5.0 to 6.0. 108 inches thick or greater.

### MAPPING UNIT 31

Mapping Unit 31 consists of Soil 31 and inclusions of other soils. The most common inclusions are Soils 13, 23, 30 and 35.

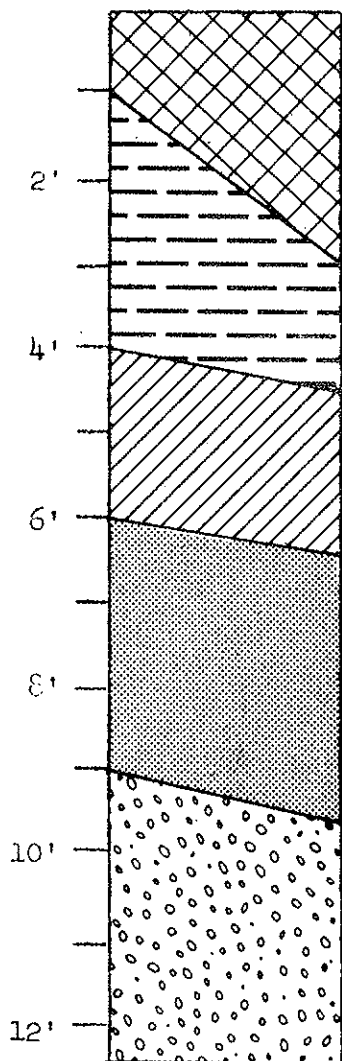
Mapping Unit 31 is similar to Mapping Unit 30 with the exception of landform and inclusions, and Mapping Unit 33 with the exception of Site Class and inclusions.

Soil 31 is a very deep nonplastic to plastic soil derived from interbedded glaciolacustrine, alluvial and till deposits. Surface soils are generally thin loams or silt loams. Subsoils are generally very thick, weakly to moderately compact, and consist of alternating sublayers of sands, silts, sandy loams, and silty clay loams. Sublayers may range from nongravelly to very gravelly.

Bedrock is sedimentary, igneous, or metamorphic and occurs 12 feet or more beneath the soil surface.

Typically Soil 31 occurs on uneven, slightly to moderately dissected toeslopes and sideslopes of greater than 35 percent slope. This soil ranges in elevation from 500 to 2500 feet and supports Site Class II and high III Douglas-fir along with cedar and hemlock. This soil is moderately well drained. Permeability is rapid in the surface soils and moderate to slow in the subsoils.

General Profile  
Sketch of Soil 31



Range of Profile Characteristics  
of Soil 31

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 4 inches thick.

Surface Layer - Yellowish brown to dark brown silt loam ranging to loam; weak very fine subangular blocky structure; 5 to 40 percent subround gravel by volume; slightly sticky, nonplastic to slightly plastic; pH ranges from 5.0 to 5.5. 10 to 36 inches thick.

Subsoil Layer - Pale brown to dark brown, stratified sublayers of sands, silt loams, sandy loams, and silty clay loams ranging from nongravelly to gravelly. Sublayers may not be all represented at any given location; massive; weakly to moderately compact; 20 to 60 percent subround gravel and cobbles by volume; nonsticky to sticky, nonplastic to plastic; pH ranges from 5.0 to 6.0. 108 inches thick or greater.

## MAPPING UNIT 32

Mapping Unit 32 consists of Soil 32 and inclusions of other soils. The most common inclusions are Soils 25, 33, 34 and 36.

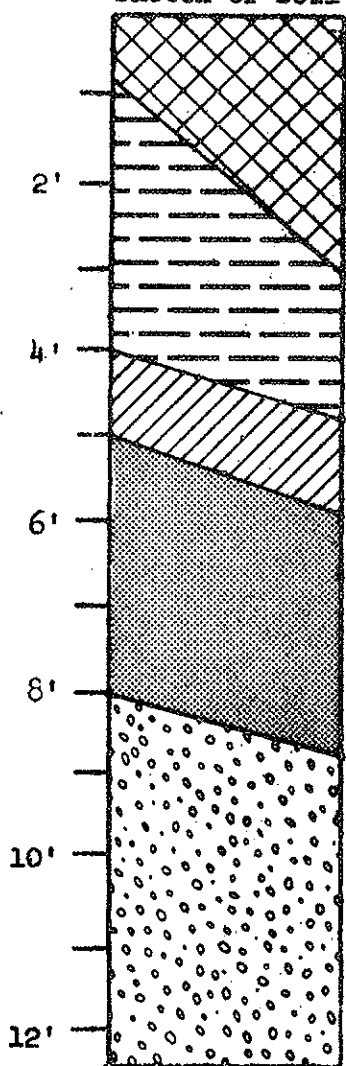
Mapping Unit 32 is similar to Mapping Unit 33 with the exception of landform and inclusions, and Mapping Unit 30 with the exception of Site Class and inclusions.

Soil 32 is a very deep nonplastic to plastic soil derived from interbedded glaciolacustrine, alluvial and till deposits. Surface soils are generally thin loams or silt loams. Subsoils are generally very thick, weakly to moderately compact, and consist of alternating sublayers of sands, silts, sandy loams and silty clay loams. Sublayers may range from nongravelly to very gravelly.

Bedrock is sedimentary, igneous, or metamorphic and occurs 12 feet or more beneath the soil surface.

Typically Soil 32 occurs on somewhat uneven, slightly to moderately dissected toeslopes of less than 35 percent slope. This soil ranges in elevation from 2000 to 3500 feet and supports Site Class IV and low III along with hemlock, true fir and cedar. This soil is moderately well to imperfectly drained. Permeability is rapid in the surface soils and moderate to slow in the subsoils.

General Profile  
Sketch of Soil 32



Range of Profile Characteristics  
of Soil 32

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 4 inches thick.

Surface Layer - Reddish brown to dark brown silt loam ranging to sandy loam; weak very fine subangular blocky structure; 5 to 40 percent subround gravel by volume; slightly sticky to nonsticky, nonplastic to slightly plastic; pH ranges from 5.0 to 5.5. 10 to 36 inches thick.

Subsoil Layer - Pale brown to dark brown, stratified sublayers of sands, silt loams, sandy loams and silty clay loams ranging from non-gravelly to gravelly. Sublayers may not be all represented at any given location; massive; weakly to moderately compact; 10 to 60 percent subround gravel and cobbles by volume; nonsticky to sticky, nonplastic to plastic; pH ranges from 5.0 to 6.0. 108 inches thick or greater.

### MAPPING UNIT 33

Mapping Unit 33 consists of Soil 33 and inclusions of other soils. The most common inclusions are Soils 26, 32, 35 and 37.

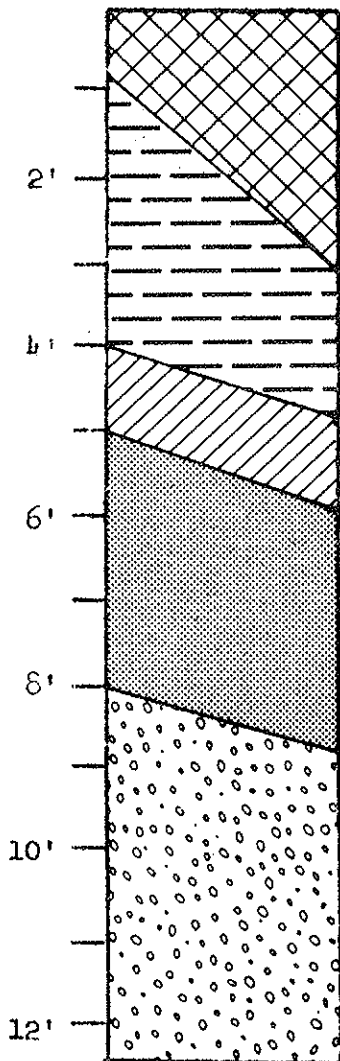
Mapping Unit 33 is similar to Mapping Unit 32 with the exception of landform and inclusions, and Mapping Unit 31 with the exception of Site Class and inclusions.

Soil 33 is a very deep nonplastic to plastic soil derived from interbedded glaciolacustrine, alluvial and till deposits. Surface soils are generally thin loams or silt loams. Subsoils are generally very thick, weakly to moderately compact, and consist of alternating sublayers of sands, silts, sandy loams and silty clay loams. Sublayers may range from nongravelly to very gravelly.

Bedrock is sedimentary, igneous, or metamorphic and occurs 12 feet or more beneath the soil surface.

Typically Soil 33 occurs on uneven, slightly to moderately dissected toeslopes and sideslopes of greater than 35 percent slope. This soil ranges in elevation from 2000 to 3500 feet and supports Site Class IV and low III along with hemlock, true fir and cedar. This soil is moderately well drained. Permeability is rapid in the surface soils and moderate to slow in the subsoils.

**General Profile  
Sketch of Soil 33**



**Range of Profile Characteristics  
of Soil 33**

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 4 inches thick.

Surface Layer - Reddish brown to dark brown silt loam ranging to sandy loam; weak very fine subangular blocky structure; 5 to 40 percent subround gravel by volume; slightly sticky to nonsticky, nonplastic to slightly plastic; pH ranges from 5.0 to 5.5. 10 to 36 inches thick.

Subsoil Layer - Reddish brown to gray, stratified sublayers of sands, silt loams, sandy loams and silty clay loams ranging from nongravelly to gravelly. Sublayers may not be all represented at any given location; massive; weakly to moderately compact; 10 to 60 percent subround gravel and cobbles by volume; nonsticky to sticky, nonplastic to plastic; pH ranges from 5.0 to 6.0. 108 inches thick or greater.

## MAPPING UNIT 34

Mapping Unit 34 consists of Soil 34 and inclusions of other soils. The most common inclusions are Soils 17, 30, 32 and 35.

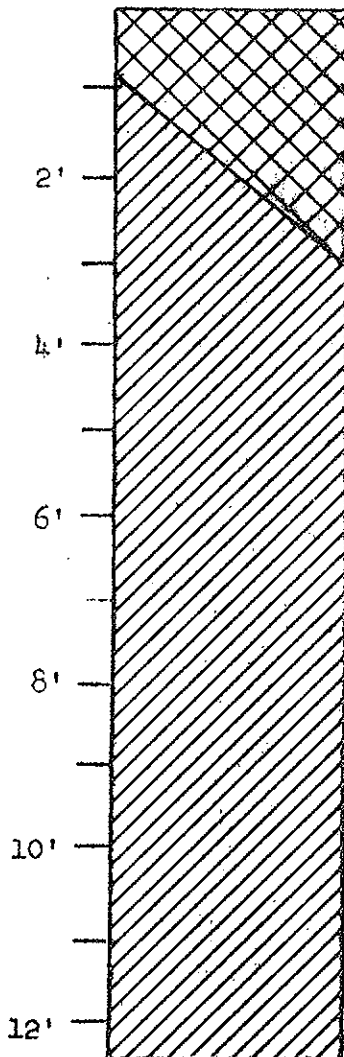
Mapping Unit 34 is similar to Mapping Unit 35 with the exception of landform and inclusions.

Soil 34 is a very deep plastic to very plastic soil derived from glaciolacustrine deposits. Surface soils are generally thin silt loams. Subsoils are generally very thick, weakly to moderately compact, silty clays.

Bedrock is sedimentary, igneous, or metamorphic and occurs 12 feet or more beneath the soil surface.

Typically Soil 34 occurs on uneven, slightly to moderately dissected toeslopes of less than 35 percent slope. This soil ranges in elevation from 500 to 3000 feet and supports Site Class II, III and IV Douglas-fir along with hemlock, cedar and true fir. This soil is imperfectly drained. Permeability is rapid in surface soils and slow in the subsoils.

General Profile  
Sketch of Soil 34



Range of Profile Characteristics  
of Soil 34

<sup>s</sup>  
Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Surface Layer - Dark brown to reddish brown silt loam ranging to silty clay loam; moderate to weak, fine subangular blocky structure; 5 to 20 percent subround gravel by volume; noncompact to weakly compact; slightly sticky to sticky, slightly plastic to plastic; pH ranges from 4.5 to 5.5. 10 to 36 inches thick.

Subsoil Layer - Reddish brown to dark gray silty clay loam ranging to silty clay; massive; 5 to 35 percent subround gravel by volume; weakly to moderately compact; sticky to very sticky, plastic to very plastic; pH ranges from 5.0 to 6.5. 108 inches thick or greater.

## MAPPING UNIT 35

Mapping Unit 35 consists of Soil 35 and inclusions of other soils. The most common inclusions are Soils 18, 31, 33 and 34.

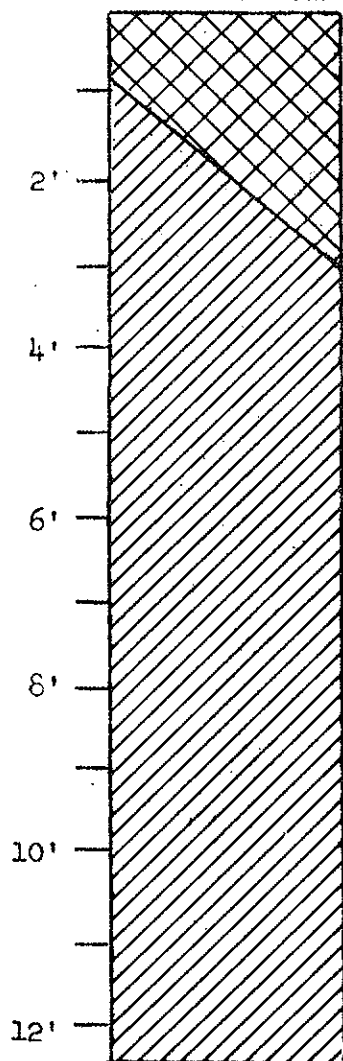
Mapping Unit 35 is similar to Mapping Unit 34 with the exception of landform and inclusions.

Soil 35 is a very deep plastic to very plastic soil derived from glaciolacustrine deposits. Surface soils are generally thin silt loams. Subsoils are generally very thick, weakly to moderately compact, silty clays.

Bedrock is sedimentary, igneous, or metamorphic and occurs 12 feet or more beneath the soil surface.

Typically Soil 35 occurs on uneven, moderately to highly dissected toeslopes and sideslopes of greater than 35 percent slope. This soil ranges in elevation from 500 to 3000 feet and supports Site Class II, III and IV Douglas-fir along with hemlock, cedar and true fir. This soil is moderately well to imperfectly drained. Permeability is rapid in surface soils and slow in the subsoils.

General Profile  
Sketch of Soil 35



Range of Profile Characteristics  
of Soil 35

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Surface Layer - Dark brown to reddish brown silt loam ranging to silty clay loam; moderate to weak, fine subangular block structure; 5 to 20 percent round gravel by volume; noncompact to weakly compact; slightly sticky to sticky, slightly plastic to plastic; pH ranges from 4.5 to 5.5. 10 to 36 inches thick.

Subsoil Layer - Reddish brown to dark gray silty clay loam ranging to silty clay; massive; 5 to 35 percent subround gravel by volume; weakly to moderately compact; sticky to very sticky, plastic to very plastic; pH ranges from 5.0 to 6.5. 108 inches thick or greater.

## MAPPING UNIT 36

Mapping Unit 36 consists of Soil 36 and inclusions of other soils. The most common inclusions are Soils 25 and 37.

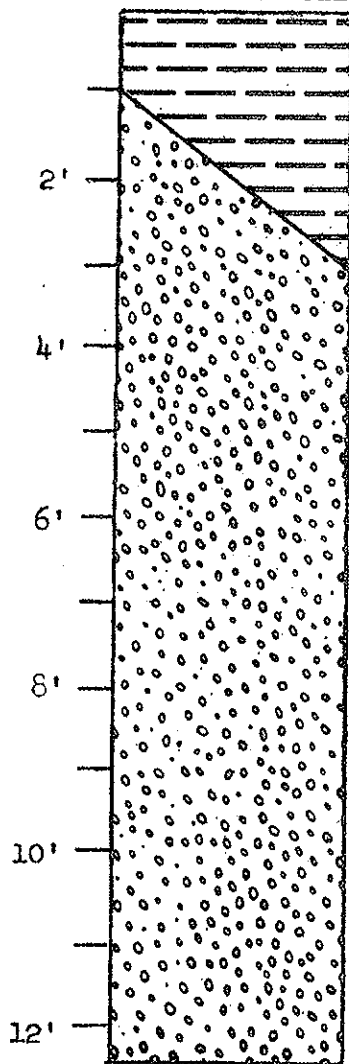
Mapping Unit 36 is similar to Mapping Unit 37 with the exception of landform and inclusions, and to Mapping Unit 25 with the exception of texture and inclusions.

Soil 36 is a very deep nonplastic soil derived from glacial till and drift. Surface soils are generally thin loams or sandy loams. Subsoils are generally very thick, moderately compact, very gravelly sandy loams.

Bedrock is sedimentary, igneous or metamorphic and occurs 12 feet or more beneath the soil surface.

Typically Soil 36 occurs on slightly to moderately dissected slopes of less than 35 percent. This soils ranges in elevation from 2000 to 4500 feet and supports Site Class IV and low III Douglas-fir along with hemlock, true fir and cedar. This soil is well to moderately well drained. Permeability is rapid in the surface soils and moderate in the subsoils.

General Profile  
Sketch of Soil 36



Range of Profile Characteristics  
of Soil 36

Litter - Needles, leaves, twigs and decomposing organic matter. 1 to 3 inches thick.

Surface Layer - Dark reddish brown to very dark brown sandy loam ranging to loam; weak fine subangular blocky structure; 20 to 40 percent angular and subround gravel and cobbles by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 5.0 to 5.5. 12 to 35 inches thick.

