Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Stephen A. Rake, district conservationist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed for each soil, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

In 1989, about 252,000 acres in Jackson County was farmland. About 160,000 acres was used as cropland, and the rest was pasture or woodland. Of the total acreage used as cropland, about 39,000 acres was used for corn; 14,000 acres for small grain, mainly oats; 6,000 acres for soybeans; 55,000 acres for hay, mainly alfalfa; and 3,000 acres for fruit and vegetable crops (Wisconsin Department of Agriculture, Trade, and Consumer Protection/USDA, 1990). The rest was mostly idle cropland. Most of the farmland is in the western half of the county.

The potential of the soils in Jackson County for increased production of food is good. About 14,000 acres of potentially good cropland is used as pasture, and about 32,000 acres is used as woodland (USDA, 1970). Food production could be increased considerably by extending the latest crop production technology to all of the cropland in the county. This soil survey can greatly facilitate the application of such technology.

The paragraphs that follow describe the main concerns in managing the soils in the county for crops and pasture. These management concerns are water erosion, soil blowing, wetness, fertility, and tilth (fig. 12).

Water erosion is the major management concern on about 50 percent of the cropland and pasture in the western part of the county. It generally is a hazard where slopes are more than 4 percent and are more than 100 feet in length.

Loss of the surface layer through erosion is damaging for three major reasons. First, productivity is reduced as the surface layer is lost and part of the