Subsoil Layer - Dark gray to reddish brown very gravelly loamy sand ranging to very gravelly very fine sandy loam; 50 to 75 percent subround gravel, cobbles and stones by volume; moderately compact; nonsticky; nonplastic; pH ranges from 5.0 to 6.0. 109 inches thick or greater.

## MAPPING UNIT 37

Mapping Unit 37 consists of Soil 37 and inclusions of other soils. The most common inclusions are Soils 26, 36, 51, 61 and 91.

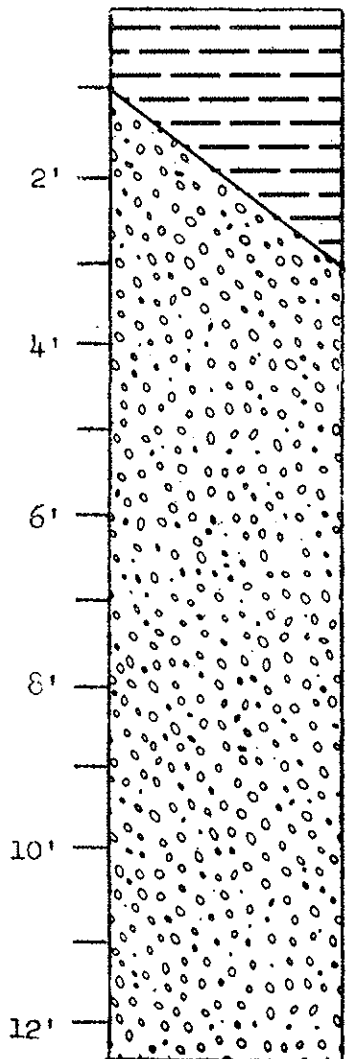
Mapping Unit 37 is similar to Mapping Unit 36 with the exception of landform and inclusions, and to Mapping Unit 26 with the exception of texture and inclusions.

Soil 37 is a very deep nonplastic soil derived from glacial till and drift. Surface soils are generally thin loams or sandy loams. Subsoils are generally very thick, weakly to moderately compact, very gravelly sandy loams.

Bedrock is sedimentary, igneous, or metamorphic and occurs 12 feet or more beneath the soil surface.

Typically Soil 37 occurs on slightly to moderately dissected slope generally between 35 and 50 percent. This soil ranges in elevation from 2000 to 4500 feet and supports Site Class IV and low III Douglas-fir along with hemlock, true fir, and cedar. This soil is well drained. Permeability is rapid in the surface soils and moderate in the subsoils.

General Profile  
Sketch of Soil 37



Range of Profile Characteristics  
of Soil 37

Litter - Needles, leaves, twigs and decomposing organic matter. 1 to 3 inches thick.

Surface Layer - Dark brown to dark yellowish brown sandy loam ranging to loam; weak fine subangular blocky structure; 10 to 35 percent angular and subround gravel by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 5.0 to 5.5. 12 to 36 inches thick.

Subsoil Layer - Dark yellowish brown to reddish brown very gravelly loamy sand ranging to very gravelly very fine sandy loam; 50 to 75 percent subround gravel, cobbles and stones by volume; weakly to moderately compact; nonsticky, nonplastic; pH ranges from 5.0 to 6.0. 108 inches thick or greater.

### MAPPING UNIT 38

Mapping Unit 38 consists of Soil 38 and inclusions of other soils. The most common inclusions are Soils 24 and 37.

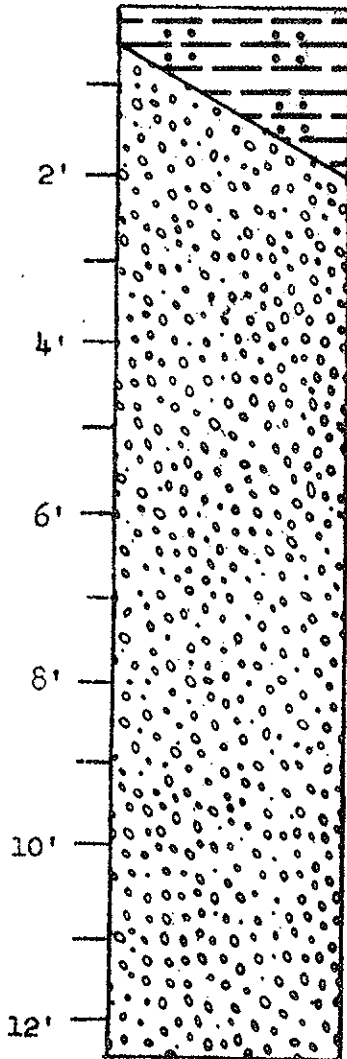
Mapping Unit 38 is similar to Mapping Unit 24 with the exception of texture and inclusions, and to 37 with the exception of landform and inclusions.

Soil 38 is a very deep nonplastic soil derived from glacial till and drift. Surface soils are generally thin gravelly loams or gravelly sandy loams. Subsoils are generally very thick, weakly to moderately compact, very gravelly sandy loams.

Bedrock is sedimentary, igneous, or metamorphic and occurs 12 feet or more beneath the soil surface.

Typically Soil 38 occurs on steep highly dissected toeslopes and in drainages of 50 to 70 percent slope. This soil ranges in elevation from 2000 to 4500 feet and supports Site Class III and IV Douglas-fir along with hemlock, true fir and cedar. This soils is well to moderately well drained. Permeability is rapid in the surface soils and rapid to moderate in the subsoils.

General Profile  
Sketch of Soil 38



Range of Profile Characteristics  
of Soil 38

Litter - Needles, leaves, twigs and decomposing organic matter. 1 to 3 inches thick.

Surface Layer - Dark yellowish brown to dark brown gravelly sandy loam ranging to gravelly loam; weak fine subangular blocky structure; 30 to 50 percent angular and subround gravel by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 5.0 to 5.5. 6 to 24 inches thick.

Subsoil Layer - Dark gray to yellowish brown very gravelly loamy sand ranging to very gravelly very fine sandy loam; 50 to 80 percent sub-round gravel, cobbles and stones by volume; weakly to moderately compact; nonsticky, nonplastic; pH ranges from 5.0 to 6.0. 120 inches thick or greater.

## MAPPING UNIT 41

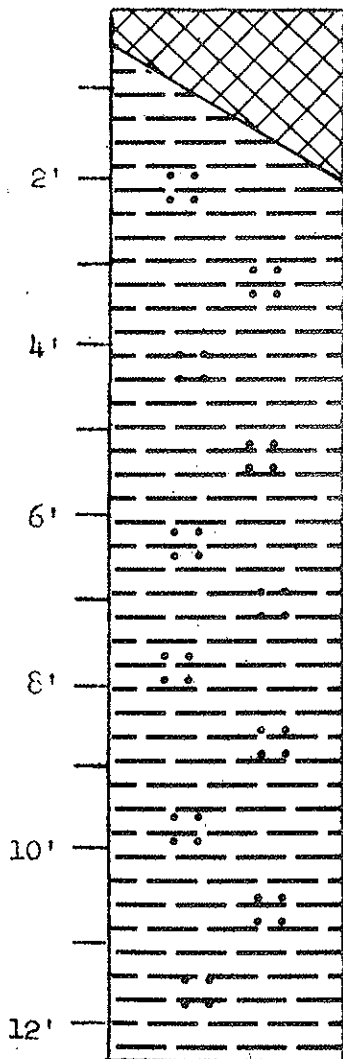
Mapping Unit 41 consists of Soil 41 and inclusions of other soils. The most common inclusions are Soils 37, 61, 81, 91 and 97.

Soil 41 is a very deep nonplastic to slightly plastic soil derived from colluvium. Surface soils are generally thin loams. Subsoils are generally very thick, very gravelly sandy loams.

Bedrock is sedimentary, igneous, or metamorphic and occurs 12 feet or more beneath the soil surface.

Typically Soil 41 occurs on steep sideslopes and toeslopes of greater than 35 percent slope. This soil ranges in elevation from 1500 to 4000 feet and supports Site Class III, IV and V Douglas-fir along with hemlock, true fir, cedar and vine maple. This soil is well drained. Permeability is rapid.

General Profile Sketch of Soil 41



Range of Profile Characteristics of Soil 41

- Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.
- Surface Layer - Light brownish gray to gray loam ranging to sandy loam; weak fine subangular blocky structure; 20 to 35 percent angular to subangular gravel by volume; nonsticky, nonplastic; pH ranges from 4.5 to 5.0. 5 to 15 inches thick.
- Subsoil Layer - Yellowish brown to reddish brown very gravelly sandy loam ranging to very gravelly loam; single grained or massive; 45 to 75 percent angular to subangular gravel, cobbles and stones by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 5.0 to 6.0. 129 inches thick or greater.

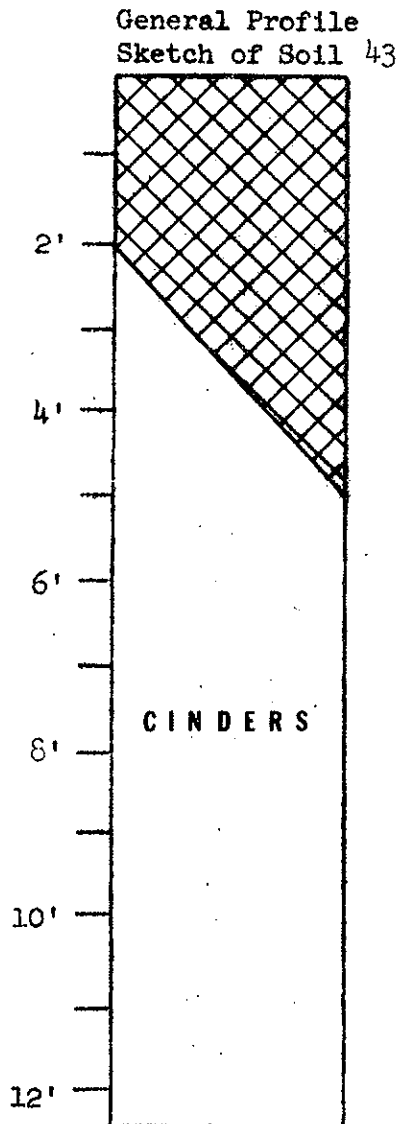
## MAPPING UNIT 43

Mapping Unit 43 consists of Soil 43 and inclusions of other soils. The most common inclusions are 26, 36, 37 and 61.

Soil 43 is a deep to very deep soil derived from ash and cinders. Surface soils are generally thin to moderately thick silt loams. Subsoils are generally thick to very thick cinders.

Bedrock is sedimentary or igneous and occurs 12 feet or more beneath the soil surface.

Typically Soil 43 occurs on smooth to somewhat dissected slopes of 20 to 60 percent. This soil ranges in elevation from 3000 to 4000 feet and supports Site Class IV and V Douglas-fir along with true fir and hemlock. This soil is well drained. Permeability is rapid.



### Range of Profile Characteristics of Soil 43

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Surface Layer - Dark reddish brown to reddish brown silt loam ranging to fine sandy loam; single grained; 0 to 25 percent angular gravel by volume; nonsticky to slightly sticky, nonplastic to slightly plastic; pH ranges from 4.5 to 6.0. 24 to 60 inches thick.

Subsoil Layer - Reddish brown to dusky red cinders; nonsticky, nonplastic; pH ranges from 6.0 to 6.5. 84 inches thick or greater.

## MAPPING UNIT 45

Mapping Unit 45 consists of Soil 45 and inclusions of other soils. The most common inclusions are Soils 47, 51, 61, 81, 91 and 97.

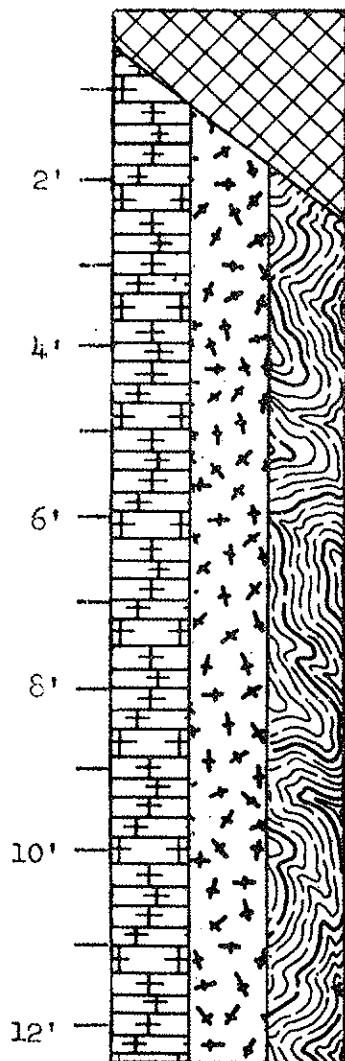
Mapping Unit 45 is similar to Mapping Unit 47 with the exception of depth to bedrock, absence of till and inclusions.

Soil 45 is a shallow nonplastic alpine soil derived from residuum and colluvium. This soil is generally loam or very fine sandy loam.

Bedrock is sedimentary, igneous, or metamorphic.

Typically Soil 45 occurs on high elevation sideslopes and on ridge tops. This soil ranges in elevation from 4000 to 6000 feet. Vegetation is primarily limited to various sedges, grasses and small shrubs. This soil is well drained. Permeability is rapid.

General Profile  
Sketch of Soil 45



Range of Profile Characteristics  
of Soil 45

Litter - Leaves, twigs and decomposing organic matter. 1/2 to 2 inches thick.

Soil Layer - Yellowish brown to dark brown very fine sandy loam or loam; single grained; 5 to 30 percent angular gravel by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 4.5 to 5.5. 6 to 30 inches thick.

Bedrock - Sedimentary, igneous or metamorphic.

## MAPPING UNIT 47

Mapping Unit 47 consists of Soil 47 and inclusions of other soils. The most common inclusions are Soils 45, 51, 61, 81, 91 and 97.

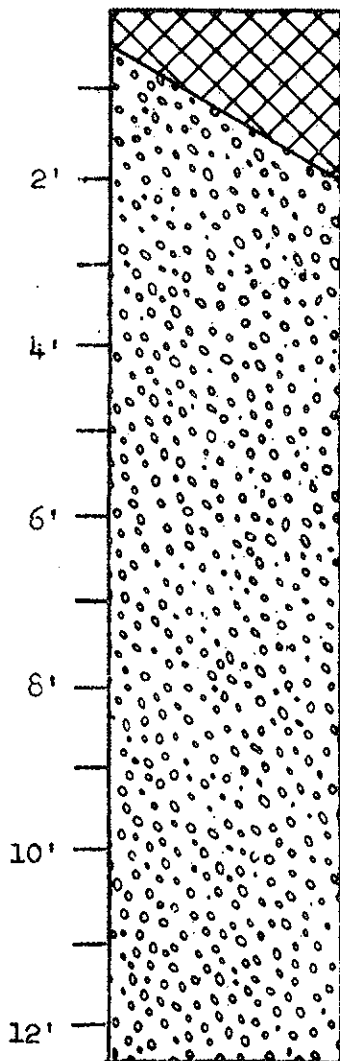
Mapping Unit 47 is similar to Mapping Unit 45 with the exception of depth to bedrock, presence of till and inclusions.

Soil 47 is a deep nonplastic alpine soil derived from glacial till. Surface soils are generally thin very fine sandy loams. Subsoils are generally thick to very thick, slightly to moderately compact, gravelly sandy loams.

Bedrock is sedimentary, igneous, or metamorphic and occurs 12 feet or more beneath the soil surface.

Typically Soil 47 occurs on high elevation cirque basins and other high elevation glaciated topography. This soil ranges in elevation from 4000 to 6000 feet. Vegetation is primarily limited to various sedges, grasses and small shrubs. This soil is well to moderately well drained. Permeability is rapid in the surface soil and rapid to moderate in the subsoil.

General Profile  
Sketch of Soil 47



Range of Profile Characteristics  
of Soil 47

Litter - Leaves, twigs and decomposing organic matter. 1/2 to 2 inches thick.

Surface Layer - Dark grayish brown to brown very fine sandy loam ranging to silt loam; massive; 5 to 30 percent subangular gravel by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 4.5 to 5.0. 5 to 18 inches thick.

Subsoil Layer - Very dark grayish brown to dark brown gravelly sandy loam ranging to gravelly very fine sandy loam; massive; 35 to 55 percent subangular gravel and cobbles by volume; weakly to moderately compact; nonsticky, nonplastic; pH ranges from 5.0 to 5.5. 126 inches thick or greater.

### Mapping Unit 50

Mapping Unit 50 consists of nonmarine sedimentary rock outcrop and inclusions of soils. The most common inclusions are Soils 5, 51, 52, 54, and 56.

The sedimentary rock outcrop is composed of bedded sandstone, graywacke, and siltstone. This rock ranges from hard to moderately hard and competent to moderately competent.

This mapping unit occurs on ridge crests and sideslopes.

## MAPPING UNIT 51

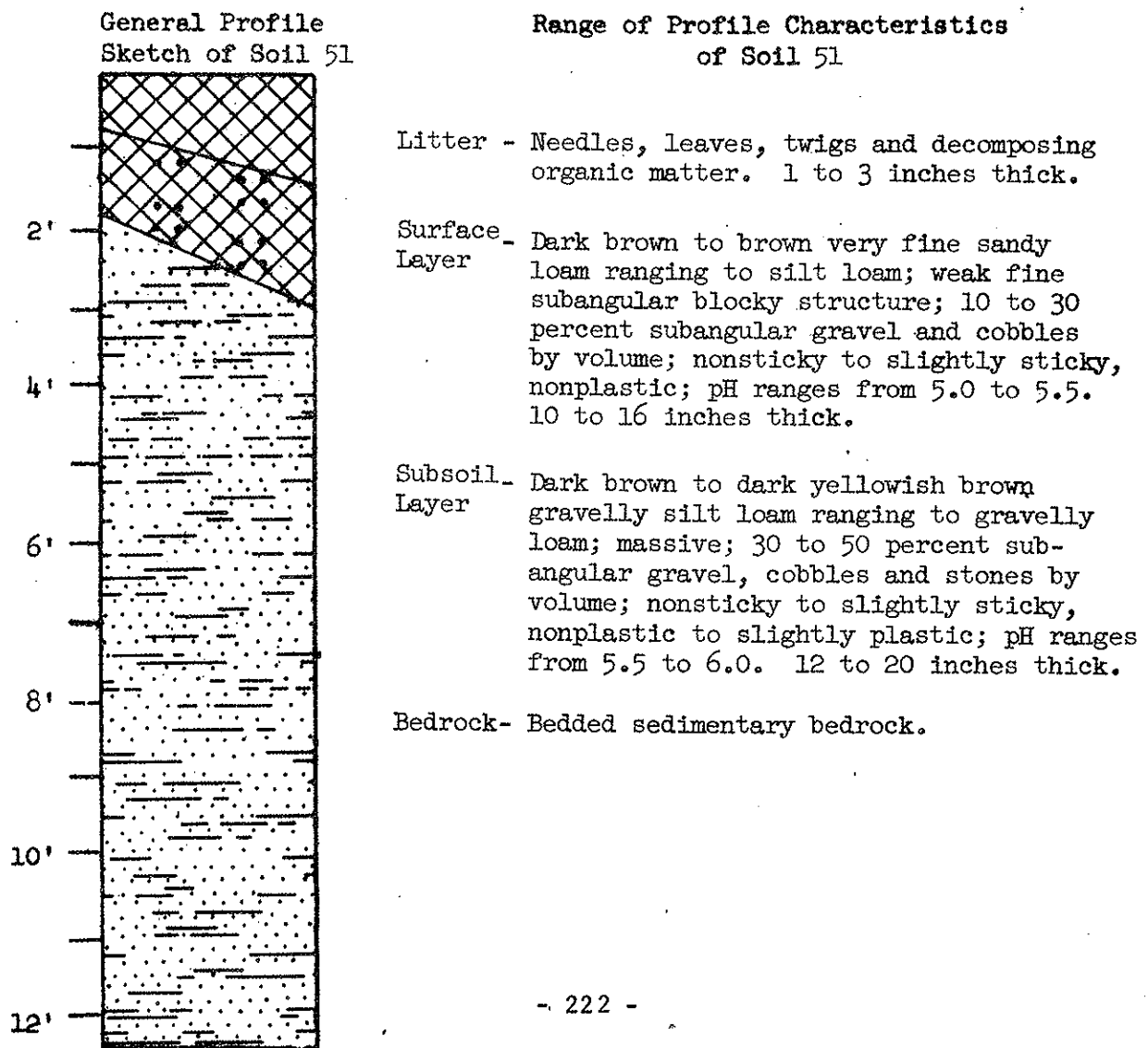
Mapping Unit 51 consists of Soil 51 and inclusions of other soils. The most common inclusions are Soils 50, 52 and 54.

Mapping Unit 51 is similar to Mapping Unit 52 with the exception of landform and inclusions, and Mapping Unit 54 with the exception of depth to bedrock and inclusions.

Soil 51 is a shallow nonplastic to slightly plastic soil derived from residuum and colluvium. Surface soils are generally thin loams. Subsoils are generally thin gravelly silt loams.

Bedrock is nonmarine sediments composed of moderately fractured graywacke and sandstone interbedded with highly fractured siltstone and mudstone.

Typically Soil 51 occurs on steep, smooth and slightly dissected sideslope and ridgetops. This soil ranges in elevation from 1000 to 4000 feet and supports Site Class III and IV Douglas-fir along with hemlock, true fir and cedar. This soil is well drained. Permeability is rapid.



## MAPPING UNIT 52

Mapping Unit 52 consists of Soil 52 and inclusions of other soils. The most common inclusions are Soils 50, 51, and 56.

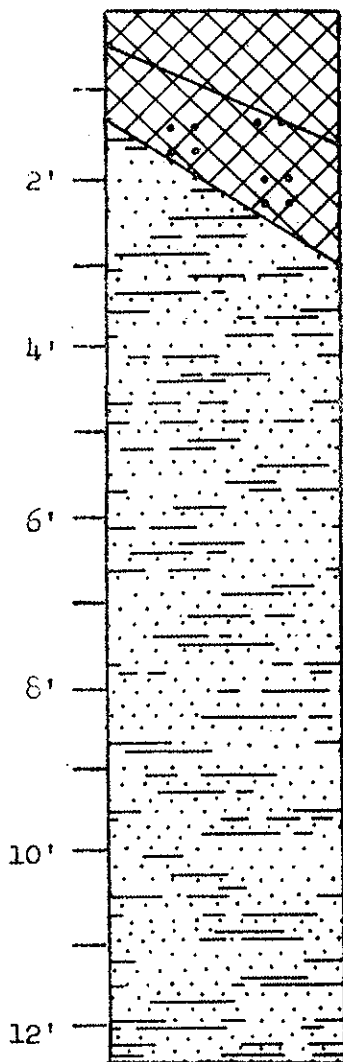
Mapping Unit 52 is similar to Mapping Unit 51 with exception of landform and inclusions.

Soil 52 is a shallow nonplastic to slightly plastic soil derived from residuum and colluvium. Surface soils are generally thin loams. Subsoils are generally thin gravelly silt loams.

Bedrock is nonmarine sediments composed of moderately fractured graywacke and sandstone interbedded with highly fractured siltstone and mudstone.

Typically Soil 52 occurs on steep, highly dissected sideslopes. This soil ranges in elevation from 1000 to 4000 feet and supports Site Class III and IV Douglas-fir along with hemlock, true fir and cedar. This soil is well drained. Permeability is rapid.

General Profile  
Sketch of Soil 52



Range of Profile Characteristics  
of Soil 52

Litter - Needles, leaves, twigs and decomposing organic matter. 1 to 3 inches thick.

Surface Layer - Dark reddish brown to dark brown very fine sandy loam ranging to silt loam; weak fine subangular blocky structure; 5 to 40 percent subangular gravel, cobbles and stones by volume; nonsticky to slightly sticky, nonplastic to slightly plastic; pH ranges from 5.0 to 5.5. 4 to 18 inches thick.

Subsoil Layer - Dark brown to dark yellowish brown gravelly silt loam ranging to gravelly loam; massive; 30 to 50 percent subangular gravel, cobbles and stones by volume; nonsticky to slightly sticky, nonplastic to slightly plastic; pH ranges from 5.5 to 6.0. 12 to 18 inches thick.

Bedrock - Bedded sedimentary bedrock.

## MAPPING UNIT 54

Mapping Unit 54 consists of Soil 54 and inclusions of other soils. The most common inclusions are Soils 37, 51, 52 and 56.

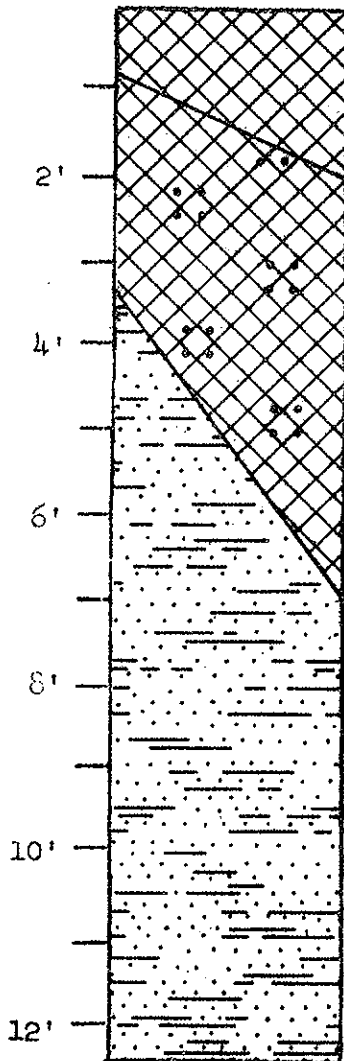
Mapping Unit 54 is similar to Mapping Unit 51 with the exception of depth to bedrock and inclusions.

Soil 54 is a moderately deep slightly plastic soil derived from residuum, colluvium and till. Surface soils are generally thin loams. Subsoils are generally moderately thick gravelly loams.

Bedrock is nonmarine sediments composed of highly fractured graywacke and sandstone interbedded with highly fractured siltstone and mudstone.

Typically, Soil 54 occurs on steep, somewhat uneven and dissected sideslopes. This soil ranges in elevation from 1000 to 4000 feet and supports Site Class III and IV Douglas-fir along with hemlock, true fir and cedar. This soil is well drained. Permeability is rapid.

General Profile Sketch of Soil 54



Range of Profile Characteristics of Soil 54

Litter - Needles, leaves, twigs and decomposing organic matter. 1 to 4 inches thick.

Surface Layer - Reddish brown to dark brown silt loam ranging to loam; moderate to weak fine subangular blocky structure; 20 to 40 percent subangular gravel and cobbles by volume; nonsticky to slightly sticky, nonplastic to slightly plastic; pH ranges from 4.5 to 5.0. 10 to 24 inches thick.

Subsoil Layer - Brown to yellowish brown gravelly sandy loam ranging to gravelly silt loam; massive; 35 to 50 percent subangular gravel, cobbles and stones by volume; weakly compact; nonsticky to slightly sticky, nonplastic to slightly plastic; pH ranges from 5.0 to 5.5. 30 to 60 inches thick.

Bedrock - Bedded sedimentary bedrock.

MAPPING UNIT 56



Mapping Unit 56 consists of Soil 56 and inclusions of other soils. The most common inclusions are Soils 51, 52 and 54.

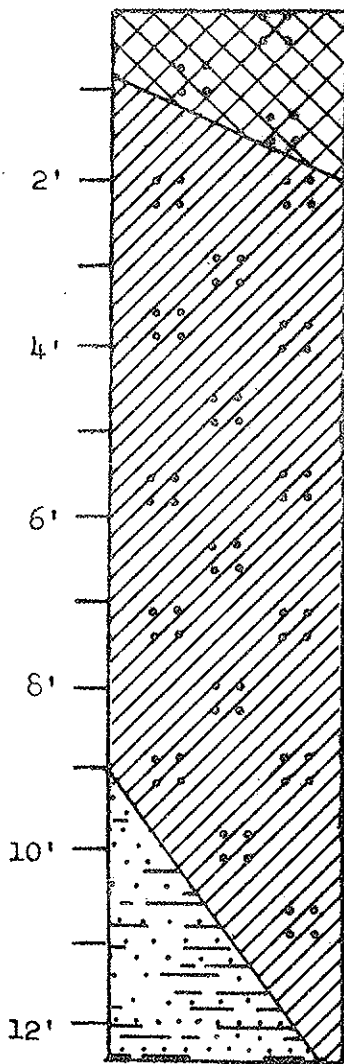
Soil 56 is similar to Soil 66 with the exception of different bedrock.

Soil 56 is a deep to very deep slightly plastic to plastic soil derived from residuum, colluvium and till. Surface soils are generally thin gravelly loams or silt loams. Subsoils are generally thick very gravelly clay loams.

Bedrock is nonmarine sediments composed of highly fractured graywacke and sandstone interbedded with highly weathered siltstone and mudstone.

Typically Soil 56 occurs in steep highly dissected drainages. This soil ranges in elevation from 1000 to 4000 feet and supports Site Class III and IV Douglas-fir, cedar, hemlock and true fir. This soil is moderately well to well drained. Permeability is rapid in the surface soils and moderate in subsoils.

General Profile Sketch of Soil 56



Range of Profile Characteristics of Soil 56

Litter - Needles, leaves, twigs and decomposing organic matter. 1 to 3 inches thick.

Surface Layer - Brown to reddish brown gravelly silt loam ranging to gravelly sandy loam; weak to moderate, fine subangular blocky structure; 35 to 50 percent subangular gravel and cobbles by volume; slightly sticky, nonplastic to slightly plastic; pH ranges from 5.0 to 5.5. 10 to 24 inches thick.

Subsoil Layer - Dark brown to yellowish brown very gravelly clay loam ranging to very gravelly silt loam; weak fine subangular blocky structure ranging to massive; 50 to 80 percent subangular gravel, cobbles and stones by volume; noncompact to weakly compact; slightly sticky to sticky, slightly plastic to plastic; pH ranges from 5.0 to 6.0. 86 inches thick or greater.

Bedrock - Highly weathered bedded sedimentary.

### Mapping Unit 60

Mapping Unit 60 consists of metasedimentary and metavolcanic rock outcrop and inclusions of soils. The most common inclusions are Soils 5, 45, 47, 61 and 62. Inclusions of perpetual snow and ice (Mapping Unit 8) may also occur on highest elevations.

The bedrock is competent to moderately competent and moderately to highly fractured.

This mapping unit occurs on ridge crests and steep sideslopes.

## MAPPING UNIT 61

Mapping Unit 61 consists of Soil 61 and inclusions of other soils. The most common inclusions are Soils 37, 41 and 62.

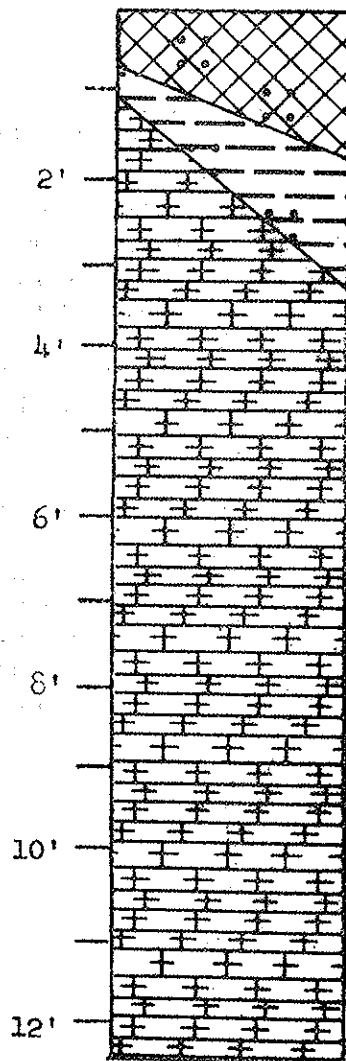
Mapping Unit 61 is similar to Mapping Unit 62 with the exception of landform and inclusions.

Soil 61 is a shallow nonplastic to slightly plastic soil derived from residuum and colluvium. Surface soils are generally thin gravelly loams. Subsoils are generally thin gravelly loams or gravelly sandy loams.

Bedrock is moderately to highly fractured metasedimentary and metavolcanic rock.

Typically Soil 61 occurs on steep, slightly dissected ridge crests, sideslopes and toeslopes. This soil ranges in elevation from 1000 to 4500 feet and supports Site Class III, IV and V Douglas-fir along with hemlock and true fir. This soil is well drained. Permeability is rapid.

General Profile  
Sketch of Soil 61



Range of Profile Characteristics  
of Soil 61

Litter - Needles, leaves, twigs and decomposing organic matter. 1 to 3 inches thick.

Surface Layer - Dark brown to dark yellowish brown gravelly loam ranging to gravelly sandy loam; weak fine subangular blocky structure; 30 to 45 percent subangular gravel and cobbles by volume; nonsticky to slightly sticky, nonplastic to slightly plastic; pH ranges from 4.5 to 5.0. 6 to 15 inches thick.

Subsoil Layer - Dark reddish brown to brown gravelly loam ranging to gravelly sandy loam; massive; 35 to 55 percent subangular gravel, cobbles and stones by volume; nonsticky to slightly sticky, nonplastic to slightly plastic; pH ranges from 5.0 to 6.0. 6 to 21 inches thick.

Bedrock - Metasedimentary and metavolcanic.

## MAPPING UNIT 62

Mapping Unit 62 consists of Soil 62 and inclusions of other soils. The most common inclusions are Soils 38, 60 and 61.

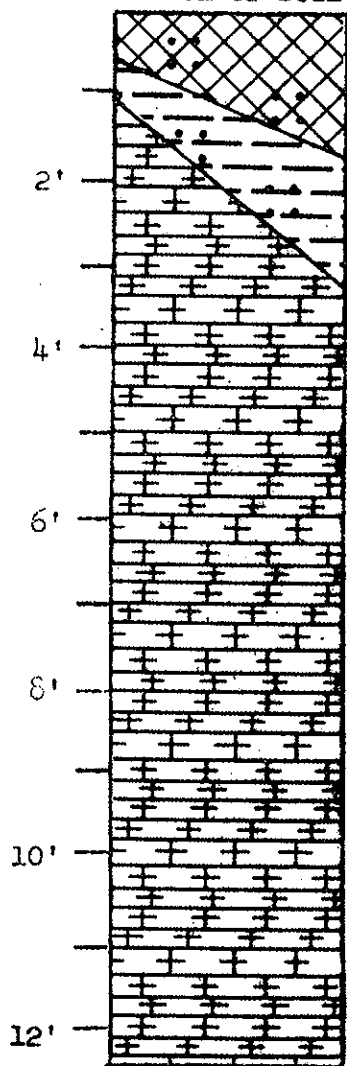
Mapping Unit 62 is similar to Mapping Unit 61 with the exception of landform and inclusions.

Soil 62 is a shallow nonplastic to slightly plastic soil derived from residuum and colluvium. Surface soils are generally thin gravelly loams. Subsoils are generally thin gravelly loams or gravelly sandy loams.

Bedrock is moderately to highly fractured metasedimentary and metavolcanic rock.

Typically Soil 62 occurs on steep, highly dissected sideslopes. This soil ranges in elevation from 1000 to 4500 feet and supports Site Class III, IV and V Douglas-fir along with hemlock and true fir. This soil is well drained. Permeability is rapid.

General Profile  
Sketch of Soil 62



Range of Profile Characteristics  
of Soil 62

Litter - Needles, leaves, twigs and decomposing organic matter. 1 to 3 inches thick.

Surface Layer - Dark brown to dark yellowish brown gravelly loam ranging to gravelly sandy loam; weak very fine subangular blocky structure; 30 to 45 percent subangular and angular gravel and cobbles by volume; nonsticky to slightly sticky, nonplastic to slightly plastic; pH ranges from 4.5 to 5.0. 6 to 12 inches thick.

Subsoil Layer - Dark reddish brown to brown gravelly sandy loam ranging to gravelly loam; massive; 35 to 55 percent subangular and angular gravel, cobbles and stones by volume; nonsticky to slightly sticky, nonplastic to slightly plastic; pH ranges from 5.0 to 6.0. 6 to 24 inches thick.

Bedrock - Metasedimentary and metavolcanic bedrock.

## MAPPING UNIT 66

Mapping Unit 66 consists of Soil 66 and inclusions of other soils. The most common inclusion is Soil 62.

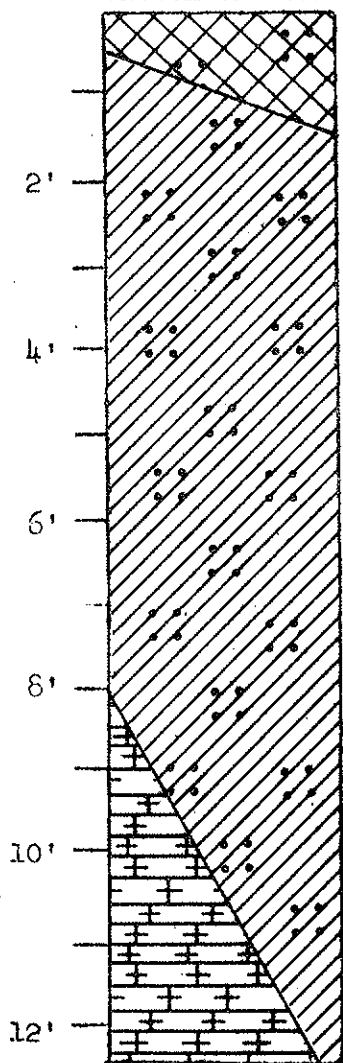
Soil 66 is similar to Soil 56 with the exception of different bedrock.

Soil 66 is a deep to very deep slightly plastic to plastic soil derived from colluvium and colluviated till. Surface soils are generally thin gravelly loams. Subsoils are generally thick very gravelly silty clay loams. The rock fragments found in the subsoil are generally saprolitic.

Bedrock is highly weathered metasediments and metavolcanics.

Typically Soil 66 occurs on steep, highly dissected sideslopes and in drainages. This soil ranges in elevation from 1500 to 3000 feet and supports Site Class III and IV Douglas-fir along with hemlock, true fir and cedar. This soil is well to moderately well drained. Permeability is rapid in the surface soils and moderate to slow in subsoils.

General Profile  
Sketch of Soil 66



Range of Profile Characteristics  
of Soil 66

Litter - Needles, leaves, twigs and decomposing organic matter. 1 to 3 inches thick.

Surface Layer - Dark brown to dark yellowish brown gravelly loam ranging to gravelly sandy loam; weak fine subangular blocky structure ranging to single grained; 30 to 50 percent subangular gravel and cobbles by volume; non-sticky to slightly sticky, nonplastic to slightly plastic; pH ranges from 5.0 to 5.5. 6 to 18 inches thick.

Subsoil Layer - Very dark gray to very dark brown very gravelly clay loam ranging to very gravelly silt loam; massive; 45 to 75 percent subangular gravel, cobbles and stones by volume; non-compact to weakly compact; slightly sticky to sticky, slightly plastic to plastic; pH ranges from 5.5 to 6.5. 78 inches thick or greater.

Bedrock - Highly weathered metasediments and metavolcanics.

### MAPPING UNIT 70

Mapping Unit 70 consists of schist rock outcrop and inclusions of soils. The most common inclusions are Soils 4, 45, 47, 71, 72 and 78. Inclusions of perpetual snow and ice (Mapping Unit 8) may also occur on highest elevations.

The bedrock is competent to incompetent, moderately to highly fractured schist.

This mapping unit occurs on ridge crests and steep sideslopes.

## MAPPING UNIT 71

Mapping Unit 71 consists of Soil 71 and inclusions of other soils. The most common inclusions are Soils 37, 70, 72, 74 and 76.

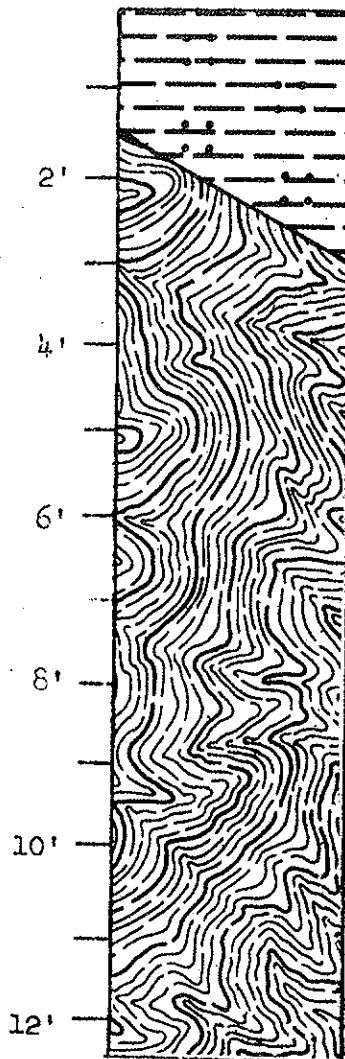
Mapping Unit 71 is similar to Mapping Unit 72 with the exception of landform and inclusions.

Soil 71 is a shallow nonplastic soil derived from residuum and colluvium. Surface soils are generally thin gravelly sandy loams. Subsoils are generally thin very gravelly sandy loams.

Bedrock is composed of competent, moderately fractured schist.

Typically Soil 71 occurs on steep nondissected to slightly dissected slopes. This soil ranges in elevation from 2000 to 4500 feet and supports Site Class IV, V and low III Douglas-fir along with hemlock, true fir and cedar. This soil is well drained. Permeability is rapid.

General Profile  
Sketch of Soil 71



Range of Profile Characteristics  
of Soil 71

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Surface Layer - Brown to grayish brown gravelly sandy loam ranging to gravelly loam; weak fine subangular blocky structure; 30 to 50 percent subangular and cobbles by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 5.0 to 5.5. 6 to 20 inches thick.

Subsoil Layer - Dark brown to yellowish brown very gravelly sandy loam ranging to very gravelly loam; single grained; 50 to 75 percent angular gravel, cobbles and stones by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 5.5 to 6.0. 12 to 16 inches thick.

Bedrock - Schist bedrock

## MAPPING UNIT 72

Mapping Unit 72 consists of Soil 72 and inclusions of other soils. The most common inclusions are Soils 38, 70, 71, 78 and 79.

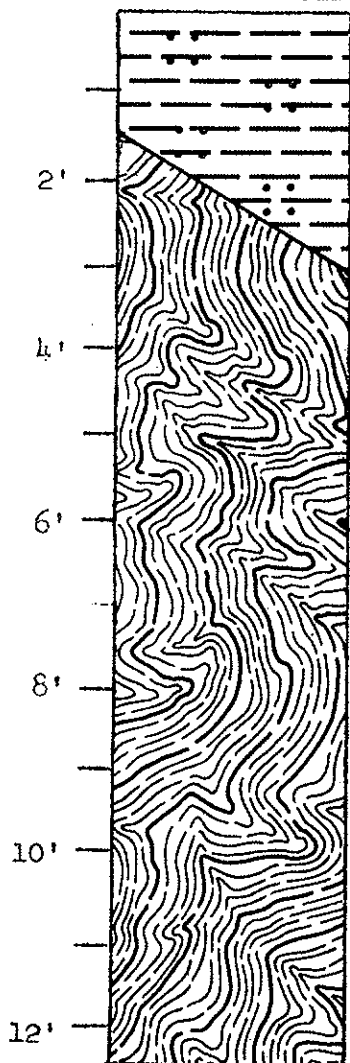
Mapping Unit 72 is similar to Mapping Unit 71 with the exception of landform and inclusions.

Soil 72 is a shallow nonplastic soil derived from residuum and colluvium. Surface soils are generally thin gravelly sandy loams. Subsoils are generally thin very gravelly sandy loams.

Bedrock is composed of competent to moderately competent, moderately to highly fractured schist.

Typically Soil 72 occurs on very steep, highly dissected sideslopes. This soil ranges in elevation from 1500 to 4500 feet and supports Site Class IV, V and low III Douglas-fir along with hemlock, true fir and cedar. This soil is well drained. Permeability is rapid.

General Profile  
Sketch of Soil 72



Range of Profile Characteristics  
of Soil 72

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Surface Layer - Brown to reddish brown gravelly sandy loam ranging to gravelly loam; weak very fine subangular blocky structure; 30 to 50 percent subangular gravel and cobbles by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 5.0 to 5.5. 6 to 20 inches thick.

Subsoil Layer - Dark brown to yellowish brown very gravelly sandy loam ranging to very gravelly loam; single grained; 50 to 75 percent angular gravel, cobbles and stones by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 5.5 to 6.0. 12 to 16 inches thick.

Bedrock - Schist bedrock.

## MAPPING UNIT 74

Mapping Unit 74 consists of Soil 74 and inclusions of other soils. The most common inclusions are Soils 23 and 73.

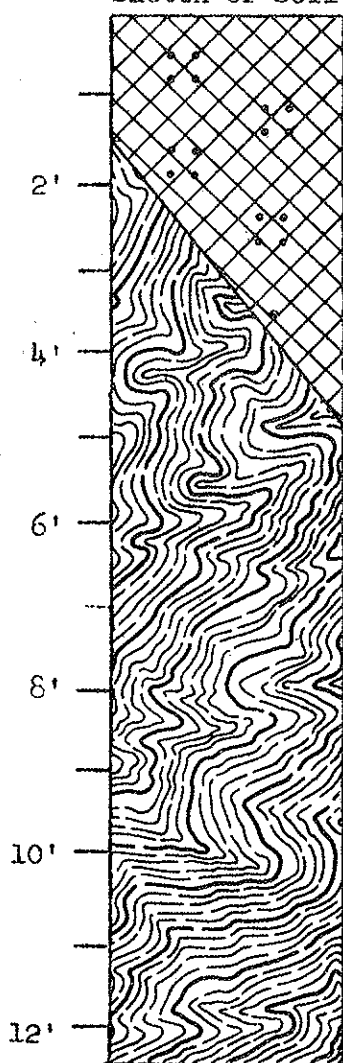
Mapping Unit 74 is similar to Mapping Unit 73 with the exception of landform and inclusions, and to Mapping Unit 76 with the exception of Site Class and inclusions.

Soil 74 is a shallow to moderately deep slightly plastic soil derived from residuum and till. Surface soils are generally thin gravelly silt loams or gravelly loams. Subsoils are generally thin to moderately thick very gravelly silt loams.

Bedrock is composed of moderately competent highly fractured schist.

Typically Soil 74 occurs on steep somewhat uneven and dissected sideslopes and toeslopes of greater than 35 percent slope. This soil ranges in elevation from 500 to 2500 feet and supports Site Class II and high III Douglas-fir along with hemlock and cedar. This soil is well drained. Permeability is rapid.

General Profile  
Sketch of Soil 74



Range of Profile Characteristics  
of Soil 74

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Surface Layer - Dark brown to brown gravelly silt loam ranging to gravelly loam; weak very fine and fine subangular blocky structure; 35 to 50 percent angular gravel by volume; slightly sticky, nonplastic to slightly plastic; pH ranges from 5.0 to 5.5. 6 to 15 inches thick.

Subsoil Layer - Brown to yellowish brown very gravelly silt loam ranging to very gravelly sandy loam; 50 to 80 percent angular gravel, cobbles and stones by volume; slightly sticky to sticky, nonplastic to slightly plastic; pH ranges from 5.5 to 6.0. 12 to 40 inches thick.

Bedrock-Schist bedrock.

## MAPPING UNIT 73

Mapping Unit 73 consists of Soil 73 and inclusions of other soils. The most common inclusions are Soils 22 and 74.

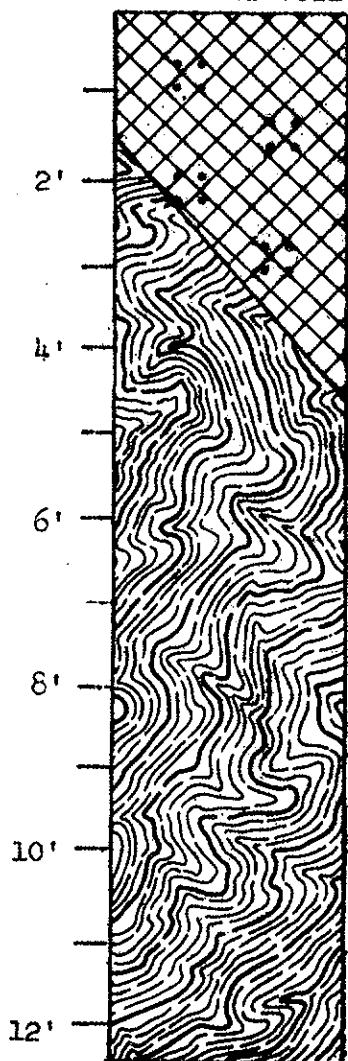
Mapping Unit 73 is similar to Mapping Unit 74 with the exception of landform and inclusions, and to Mapping Unit 75 with the exception of Site Class and inclusions.

Soil 73 is a shallow to moderately deep slightly plastic soil derived from residuum and till. Surface soils are generally thin gravelly silt loams. Subsoils are generally thin to moderately thick very gravelly silt loams.

Bedrock is composed of moderately competent highly fractured schist.

Typically Soil 73 occurs on smooth, slightly dissected slopes of less than 35 percent slope. This soil ranges in elevation from 500 to 2500 feet and supports Site Class II and high III Douglas-fir along with hemlock and cedar. This soil is well drained. Permeability is rapid.

General Profile  
Sketch of Soil 73



Range of Profile Characteristics  
of Soil 73

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Surface Layer - Dark brown to strong brown gravelly silt loam ranging to gravelly loam; weak very fine and fine subangular blocky structure; 35 to 50 percent subangular gravel by volume; slightly sticky, slightly plastic; pH ranges from 5.0 to 5.5. 6 to 24 inches thick.

Subsoil Layer - Brown to yellowish brown very gravelly silt loam ranging to very gravelly loam; massive; 50 to 80 percent subangular gravel and cobbles by volume; slightly sticky to sticky, nonplastic to slightly plastic; pH ranges from 5.5 to 6.0. 12 to 30 inches thick.

Bedrock-Schist bedrock.

## MAPPING UNIT 75

Mapping Unit 75 consists of Soil 75 and inclusions of other soils. The most common inclusions are Soils 25 and 76.

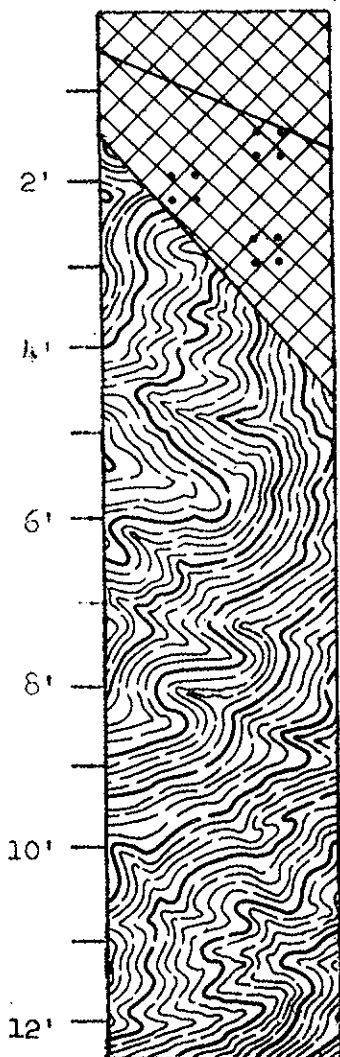
Mapping Unit 75 is similar to Mapping Unit 76 with the exception of landform and inclusions, and to Mapping Unit 73 with the exception of Site Class and inclusions.

Soil 75 is a shallow to moderately deep slightly plastic soil derived from residuum and till. Surface soils are generally thin silt loams. Subsoils are generally thin gravelly silt loams.

Bedrock is composed of moderately competent highly fractured schist.

Typically Soil 75 occurs on smooth, slightly dissected slopes of less than 35 percent slope. This soil ranges in elevation from 2500 to 4500 feet and supports Site Class IV and V Douglas-fir along with hemlock, true fir and cedar. This soil is well drained. Permeability is rapid.

General Profile  
Sketch of Soil 75



Range of Profile Characteristics  
of Soil 75

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Surface Layer - Brown to reddish brown silt loam ranging to loam; weak very fine and fine subangular blocky structure; 20 to 35 percent subangular gravel and cobbles by volume; nonsticky to slightly sticky, nonplastic to slightly plastic; pH ranges from 5.0 to 5.5. 6 to 20 inches thick.

Subsoil Layer - Dark brown to yellowish brown gravelly loam ranging to gravelly silt loam; massive; 30 to 50 percent subangular gravel, cobbles and stones by volume; noncompact to weakly compact; pH ranges from 5.5 to 6.0. 12 to 35 inches thick.

Bedrock - Schist bedrock.

## MAPPING UNIT 76

Mapping Unit 76 consists of Soil 76 and inclusions of other soils. The most common inclusions are Soils 26, 75 and 78.

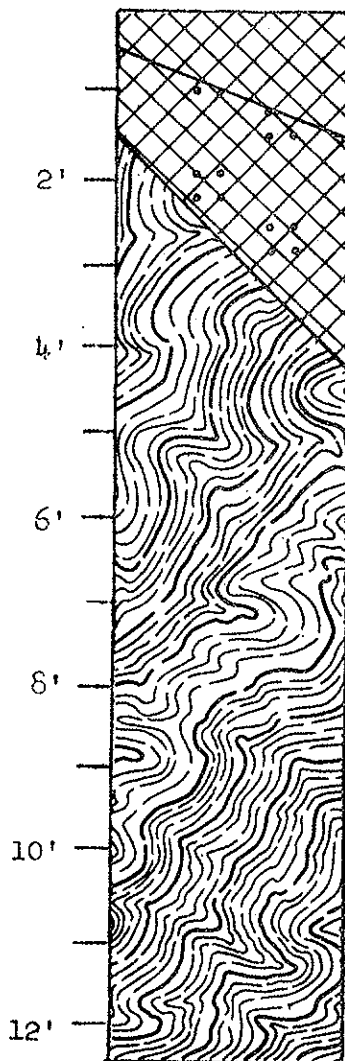
Mapping Unit 76 is similar to Mapping Unit 75 with the exception of landform and inclusions, and to Mapping Unit 74 with the exception of Site Class and inclusions.

Soil 76 is a shallow to moderately deep slightly plastic soil derived from residuum and till. Surface soils are generally thin silt loams. Subsoils are generally thin gravelly silt loams.

Bedrock is composed of moderately competent, highly fractured schist.

Typically Soil 76 occurs on steep somewhat uneven and dissected sideslopes and toeslopes of greater than 35 percent slope. This soil ranges in elevation from 2500 to 4500 feet and supports Site Class IV and V Douglas-fir along with hemlock, true fir and cedar. This soil is well drained. Permeability is rapid.

General Profile  
Sketch of Soil 76



Range of Profile Characteristics  
of Soil 76

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Surface Layer - Brown to reddish brown silt loam ranging to loam; weak very fine and fine sub-angular blocky structure; 20 to 35 percent angular gravel and cobbles by volume; nonsticky to slightly sticky, nonplastic to slightly plastic; pH ranges from 5.0 to 5.5. 6 to 15 inches thick.

Subsoil Layer - Dark brown to yellowish brown gravelly silt loam ranging to gravelly loam; massive; 30 to 50 percent angular gravel, cobbles and stones by volume; slightly sticky, slightly plastic; pH ranges from 5.5 to 6.0. 12 to 35 inches thick.

Bedrock - Schist bedrock.

## MAPPING UNIT 78

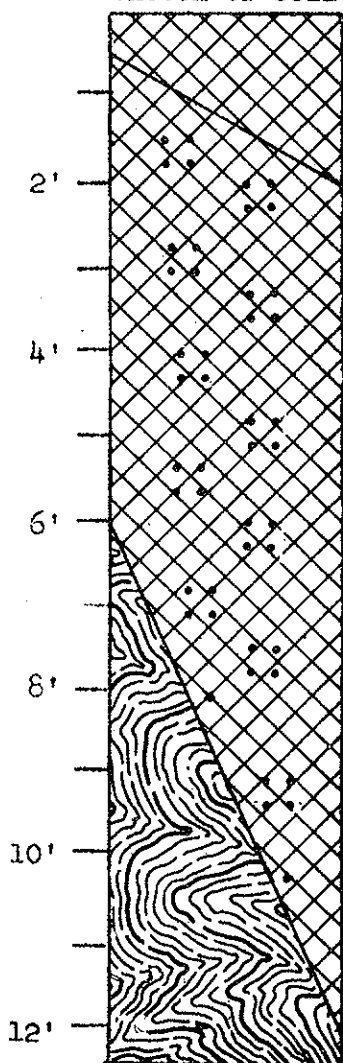
Mapping Unit 78 consists of Soil 78 and inclusions of other soils. The most common inclusions are Soils 24, 72 and 79.

Soil 78 is a moderately deep to deep slightly plastic soil derived from colluvium and till. Surface soils are generally thin silt loams. Subsoils are generally moderately thick to thick very gravelly silt loams.

Bedrock is generally composed of weathered and incompetent, highly fractured schist but locally includes serpentized basic igneous rocks.

Typically Soil 78 occurs on steep, highly dissected sideslope drainages. This soil ranges in elevation from 1000 to 4500 feet and supports Site Class III and IV Douglas-fir along with hemlock, true fir and cedar. This soil is well to moderately well drained. Permeability is rapid in surface soils and moderate in the subsoils.

General Profile  
Sketch of Soil 78



Range of Profile Characteristics  
of Soil 78

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Surface Layer - Dark brown to yellowish brown silt loam ranging to sandy loam; weak to moderate, fine subangular blocky structure; 20 to 35 percent angular gravel and cobbles by volume; slightly sticky, nonplastic to slightly plastic; pH ranges from 5.0 to 5.5. 6 to 24 inches thick.

Subsoil Layer - Yellowish brown to dark gray very gravelly silt loam ranging to very gravelly loam; massive; 50 to 80 percent angular gravel, cobbles and stones by volume; weakly to moderately compact; slightly sticky to sticky, slightly plastic; pH ranges from 5.0 to 5.5. 66 to 120 inches thick.

Bedrock - Weathered, incompetent schist and serpentine.

## MAPPING UNIT 79

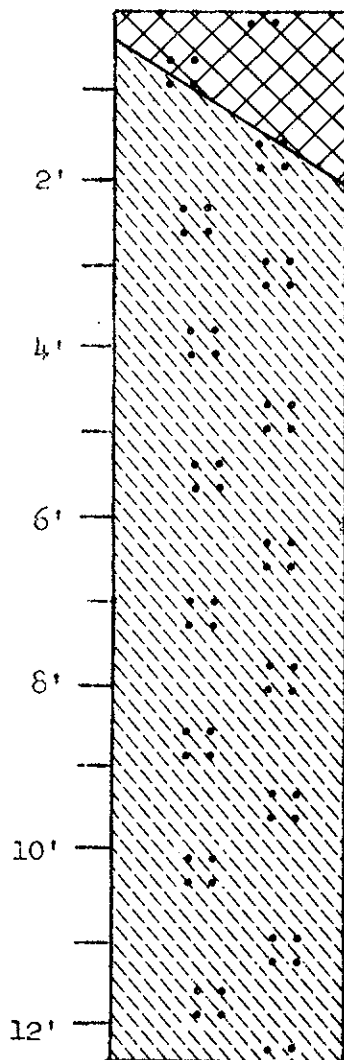
Mapping Unit 79 consists of Soil 79 and inclusions of other soils. The most common inclusions are Soils 24, 72 and 78.

Soil 79 is a very deep plastic soil derived from residuum, colluvium and till. Surface soils are generally thin gravelly silt loams. Subsoils are generally very thick gravelly sandy clay.

Bedrock is composed of incompetent, highly weathered schist or serpentinized basic igneous and occurs 12 feet or more beneath the soil surface.

Typically Soil 79 occurs on steep highly dissected sideslope drainages. This soil ranges in elevation from 1000 to 4500 feet and supports Site Class III and IV Douglas-fir along with hemlock, true fir and cedar. This soil is moderately well to imperfectly drained. Permeability is rapid in the surface soils and moderate to slow in the subsoils.

General Profile  
Sketch of Soil 79



Range of Profile Characteristics  
of Soil 79

- Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.
- Surface Layer - Grayish brown to strong brown gravelly silt loam ranging to gravelly sandy loam; weak fine subangular blocky structure ranging to single grained; 30 to 50 percent platy and angular gravel and cobbles by volume; nonsticky to slightly sticky, nonplastic to slightly plastic; pH ranges from 4.5 to 5.5. 4 to 24 inches thick.
- Subsoil Layer - Dark gray to yellowish brown gravelly sandy clay ranging to gravelly silty clay loam; massive; 35 to 50 percent platy and subround saprolitic gravel and cobbles by volume; weakly compact; slightly sticky to sticky, slightly plastic to plastic; pH ranges from 5.5 to 6.5. 120 inches thick or greater.

MAPPING UNIT 80

Mapping Unit 80 consists of intrusive igneous and gneissic rock outcrop and inclusions of soils. The most common inclusions are Soils 5, 45, 47, 81 and 82. Inclusions of perpetual snow and ice (Mapping Unit 8) may also occur on highest elevations.

Bedrock is generally competent and moderately to highly fractured.

This mapping unit occurs on ridge crests and steep sideslopes.

## MAPPING UNIT 81

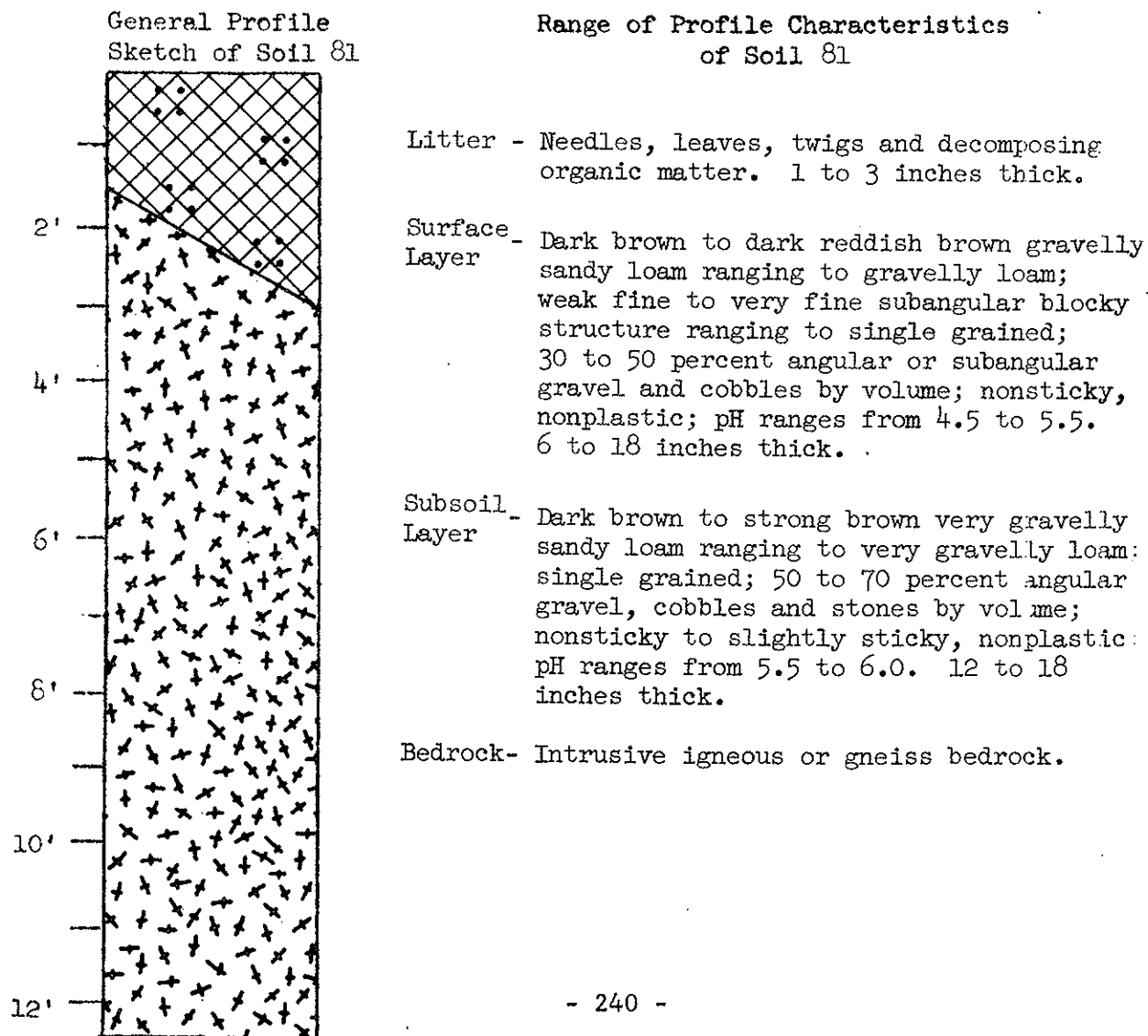
Mapping Unit 81 consists of Soil 81 and inclusions of other soils. The most common inclusions are Soils 21, 80 and 82.

Mapping Unit 81 is similar to Mapping Unit 82 with the exception of landform and inclusions.

Soil 81 is a shallow nonplastic soil derived from residuum and colluvium. Surface soils are generally thin gravelly sandy loams. Subsoils are generally thin very gravelly sandy loams.

Bedrock is competent, moderately to highly fractured intrusive igneous and gneiss rock.

Typically Soil 81 occurs on steep smooth, slightly dissected sideslopes. This soil ranges in elevation from 2000 to 6000 feet and supports Site Class IV and V Douglas-fir along with hemlock, true fir and cedar. This soil is well drained. Permeability is rapid.



## MAPPING UNIT 82

Mapping Unit 82 consists of Soil 82 and inclusions of other soils. The most common inclusions are Soils 21, 80 and 81.

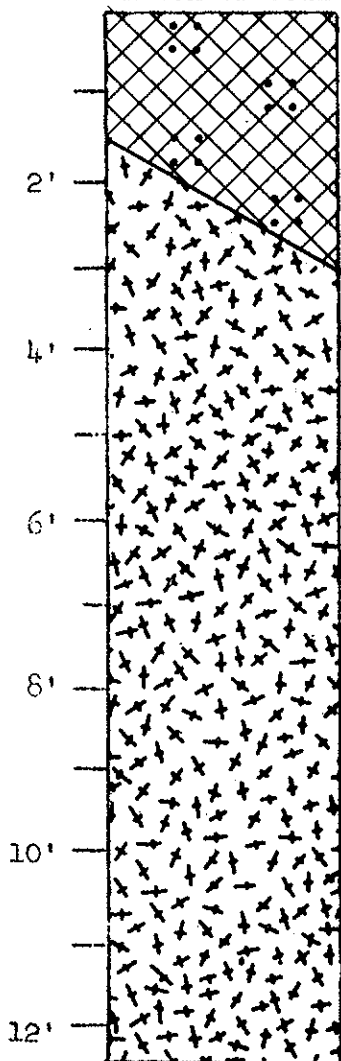
Mapping Unit 82 is similar to Mapping Unit 81 with the exception of landform and inclusions.

Soil 82 is a shallow nonplastic soil derived from residuum and colluvium. Surface soils are generally thin gravelly sandy loams. Subsoils are generally very gravelly sandy loams.

Bedrock is competent to moderately competent, moderately to highly fractured intrusive igneous and gneiss rock.

Typically Soil 82 occurs on very steep, dissected sideslopes. This soil ranges in elevation from 2000 to 6000 feet and supports Site Class IV and V Douglas-fir along with hemlock, true fir and cedar. This soil is well drained. Permeability is rapid.

General Profile  
Sketch of Soil 82



Range of Profile Characteristics  
of Soil 82

Litter - Needles, leaves, twigs and decomposing organic matter. 1 to 3 inches thick.

Surface Layer - Dark brown to dark reddish brown gravelly sandy loam ranging to gravelly loam; weak fine to very fine subangular blocky structure ranging to single grained; 30 to 50 percent angular or subangular gravel and cobbles by volume; nonsticky, nonplastic; pH ranges from 4.5 to 5.5. 6 to 18 inches thick.

Subsoil Layer - Dark brown to strong brown very gravelly sandy loam ranging to very gravelly loam; single grained; 50 to 70 percent angular gravel, cobbles and stones by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 5.5 to 6.0. 12 to 18 inches thick.

Bedrock- Intrusive igneous or gneiss bedrock.

### MAPPING UNIT 83

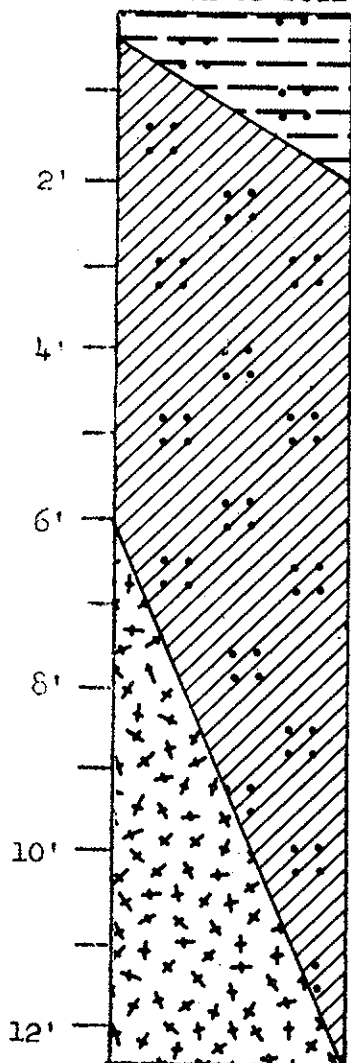
Mapping Unit 83 consists of Soil 83 and inclusions of other soils. The most common inclusions are Soils 21 and 82.

Soil 83 is a moderately deep to deep slightly plastic to plastic soil derived from residuum and colluvium. Surface soils are generally thin gravelly sandy loams. Subsoils are generally thick very gravelly silty clay loams.

Bedrock is moderately competent to incompetent, highly fractured and weathered gneiss and granitic rock.

Typically Soil 83 occurs on steep highly dissected sideslope drainages. This soil ranges in elevation from 2000 to 5000 feet and supports Site Class IV and V and low III Douglas-fir along with true fir, hemlock and cedar. This soil is well to moderately well drained. Permeability is rapid in the surface soils and rapid to moderately rapid in subsoils.

General Profile  
Sketch of Soil 83



Range of Profile Characteristics  
of Soil 83

Litter - Needles, leaves, twigs and decomposing organic matter. 1 to 3 inches thick.

Surface Layer - Dark yellowish brown to grayish brown gravelly sandy loam ranging to gravelly loam; weak fine subangular blocky structure; 35 to 50 percent angular gravel, cobbles and stones by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 4.5 to 5.5. 4 to 24 inches thick.

Subsoil Layer - Light brownish gray to yellowish brown very gravelly silty clay loam ranging to very gravelly loam; massive; 50 to 80 percent angular gravel, cobbles and stones by volume; slightly sticky to sticky, slightly plastic to plastic; pH ranges from 5.5 to 6.0. 68 to 120 inches thick.

Bedrock - Intrusive igneous and gneiss bedrock.

### MAPPING UNIT 85

Mapping Unit 85 consists of serpentized rock outcrop and inclusions of soils. The most common inclusions are Soils 5, 45, 47 and 86. Inclusions of perpetual snow and ice (Mapping Unit 8) may also occur on highest elevations.

Bedrock is moderately competent to incompetent, highly fractured, and partially to highly altered to serpentine.

This mapping unit occurs on ridge crests and steep sideslopes.

### MAPPING UNIT 83

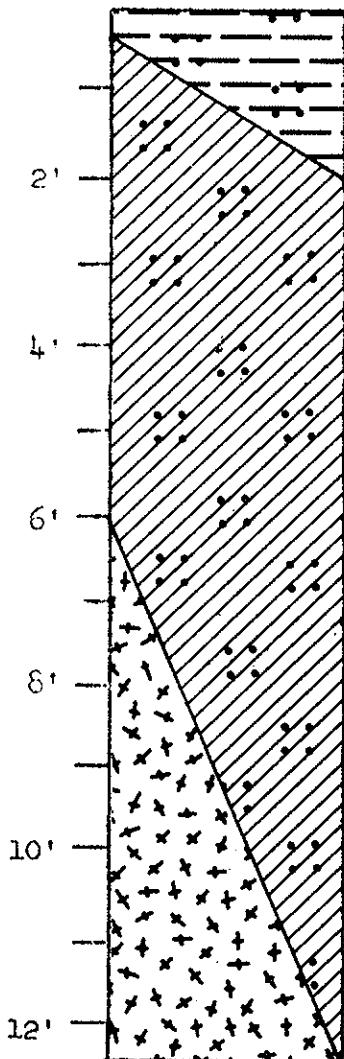
Mapping Unit 83 consists of Soil 83 and inclusions of other soils. The most common inclusions are Soils 21 and 82.

Soil 83 is a moderately deep to deep slightly plastic to plastic soil derived from residuum and colluvium. Surface soils are generally thin gravelly sandy loams. Subsoils are generally thick very gravelly silty clay loams.

Bedrock is moderately competent to incompetent, highly fractured and weathered gneiss and granitic rock.

Typically Soil 83 occurs on steep highly dissected sideslope drainages. This soil ranges in elevation from 2000 to 5000 feet and supports Site Class IV and V and low III Douglas-fir along with true fir, hemlock and cedar. This soil is well to moderately well drained. Permeability is rapid in the surface soils and rapid to moderately rapid in subsoils.

General Profile  
Sketch of Soil 83



Range of Profile Characteristics  
of Soil 83

Litter - Needles, leaves, twigs and decomposing organic matter. 1 to 3 inches thick.

Surface Layer - Dark yellowish brown to grayish brown gravelly sandy loam ranging to gravelly loam; weak fine subangular blocky structure; 35 to 50 percent angular gravel, cobbles and stones by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 4.5 to 5.5. 4 to 24 inches thick.

Subsoil Layer - Light brownish gray to yellowish brown very gravelly silty clay loam ranging to very gravelly loam; massive; 50 to 80 percent angular gravel, cobbles and stones by volume; slightly sticky to sticky, slightly plastic to plastic; pH ranges from 5.5 to 6.0. 68 to 120 inches thick.

Bedrock - Intrusive igneous and gneiss bedrock.

#### MAPPING UNIT 85

Mapping Unit 85 consists of serpentized rock outcrop and inclusions of soils. The most common inclusions are Soils 5, 45, 47 and 86. Inclusions of perpetual snow and ice (Mapping Unit 8) may also occur on highest elevations.

Bedrock is moderately competent to incompetent, highly fractured, and partially to highly altered to serpentine.

This mapping unit occurs on ridge crests and steep sideslopes.

## MAPPING UNIT 86

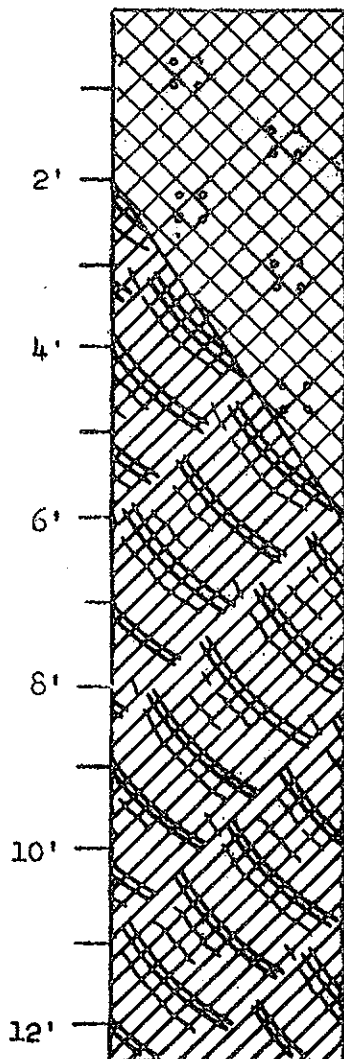
Mapping Unit 86 consists of Soil 86 and inclusions of other soils. The most common inclusions are Soils 37 and 85.

Soil 86 is a shallow to moderately deep nonplastic to slightly plastic soil derived from residuum and colluvium. Surface soils are generally thin gravelly loams. Subsoils are generally thin to moderately thick very gravelly silt loams.

Bedrock is moderately competent, highly fractured, serpentinized rock.

Typically Soil 86 occurs on steep slightly to somewhat dissected sideslopes and ridge crests. This soil ranges in elevation from 2000 to 5000 feet and supports Site Class IV, V and low III Douglas-fir along with hemlock, true fir and cedar. This soil is well drained. Permeability is rapid.

General Profile  
Sketch of Soil 86



Range of Profile Characteristics  
of Soil 86

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Surface Layer - Dark brown to reddish brown gravelly loam ranging to gravelly fine sandy loam; weak fine subangular blocky structure; 35 to 50 percent angular gravel and cobbles by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 5.0 to 5.5. 6 to 24 inches thick.

Subsoil Layer - Dark yellowish brown to dark gray very gravelly silt loam ranging to very gravelly loam; massive; 50 to 70 percent angular gravel, cobbles and stones by volume; slightly sticky, nonplastic to slightly plastic; pH ranges from 5.0 to 5.5. 18 to 48 inches thick.

Bedrock- Serpentinized rock.

### MAPPING UNIT 90

Mapping Unit 90 consists of andesite, basalt, and dacite rock outcrop with minor inclusions of interbedded rhyolitic and sedimentary rock outcrop and inclusions of soils. The most common inclusions are Soils 5, 91 and 92. Inclusions of perpetual snow and ice (Mapping Unit 8) may also occur on highest elevations.

Bedrock is generally competent and is moderately to highly fractured.

This mapping unit occurs on ridge crests and steep sideslopes.

## MAPPING UNIT 91

Mapping Unit 91 consists of Soil 91 and inclusions of other soils. The most common inclusions are Soils 37, 41, 90 and 92.

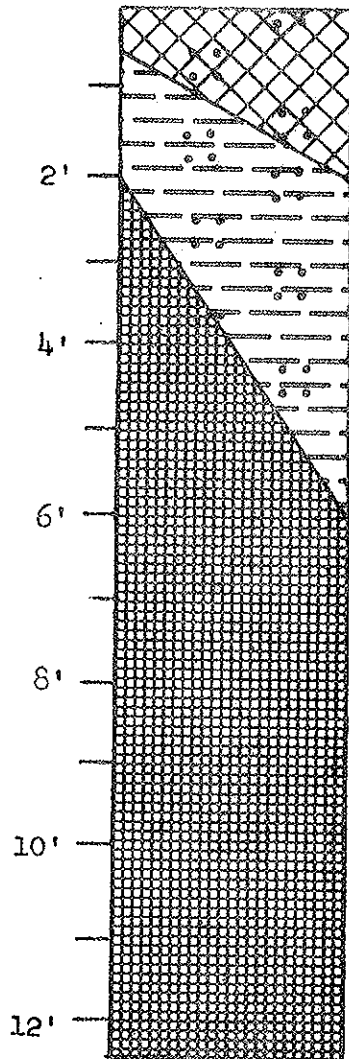
Mapping Unit 91 is similar to Mapping Unit 92 with the exception of landform and inclusions.

Soil 91 is a shallow to moderately deep nonplastic to slightly plastic soil derived from residuum and colluvium. Surface soils are generally thin gravelly loams. Subsoils are generally thin very gravelly sandy loams.

Bedrock is competent to moderately competent highly fractured andesite, basalt, flow breccia and/or dacite with minor inclusions of interbedded rhyolitic and sedimentary rock.

Typically Soil 91 occurs on steep smooth to somewhat uneven, slightly dissected sideslopes. This soil ranges in elevation from 2000 to 4500 feet and supports Site Class IV and low III Douglas-fir along with true fir, hemlock and cedar. This soil is well drained. Permeability is rapid.

General Profile  
Sketch of Soil 91



Range of Profile Characteristics  
of Soil 91

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Surface Layer - Dark yellowish brown to brown gravelly loam ranging to gravelly sandy loam; weak fine and very fine subangular blocky structure; 30 to 50 percent angular gravel and cobbles by volume; nonsticky to slightly sticky, nonplastic to slightly plastic; pH ranges from 5.0 to 5.5. 6 to 24 inches thick.

Subsoil Layer - Dark brown to pale brown very gravelly sandy loam ranging to very gravelly loam; massive; 50 to 70 percent angular gravel, cobbles and stones by volume; nonsticky to slightly sticky, nonplastic to slightly plastic; pH ranges from 5.0 to 5.5. 16 to 48 inches thick.

Bedrock- Extrusive igneous.

## MAPPING UNIT 92

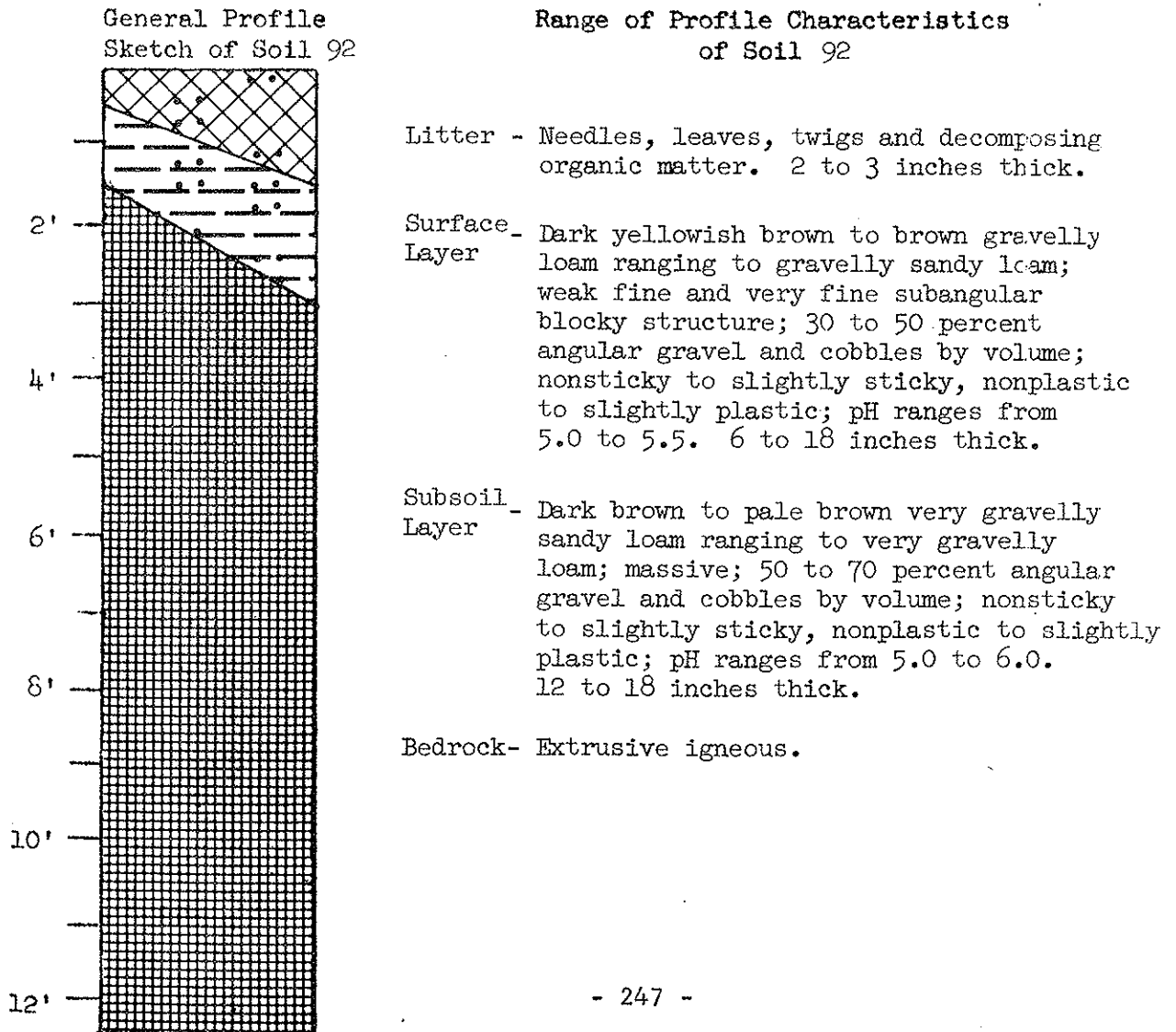
Mapping Unit 92 consists of Soil 92 and inclusions of other soils. The most common inclusions are Soils 38, 41, 90 and 91.

Mapping Unit 92 is similar to Mapping Unit 91 with the exception of landform and inclusions.

Soil 92 is a shallow nonplastic to slightly plastic soil derived from residuum and colluvium. Surface soils are generally thin gravelly loams. Subsoils are generally thin very gravelly sandy loams.

Bedrock is competent to moderately competent highly fractured andesite, basalt, flow breccia and/or dacite with minor inclusions of interbedded rhyolitic and sedimentary rock.

Typically Soil 92 occurs on very steep, highly dissected sideslopes. This soil ranges in elevation from 2000 to 4500 feet and supports Site Class IV and low III Douglas-fir along with true fir, hemlock and cedar. This soil is well drained. Permeability is rapid.



### MAPPING UNIT 95

Mapping Unit 95 consists of recent andesite, basalt and pyroclastic rock outcrop and inclusions of soils. The most common inclusions are Soils 5, 8, 45, 47, 96 and 97.

The basalt and andesite rocks are hard, competent and moderately to highly fractured. The pyroclastic rocks are moderately hard to soft, and moderately competent to incompetent.

This mapping unit occurs on ridge crests and sideslopes.

## MAPPING UNIT 96

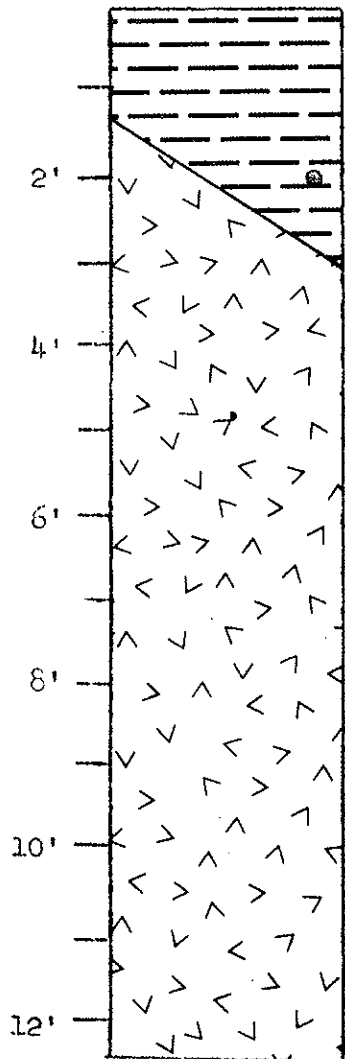
Mapping Unit 96 consists of Soil 96 and inclusions of other soils. The most common inclusions are Soils 95 and 97.

Soil 96 is a shallow nonplastic soil derived from residuum. These soils are sandy loams.

Bedrock is recent, competent, andesite and basalt flows.

Typically Soil 96 occurs on smooth valley bottoms on slopes of less than 35 percent slope. This soil ranges in elevation from 1000 to 4000 feet and supports Site Class V, IV and low III Douglas-fir along with true fir, hemlock and cedar. This soil is well drained. Permeability is rapid.

General Profile  
Sketch of Soil 96



Range of Profile Characteristics  
of Soil 96

Litter - Needles, leaves, twigs and decomposing organic matter. 2 to 3 inches thick.

Soil Layer - Dark reddish brown to yellowish sandy loam; single grained; 25 to 35 percent subangular gravel, cobbles and stones by volume; nonsticky, nonplastic; pH ranges from 4.5 to 5.5. 15 to 36 inches thick.

Bedrock- Recent andesite and basalt flow rocks.

## MAPPING UNIT 97

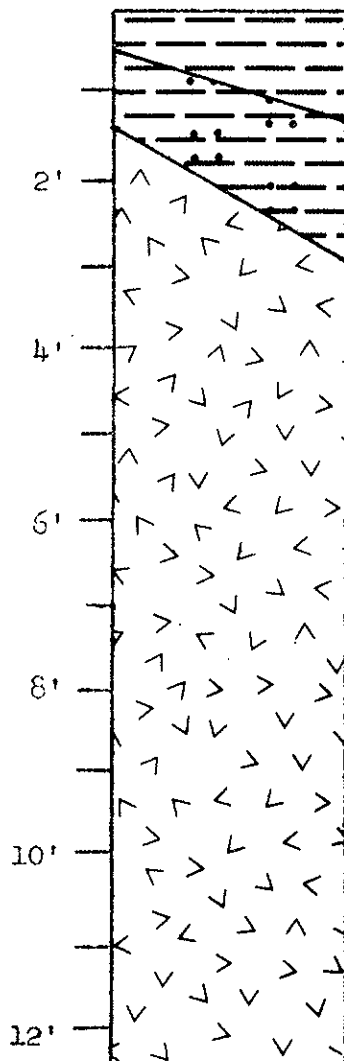
Mapping Unit 97 consists of Soil 97 and inclusions of other soils. The most common inclusions are Soils 95 and 96.

Soil 97 is a shallow nonplastic soil derived from residuum and colluvium. Surface soils are generally thin sandy loams. Subsoils are generally thin gravelly sandy loams.

Bedrock is hard and competent, columnar jointed, recent andesites and basalts.

Typically Soil 97 occurs on steep slightly to moderately dissected sideslopes of greater than 35 percent slope. This soil ranges in elevation from 2500 to 5000 feet and supports Site Class IV and V Douglas-fir along with true fir, hemlock and cedar. This soil is well drained. Permeability is rapid.

General Profile  
Sketch of Soil 97



Range of Profile Characteristics  
of Soil 97

Litter - Needles, leaves, twigs and decomposing organic matter. 1 to 3 inches thick.

Surface Layer - Dark brown to dark yellowish brown sandy loam ranging to loam; weak fine subangular blocky structure; 20 to 35 percent subangular gravel and cobbles by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 4.5 to 5.0. 6 to 15 inches thick.

Subsoil Layer - Brown to yellowish brown gravelly sandy loam ranging to gravelly loam; massive; 35 to 50 percent subangular gravel, cobbles and stones by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 5.0 to 5.5. 10 to 20 inches thick.

Bedrock - Recent andesites and basalts.

APPENDIX V

ENGINEERING LABORATORY TEST DATA

This Appendix contains standard engineering test data for some representative soils. Mechanical analysis was done by Joe E. Whittaker, Materials Engineering Technician, Mt. Baker National Forest. Minimum resistivity and pH were done by LeRoy Meyers, Soil Scientist, Gifford Pinchot National Forest. Comments have been reviewed by R.O. Soils Materials Engineer, Chris Schwarzhoff.

Report of Laboratory Test Results

Soil No. 21

Location: SE $\frac{1}{4}$ , SW $\frac{1}{4}$ , Sec. 26, T33N, R11E., W.M.		Mechanical Analysis	
Depth: 4-8'	Unified Classification: SW	Sieve Size	% Passing
Liquid Limit:	Plasticity Index: N.P.	1 1/2	91.3
pH (by Photovolt pH meter): 3.6		3/4	78.0
Minimum Electrical Resistivity, Ohms per cc: 29,800+		3/8	62.4
Hydrometer Analysis:		No. 4	53.1
This material should have excellent drainage characteristics. The sand should not be frost susceptible, nor should it exhibit any expansive or compressive characteristics. It should make good subgrade. The soil is extremely acid and will probably corrode reactive metals which are not coated.		10	45.3
		20	33.4
		40	21.4
		60	13.9
		100	8.4
		200	4.5

Soil No. 23

Location: SE $\frac{1}{4}$ , NE $\frac{1}{4}$ , Sec. 18, T. 32N, R10E., W.M.		Mechanical Analysis	
Depth: 5-7'	Unified Classification: SM-SC	Sieve Size	% Passing
Liquid Limit: 23.2	Plasticity Index: 6.1	1 1/2	98.8
pH (by Photovolt pH meter): 5.4		3/4	94.6
Minimum Electrical Resistivity, Ohms per cc: 6,370		3/8	91.3
Hydrometer Analysis:		No. 4	87.8
This material can be expected to have poor drainage characteristics and make only fair subgrade. The soil will probably be frost susceptible and may exhibit some expansive and compressive characteristics.		10	82.7
		20	75.7
		40	70.0
		60	64.4
		100	58.9
		200	49.6

Soil No. 26

Location: NE $\frac{1}{4}$ , NW $\frac{1}{4}$ , Sec. 27, T. 34N, R9E., W.M.		Mechanical Analysis	
Depth: 5-8'	Unified Classification: SC	Sieve Size	% Passing
Liquid Limit: 28.7	Plasticity Index: 8.4	3/4	97.4
pH (by Photovolt pH meter): 4.6		3/8	90.2
Minimum Electrical Resistivity, Ohms per cc: 7,890		No. 4	80.4
Hydrometer Analysis:		10	71.7
This material can be expected to have poor drainage characteristics and make only fair subgrade. The soil may be frost susceptible and exhibit some expansive and compressive characteristics. The soil is strongly acid and will probably corrode reactive metals which are not coated.		20	62.8
		40	57.0
		60	52.7
		100	48.9
		200	43.9

Report of Laboratory Test Results

Soil No. 26

Location: SE $\frac{1}{4}$ , SW $\frac{1}{4}$ , Sec. 9, T. 34 N, R. 8 E, W.M.		Mechanical Analysis	
Depth: 0-4'	Unified Classification: SM-u	Sieve Size	% Passing
Liquid Limit: 43.8	Plasticity Index: N.P.	3	89.7
pH (by Photovolt pH meter): 3.9		1 1/2	85.1
Minimum Electrical Resistivity, Ohms per cc: 19,500		3/4	76.2
Hydrometer Analysis:		3/8	63.5
This material should have poor drainage characteristics, and have only fair value as subgrade. The soil may be frost susceptible and exhibit some expansive and compressive characteristics. The soil is extremely acid and will probably corrode reactive metals which are not coated.		No. 4	51.7
		10	39.0
		40	23.3
		60	19.8
		100	16.8
		200	13.8

Soil No. 26

Location: SE $\frac{1}{4}$ , SW $\frac{1}{4}$ , Sec. 9, T. 34 N, R. 8 E, W.M.		Mechanical Analysis	
Depth: 4-8'	Unified Classification: SM-d - GM-d	Sieve Size	% Passing
Liquid Limit: 21.60	Plasticity Index: 0.74	3	90.1
pH (by Photovolt pH meter): 4.5		1 1/2	84.3
Minimum Electrical Resistivity, Ohms per cc:		3/4	74.5
Hydrometer Analysis:		3/8	60.5
This material should have fair drainage characteristics and make good subgrade. It may be frost susceptible and show slight expansive and compressive characteristics. The soil is extremely acid and will probably corrode reactive metals which are not coated.		No. 4	50.0
		10	41.3
		40	28.0
		60	23.8
		100	20.6
		200	17.1

Soil No. 29

Location: SE $\frac{1}{4}$ , SE $\frac{1}{4}$ , Sec. 27, T. 31 N, R. 8 E, W.M.		Mechanical Analysis	
Depth: 7-8'	Unified Classification: SW-SM	Sieve Size	% Passing
Liquid Limit: 33.5	Plasticity Index: 6.5	1 1/2	96.0
pH (by Photovolt pH meter): 3.7		3/4	90.2
Minimum Electrical Resistivity, Ohms per cc: 29,800+		3/8	81.5
Hydrometer Analysis:		No. 4	72.0
This material should have fairly good drainage characteristics and make fair to good subgrade. The soil may be frost susceptible. It should exhibit little expansive and compressive characteristics. The soil is extremely acid and will probably corrode reactive metals which are not coated.		10	60.6
		20	38.6
		40	24.8
		60	17.4
		100	11.6
		200	6.8

Report of Laboratory Test Results

Soil No. 31

Location: SE $\frac{1}{4}$ , SE $\frac{1}{4}$ , Sec. 18, T 32 N, R 10 E., W.M.		Mechanical Analysis	
Depth: 3-5'	Unified Classification: ML	Sieve Size	% Passing
Liquid Limit: 33.75	Plasticity Index: 10.44	3/4	99.6
pH (by Photovolt pH meter): 4.1		3/8	99.3
Minimum Electrical Resistivity, Ohms per cc: 9,180		No. 4	98.8
Hydrometer Analysis:		10	98.0
This material should have poor drainage characteristics		20	93.8
and will make fair to poor subgrade. The silt may be		40	89.7
highly frost susceptible and may exhibit expansive		60	86.0
and compressive characteristics. The soil is strongly		100	82.0
acid and will probably corrode reactive metals which are		200	75.9
not coated.			

Soil No. 32

Location: NW $\frac{1}{4}$ , NW $\frac{1}{4}$ , Sec. 32, T. 34 N, R. 8 E, W.M.		Mechanical Analysis	
Depth: 2-4'	Unified Classification: ML	Sieve Size	% Passing
Liquid Limit: 36.35	Plasticity Index: 0.09	3/8	99.9
pH (by Photovolt pH meter): 3.6		No. 4	99.7
Minimum Electrical Resistivity, Ohms per cc: 29,800+		10	99.1
Hydrometer Analysis:		20	96.7
This material should have poor drainage characteristics		40	93.6
and will make fair to poor subgrade. The silt may be		60	90.5
highly frost susceptible and may exhibit expansive and		100	86.2
compressive characteristics. The soil is extremely acid		200	78.4
and will probably corrode reactive metals which are not			
coated.			

Soil No. 33

Location: NE $\frac{1}{4}$ , SW $\frac{1}{4}$ , Sec. 9, T. 31 N, R. 8 E, W.M.		Mechanical Analysis	
Depth: 8-10'	Unified Classification: SM-d	Sieve Size	% Passing
Liquid Limit:	Plasticity Index: N.P.	3/4	97.7
pH (by Photovolt pH meter): 4.3		3/8	90.1
Minimum Electrical Resistivity, Ohms per cc: 29,800+		No. 4	80.7
Hydrometer Analysis:		10	67.6
This material should have fair drainage characteristics		20	55.1
and make good subgrade. It may be frost susceptible but		40	48.3
show slight expansive and compressive characteristics.		60	44.2
The soil is strongly acid and will probably corrode re-		100	38.3
active metals which are not coated.		200	24.8

Report of Laboratory Test Results

Soil No. 33

Location: NE $\frac{1}{4}$ , SW $\frac{1}{4}$ , Sec. 9, T.31N, R8E, W.M.		Mechanical Analysis	
Depth: 7-8'	Unified Classification: ML	Sieve Size	% Passing
Liquid Limit:	Plasticity Index: N.P.	3/8	100
pH (by Photovolt pH meter): 4.0		No. 4	99.9
Minimum Electrical Resistivity, Ohms per cc: 29,800+		10	99.0
Hydrometer Analysis:		20	97.5
This material will have poor drainage characteristics and will make fair to poor subgrade. The silt may be highly frost susceptible and may exhibit expansive and compressive characteristics. The soil is extremely acid and will probably corrode reactive metals which are not coated.		40	96.3
		60	94.3
		100	85.4
		200	56.7

Soil No. 34

Location: SW $\frac{1}{4}$ , NW $\frac{1}{4}$ , Sec. 25, T31N, R8E, W.M.		Mechanical Analysis	
Depth: 2-3'	Unified Classification: SM-d	Sieve Size	% Passing
Liquid Limit: 25.3	Plasticity Index: 3.0	No. 4	100
pH (by Photovolt pH meter): 4.2		10	92.9
Minimum Electrical Resistivity, Ohms per cc:		20	69.7
Hydrometer Analysis:		40	57.0
This material should have fair drainage characteristics and make good subgrade. It may be frost susceptible but show slight expansive and compressive characteristics. The soil is strongly acid and will probably corrode reactive metals which are not coated.		60	51.0
		100	41.7
		200	30.8

Soil No. 34

Location: NW $\frac{1}{4}$ , SE $\frac{1}{4}$ , Sec. 22, T30N, R10E, W.M.		Mechanical Analysis	
Depth: 2-3'	Unified Classification: SM-u	Sieve Size	% Passing
Liquid Limit: 55.4	Plasticity Index: 10.8	3/4	99.8
pH (by Photovolt pH meter): 3.9		3/8	99.6
Minimum Electrical Resistivity, Ohms per cc: 29,800+		No. 4	99.3
Hydrometer Analysis:		10	89.1
This material should have poor drainage characteristics and have only fair value as subgrade. The soil may be frost susceptible and exhibit some expansive and compressive characteristics. The soil is extremely acid and will probably corrode reactive metals which are not coated.		20	55.2
		40	37.1
		60	28.0
		100	20.5
		200	14.2

Report of Laboratory Test Results

Soil No. 36

Location: SE $\frac{1}{4}$ , NW $\frac{1}{4}$ , Sec. 25, T38N, R8E, W.M.		Mechanical Analysis	
Depth: 18-28'	Unified Classification: SM-d	Sieve Size	% Passing
Liquid Limit:	Plasticity Index: N.P.	3/4	90.2
pH (by Photovolt pH meter): 4.2		3/8	80.7
Minimum Electrical Resistivity, Ohms per cc: 29,800+		No. 4	75.7
Hydrometer Analysis:		10	71.8
This material should have fair drainage characteristics		20	66.1
and make good subgrade. It may be frost susceptible and		40	59.3
show slight expansive and compressive characteristics.		60	51.1
The soil is strongly acid and will probably corrode		100	40.6
reactive metals which are not coated.		200	29.0

Soil No. 36

Location: SW $\frac{1}{4}$ , SE $\frac{1}{4}$ , Sec. 19, T30N, R8E, W.M.		Mechanical Analysis	
Depth: 2-3'	Unified Classification: SM-d	Sieve Size	% Passing
Liquid Limit:	Plasticity Index: N.P.	1 1/2	84.1
pH (by Photovolt pH meter): 4.9		3/4	76.8
Minimum Electrical Resistivity, Ohms per cc: 29,800+		3/8	69.4
Hydrometer Analysis:		No. 4	63.5
This material should have fair drainage characteristics		10	56.6
and make good subgrade. It may be frost susceptible and		20	49.6
show slight expansive and compressive characteristics.		40	43.1
The soil is strongly acid and will probably corrode		60	36.8
reactive metals which are not coated.		100	30.4
		200	23.1

Soil No. 37

Location: NE $\frac{1}{4}$ , Sec. 10, T33N, R8E, W.M.		Mechanical Analysis	
Depth: 0-2'	Unified Classification: GW-GM	Sieve Size	% Passing
Liquid Limit:	Plasticity Index: N.P.	3	89.4
pH (by Photovolt pH meter): 3.8		1 1/2	75.6
Minimum Electrical Resistivity, Ohms per cc: 29,800+		3/4	63.4
Hydrometer Analysis:		3/8	51.4
This material should have good drainage characteristics		No. 4	41.1
and make good subgrade. It may be slightly frost suscep-		10	25.2
tible but should exhibit very little expansive and com-		20	15.7
pressive characteristics. The soil is extremely acid and		40	10.1
will probably corrode reactive metals which are not coated.		100	5.9
		200	5.0

Report of Laboratory Test Results

Soil No. 38

Location: SW $\frac{1}{4}$ , SW $\frac{1}{4}$ , Sec. 14, T32N, R12E, W.M.		Mechanical Analysis	
Depth: 5-10'	Unified Classification: SW	Sieve Size	% Passing
Liquid Limit:	Plasticity Index: N.P.	1 1/2	98.1
pH (by Photovolt pH meter): 4.2		3/4	90.2
Minimum Electrical Resistivity, Ohms per cc: 29,800+		3/8	82.1
Hydrometer Analysis:		No. 4	74.1
This material should have good drainage characteristics and make good subgrade. It may be frost susceptible but exhibit little expansive and compressive characteristics.		10	66.3
		20	52.7
		40	38.0
The soil is strongly acid and will probably corrode reactive metals which are not coated.		60	25.1
		100	12.6
		200	4.5

Soil No. 38

Location: SW $\frac{1}{4}$ , SE $\frac{1}{4}$ , Sec. 19, T38N, R9E, W.M.		Mechanical Analysis	
Depth: 20'	Unified Classification: GW-GM	Sieve Size	% Passing
Liquid Limit:	Plasticity Index: N.P.	3	93.4
pH (by Photovolt pH meter): 4.9		1 1/2	72.6
Minimum Electrical Resistivity, Ohms per cc: 16,000		3/4	61.3
Hydrometer Analysis:		3/8	51.4
This material should have good drainage characteristics and make good subgrade. It may be slightly frost susceptible but exhibit very little expansive and compressive characteristics. The soil is strongly acid and will probably corrode reactive metals which are not coated.		No. 4	42.1
		10	33.3
		20	24.6
		40	18.8
		100	11.3
		200	7.5

Soil No. 38

Location: SE $\frac{1}{4}$ , NE $\frac{1}{4}$ , Sec. 21, T33N, R11E, W.M.		Mechanical Analysis	
Depth: 15'	Unified Classification: GW	Sieve Size	% Passing
Liquid Limit:	Plasticity Index: N.P.	1 1/2	84.9
pH (by Photovolt pH meter): 4.3		3/4	79.1
Minimum Electrical Resistivity, Ohms per cc: 22,300		3/8	68.7
Hydrometer Analysis:		No. 4	56.5
This material should have excellent drainage characteristics and make excellent subgrade. It should not be frost susceptible nor exhibit expansive and compressive characteristics. The soil is strongly acid and will probably corrode reactive metals which are not coated.		10	46.4
		20	35.4
		40	27.4
		60	20.3
		100	11.5
		200	4.6

Report of Laboratory Test Results

Soil No. 41

Location: SE $\frac{1}{4}$ , SE $\frac{1}{4}$ , Sec. 18, T31N, R12E, W.M.		Mechanical Analysis	
Depth: 3-8'	Unified Classification: GW	Sieve Size	% Passing
Liquid Limit:	Plasticity Index: N.P.	3	57.8
pH (by Photovolt pH meter): 4.1		1 1/2	45.9
Minimum Electrical Resistivity, Ohms per cc: 29,800+		3/4	39.7
Hydrometer Analysis:		3/8	35.2
This material should have excellent drainage characteristics and make excellent subgrade. It should not be frost susceptible nor exhibit expansive and compressive characteristics. The soil is strongly acid and will probably corrode reactive metals which are not coated.		No. 4	31.9
		10	28.7
		40	18.5
		60	13.4
		100	8.3
		200	4.5

Soil No. 41

Location: SE $\frac{1}{4}$ , SE $\frac{1}{4}$ , Sec. 17, T29N, R11E, W.M.		Mechanical Analysis	
Depth: 12'	Unified Classification: SW-SM	Sieve Size	% Passing
Liquid Limit: 24.9	Plasticity Index: 4.9	1 1/2	88.6
pH (by Photovolt pH meter): 4.5		3/4	80.1
Minimum Electrical Resistivity, Ohms per cc:		3/8	69.8
Hydrometer Analysis:		No. 4	58.6
This material should have fairly good drainage characteristics and make good subgrade. It may be frost susceptible and exhibit slight expansive and compressive characteristics. The soil is strongly acid and will probably corrode reactive metals which are not coated.		10	46.6
		20	30.4
		40	21.4
		60	16.7
		100	12.6
		200	8.1

Soil No. 51

Location: NE $\frac{1}{4}$ , NE $\frac{1}{4}$ , Sec. 16, T30N, R10E, W.M.		Mechanical Analysis	
Depth: 3'	Unified Classification: SW-SM	Sieve Size	% Passing
Liquid Limit:	Plasticity Index: N.P.	1 1/2	98.9
pH (by Photovolt pH meter): 4.1		3/4	89.2
Minimum Electrical Resistivity, Ohms per cc: 29,800+		3/8	75.1
Hydrometer Analysis:		No. 4	62.5
This material should have fairly good drainage characteristics and make good subgrade. It may be frost susceptible and exhibit slight expansive and compressive characteristics. The soil is strongly acid and will probably corrode reactive metals which are not coated.		10	50.1
		20	37.2
		40	26.8
		60	18.6
		100	12.5
		200	7.6

Report of Laboratory Test Results

Soil No. 54

Location: NE $\frac{1}{4}$ , NE $\frac{1}{4}$ , Sec. 25, T33N, R8E, W.M.		Mechanical Analysis	
Depth: 1-3'	Unified Classification: GM-u	Sieve Size	% Passing
Liquid Limit: 35.4	Plasticity Index: 2.6	3	87.7
pH (by Photovolt pH meter): 3.5		1 1/2	75.3
Minimum Electrical Resistivity, Ohms per cc: 29,800+		3/4	67.4
Hydrometer Analysis:		3/8	57.9
This material should have poor drainage characteristics but		No. 4	49.2
make fairly good subgrade. The soil may be slightly frost-		10	42.3
susceptible and exhibit slight expansive and compressive		40	32.1
characteristics. The soil is extremely acid and will proba-		60	23.8
bly corrode reactive metals which are not coated.		100	19.6
		200	15.0

Soil No. 56

Location: NW $\frac{1}{4}$ , NW $\frac{1}{4}$ , Sec. 36, T34N, R7E, W.M.		Mechanical Analysis	
Depth: 1-2'	Unified Classification: SM-u	Sieve Size	% Passing
Liquid Limit: 38.6	Plasticity Index: 9.0	1 1/2	96.1
pH (by Photovolt pH meter): 3.2		3/4	91.9
Minimum Electrical Resistivity, Ohms per cc: 25,000		3/8	84.2
Hydrometer Analysis:		No. 4	75.5
This material should have poor drainage characteristics		10	69.1
and have only fair value as subgrade. The soil may be		20	58.3
frost susceptible and exhibit some expansive and compressive		40	49.5
characteristics. The soil is extremely acid and will proba-		60	43.6
bly corrode reactive metals which are not coated.		100	38.8
		200	33.8

Soil No. 56

Location: NW $\frac{1}{4}$ , NW $\frac{1}{4}$ SEC. 36, T34N, R7E, W.M.		Mechanical Analysis	
Depth: 8-10'	Unified Classification: SM-SC	Sieve Size	% Passing
Liquid Limit: 30.75	Plasticity Index: 7.52	3/4	99.4
pH (by Photovolt pH meter): 3.8		3/8	93.7
Minimum Electrical Resistivity, Ohms per cc: 6,160		No. 4	82.5
Hydrometer Analysis:		10	69.9
This material should have very poor drainage characteristics		20	51.8
and will make fair to poor subgrade. The soil should be		40	39.4
frost susceptible and may exhibit some expansive and compres-		60	31.3
sive characteristics. The soil is extremely acid and does		100	25.2
contain some soluble salts which will cause an uncoated		200	20.9
reactive metal to corrode rapidly.			

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Soil No. 62

Location: NW $\frac{1}{4}$ , NE $\frac{1}{4}$ , Sec. 13, T31N, R11E, W.M.	Mechanical Analysis	
Depth: 1-4' Unified Classification: SW-SM	Sieve Size	% Passing
Liquid Limit: 23.5 Plasticity Index: N.P.	1 1/2	92.8
pH (by Photovolt pH meter): 4.4	3/4	89.5
Minimum Electrical Resistivity, Ohms per cc: 12,000	3/8	83.2
Hydrometer Analysis:	No. 4	76.7
This material should have fairly good drainage characteristics and make good subgrade. It may be frost susceptible and exhibit slight expansive and compressive characteristics. The soil is strongly acid and will probably corrode reactive metals which are not coated.	10	64.7
	20	45.6
	40	30.9
	60	21.7
	100	13.7
	200	7.6

Soil No. 72

Location: NW $\frac{1}{4}$ , SE $\frac{1}{4}$ , Sec. 21, T32N, R12E., W.M.	Mechanical Analysis	
Depth: 1-3' Unified Classification: SM-d	Sieve Size	% Passing
Liquid Limit: Plasticity Index: N.P.	3	84.5
pH (by Photovolt pH meter): 4.5	3/4	80.6
Minimum Electrical Resistivity, Ohms per cc: 29,800+	3/8	77.6
Hydrometer Analysis:	No. 4	73.9
This material should have fair drainage characteristics and make good subgrade. It may be frost susceptible and show slight expansion and compressive characteristics. The soil is strongly acid and will probably corrode reactive metals which are not coated.	10	68.1
	20	60.5
	40	52.7
	60	42.4
	100	29.9
	200	19.2

Soil No. 74

Location: NE $\frac{1}{4}$ , NW $\frac{1}{4}$ , Sec. 28, T33N, R9E, W.M.	Mechanical Analysis	
Depth: 0-3' Unified Classification: SM-u	Sieve Size	% Passing
Liquid Limit: 47.5 Plasticity Index: N.P.	1 1/2	94.3
pH (by Photovolt pH meter): 4.1	3/4	86.5
Minimum Electrical Resistivity, Ohms per cc: 25,000	3/8	76.7
Hydrometer Analysis:	No. 4	67.3
This material should have poor drainage characteristics and only fair value as subgrade. The soil may be frost susceptible and exhibit some expansive and compressive characteristics. The soil is strongly acid and will probably corrode reactive metals which are not coated.	10	55.8
	20	44.9
	40	39.0
	60	35.1
	100	31.7
	200	27.9

Report of Laboratory Test Results

Soil No. 76

Location: NE $\frac{1}{4}$ , NE $\frac{1}{4}$ , Sec. 14, T34N, R8E., W.M.		Mechanical Analysis	
Depth: 0-2'	Unified Classification: SM-u	Sieve Size	% Passing
Liquid Limit: 55.75	Plasticity Index: 7.29	3/4	93.7
pH (by Photovolt pH meter): 3.6		3/8	83.0
Minimum Electrical Resistivity, Ohms per cc: 29,800+		No. 4	71.4
Hydrometer Analysis:		10	65.5
This material should have poor drainage characteristics and only fair value as subgrade. The soil may be frost susceptible and exhibit some expansive and compressive characteristics. The soil is extremely acid and will probably corrode reactive metals which are not coated.		20	54.2
		40	46.9
		60	42.0
		100	37.6
		200	32.4

Soil No. 76

Location: SE $\frac{1}{4}$ , NE $\frac{1}{4}$ , Sec. 8, T34W, R8E, W M		Mechanical Analysis	
Depth: 1-3'	Unified Classification: SW-SM	Sieve Size	% Passing
Liquid Limit: 33.8	Plasticity Index: 2.7	3/4	91.1
pH (by Photovolt pH meter): 3.5		3/8	76.1
Minimum Electrical Resistivity, Ohms per cc: 29,800+		No. 4	64.4
Hydrometer Analysis:		10	50.7
This material should have fairly good drainage characteristics and make good subgrade. It may be frost susceptible and exhibit slight expansive and compressive characteristics. The soil is extremely acid and will probably corrode reactive metals which are not coated.		20	34.3
		40	24.7
		60	19.3
		100	14.4
		200	9.8

Soil No. 79

Location: SE $\frac{1}{4}$ , SE $\frac{1}{4}$ , Sec. 27, T34N, R9E, W.M.		Mechanical Analysis	
Depth: 15-20'	Unified Classification: SM-SC	Sieve Size	% Passing
Liquid Limit: 26.75	Plasticity Index: 7.00	3/4	91.7
pH (by Photovolt pH meter): 6.9		3/8	84.8
Minimum Electrical Resistivity, Ohms per cc:		No. 4	75.2
Hydrometer Analysis:		10	67.3
This material should have poor drainage characteristics and have poor to fair value as subgrade. It should exhibit susceptibility to frost and moderate expansive and compressive characteristics.		20	57.6
		40	50.9
		60	45.7
		100	41.3
		200	35.8

Report of Laboratory Test Results

Soil No. 79

Location: SE $\frac{1}{4}$ , SE $\frac{1}{4}$ , Sec. 11, T34N, R8E, W.M.		Mechanical Analysis	
Depth: 7-10'	Unified Classification: SC	Sieve Size	% Passing
Liquid Limit: 37.0	Plasticity Index: 15.0	1 1/2	97.9
pH (by Photovolt pH meter): 6.2		3/4	95.8
Minimum Electrical Resistivity, Ohms per cc: 3,190		3/8	90.6
Hydrometer Analysis:		No. 4	83.4
This material should have very poor drainage characteristics and will make poor subgrade. The soil should be frost susceptible and exhibit some expansive and compressive characteristics. The soil is slightly acid and does contain a significant amount of soluble salts which will cause an uncoated reactive metal to corrode rapidly.		10	74.8
		20	64.0
		40	55.9
		60	48.9
		100	42.9
		200	37.4

Soil No. 81

Location: SW $\frac{1}{4}$ , NW $\frac{1}{4}$ , Sec. 20, T33N, R11E, W.M.		Mechanical Analysis	
Depth: 1-3'	Unified Classification: SW-SM	Sieve Size	% Passing
Liquid Limit:	Plasticity Index: N.P.	1 1/2	89.0
pH (by Photovolt pH meter): 5.1		3/4	73.8
Minimum Electrical Resistivity, Ohms per cc: 12,700		3/8	65.8
Hydrometer Analysis:		No. 4	58.8
This material should have fairly good drainage characteristics and make good subgrade. It may be frost susceptible and exhibit slight expansive and compressive characteristics		10	50.6
		20	41.0
		40	31.4
		60	23.7
		100	15.2
		200	6.8

Soil No.

Location:		Mechanical Analysis	
Depth:	Unified Classification:	Sieve Size	% Passing
Liquid Limit:	Plasticity Index:		
pH (by Photovolt pH meter):			
Minimum Electrical Resistivity, Ohms per cc:			
Hydrometer Analysis:			

## APPENDIX VI

### GLOSSARY

- Alluvium - Fine material such as sand, silt, or clay that has been deposited on land by streams.
- 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 planes 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.
- Basalt - A dark gray to black, dense, fine-grained extrusive igneous rock.
- 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 solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.
- Block Glide - A deep-seated, slow moving failure marked by lateral separation with but little vertical displacement. Generally occurs in plastic materials.
- Clay - A soil separate less than .002 millimeters in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
- Colluvium - Soil material or rock fragments moved downslope by gravitational force in the form of soil creep, slides, and local wash.
- 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 land type are so intricately mixed that it is not practical to show them separately at the scale of mapping used.
- Conglomerate - A highly resistant sedimentary rock, consisting of firmly cemented sand and gravel.
- Critical Soil - The term "critical soil" is frequently used by laymen, but it is a meaningless term unless it is related to a specific function. Many soils may be critical for one reason or another but different soils may not be critical for the same reasons. For example, a deep, wet, plastic and unstable soil will be critical in relation to road location and stability. This soil is not critical in relation to regeneration and drouthiness problems. Another soil may be very shallow over hard bedrock. This soil is not critical from the standpoint of road stability, but may be critical as to regeneration problems resulting from drouthiness and low fertility. It may also be critical in relation to surface erosion. From these two examples it becomes obvious that the term "critical soil" must be defined by the user in relation to its intended purpose.
- Debris Slide - A rapidly moving slide composed of soil, bedrock, or both.
- Erosion - The wearing away of the land surface by running water, wind, ice or gravitational creep. Accelerated erosion may result from the activities of man or animals.
- Extrusive Bedrock - This applies to those igneous rocks derived from volcanic lavas that cooled on the surface of the earth. This lava rapidly cools and forms fine-textured rocks such as basalt and andesite.
- Feldspathic Sandstones - Sandstone that is high in quartz and low in clay-producing minerals.
- Geomorphology - The study of landforms as they relate to geologic composition and history.
- Glacial Drift - The debris deposited by glaciers or by streams directly associated with them.
- Glacial Soils - Soils derived from materials transported or influenced by glaciers.

- Glaciated Valley - U-shaped valley formerly occupied by a glacier.
- 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.
- 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.
- Landform - Structural configuration of the topography as a result of past and present geological activity.
- 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.
- Mass Wasting - Wearing away of the landscape through the process of mass movement. Geologic erosion.
- Miscellaneous Land type - 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.
- 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.

- Outwash - Glacial material swept out, sorted and deposited by water that originated from the melting of glacial ice.
- Peak Flow (Peak Runoff) - The greatest water discharge for any single runoff period.
- Plastic Soil - A soil capable of being molded or deformed continuously and permanently, by relatively moderate pressure, into various shapes.
- Residuum - Soil material formed by rock weathering in place.
- 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 millimeters in diameter.
- Sandstone - A hard rock composed primarily of cemented sand-size 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 or nearly parallel to stratification.
- Sheet Erosion - Uniform removal of surface soil by water flowing overland or by wind.
- 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 - Any and all loose, incoherent, unconsolidated, weathered material on the earth's surface resting on solid, consolidated, unweathered bedrock, no matter how formed, or origin, or method of weathering or deposition. Generally includes any material that may be moved or broken by hand tools or heavy equipment without the need of blasting except soft, unweathered bedrock. In soil horizon designation, soil materials included "A", "B", and "C" horizons.
- 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 Unit - Taxonomic description of a portion of the landscape sufficiently uniform in soil, bedrock and landform that it can be clearly defined and easily recognized wherever it occurs.
- Spot Symbols - Symbols used on soil maps to represent a landscape factor too small to delineate.
- Surface Slips - Rapid movement downslope of the surface few feet of soil on steep slopes.
- 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.
- 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.