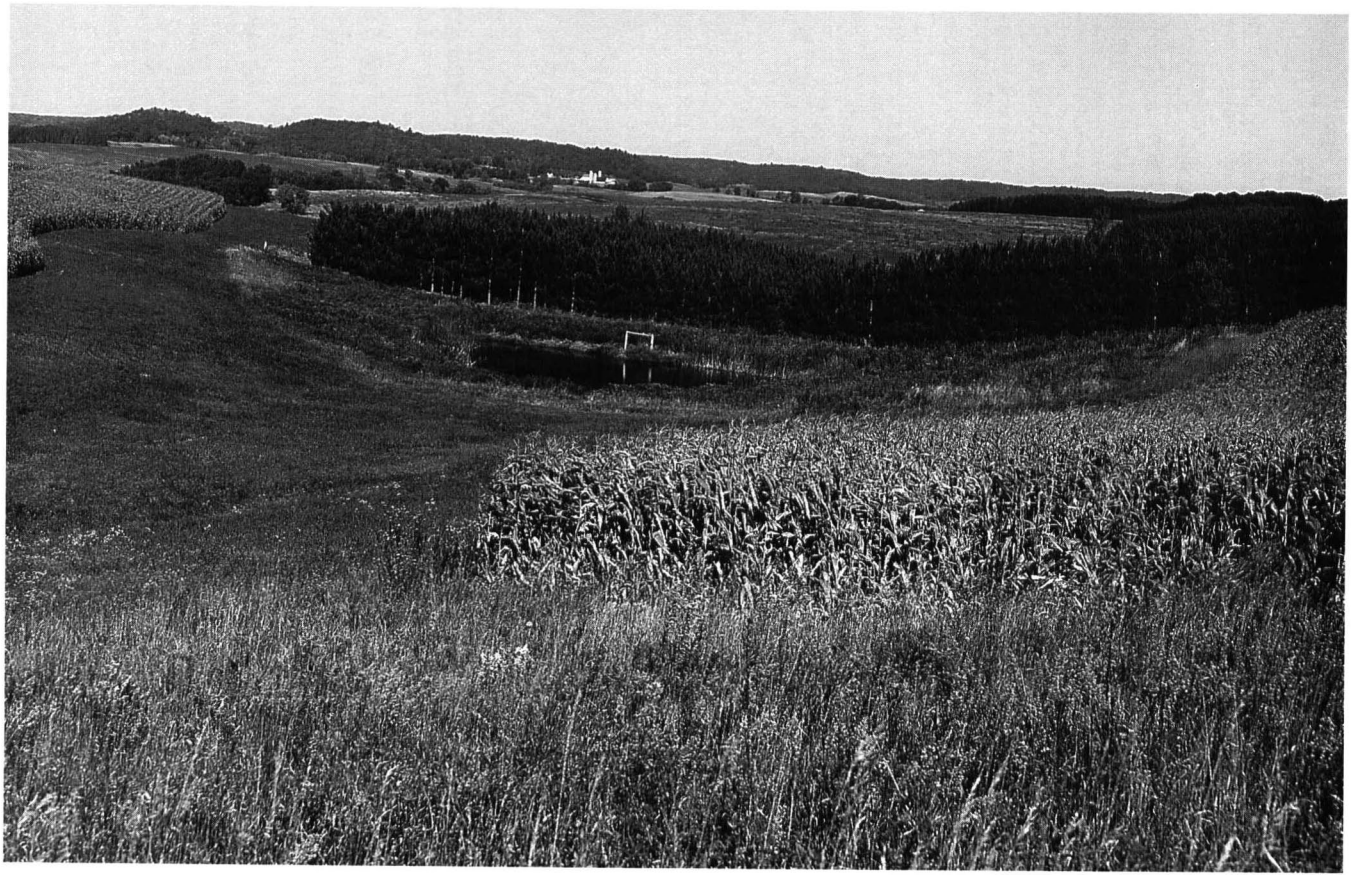

Figure 12.—Conservation management practices in an area of Council and Seaton soils. The pond, contour stripcropping, grassed waterways, and pine plantations help to control runoff and erosion. The pond and the pine plantation also provide wildlife habitat.

subsurface layer or subsoil is incorporated into the plow layer. The surface layer contains more organic matter than other parts of the soil. Second, incorporation of material from the subsurface layer or subsoil can result in poor tilth and crusting, which in turn can result in poor seed germination or poor seedling emergence. Third, erosion can result in the sedimentation of streams. Controlling erosion minimizes this pollution and improves the quality of water for farm and municipal uses, for recreation, and for fish and wildlife.

Erosion-control measures provide a protective ground cover, reduce the runoff rate, and increase the rate of water infiltration. A cropping system that maintains a plant cover on the surface for extended periods can help to hold soil losses to an amount that does not reduce the productive capacity of the soils. On livestock farms, where pasture and hay are needed, including grasses and legumes in the cropping sequence not only provides nitrogen and improves tilth but also reduces the hazard of erosion.

Conservation tillage systems are very effective in controlling runoff and erosion and increasing the rate of water infiltration. Using a chisel plow, a disk, or other conservation tillage equipment can leave 30 to 50 percent of the surface covered with plant residue. This residue helps to prevent the displacement and movement of soil particles. No-till planting is also effective in controlling erosion. Under this system, only a small slot is dug where the seed is planted and a residue cover of 50 to 90 percent is possible. Conservation tillage systems can be used on most of the soils in the county.

In Jackson County, contour farming and contour stripcropping are the main practices used to control erosion in areas where slopes are 4 to 20 percent. Contour stripcropping involves alternating strips of corn, soybeans, or small grain with hay. The strips, planted on the contour, help to control runoff and erosion and increase the rate of water infiltration. Contour farming and contour stripcropping are well suited to most soils and can be used with feed grain-hay rotations, which are common in dairy farming.

Terraces and diversions reduce the length of

slopes and thus help to control erosion. These structures are not common in Jackson County because they are most practical in areas of deep soils that have uniform slopes. Only a few areas in the county, mainly areas of Council and Seaton soils, are suitable for terraces.

Soil blowing is a hazard on sandy soils, such as Boone, Gosil, Rockdam, and Tarr soils; on loamy soils, such as Bilmod, Bilson, and Humbird soils; and in drained areas of organic soils, such as Adder, Dawsil, and Loxley soils. Soil blowing can damage the soils and any young plants in just a few hours if the winds are strong and the soils are dry and are not protected by vegetation or crop residue. Maintaining a cover of plants or crop residue, wind stripcropping, and establishing field windbreaks help to control soil blowing.

Information about the design of erosion-control measures for each soil in the county is provided in the Technical Guide, which is available in the local office of the Natural Resources Conservation Service.

Wetness is the major management concern on about 7 percent of the acreage used for crops or pasture in the county. Some soils are naturally so wet that they generally cannot be used for the crops commonly grown in the county unless they are drained. Examples are the very poorly drained organic soils, such as Dawsil, Houghton, and Loxley soils, and the poorly drained mineral soils, such as Elm Lake, Ettrick, Newlang, and Ponycreek soils. Unless they are drained, Coffton, Fairchild, Ironrun, Merrillan, and other somewhat poorly drained soils are wet enough that crops are damaged during most years.

The design of both surface and subsurface drainage systems varies, depending on soil properties and site conditions. A combination of surface and subsurface drains is needed in most areas of the poorly drained and very poorly drained soils used intensively for row crops. Diversions are needed in some areas to remove runoff from the adjacent fields. In areas of soils that are underlain by stratified silt and very fine sand or fine sand, special covering is needed over the drainage tile to prevent the material from the substratum from filling and clogging the tile.

If organic soils are used as cropland, special management measures are necessary. These soils oxidize and subside when water is removed. Drainage systems that control the depth and period of drainage are needed. Keeping the water table at the level required for crop growth during the growing season and raising it to the surface during other parts of the year minimize the oxidation and subsidence of these soils.

Further information about the design of drainage systems is provided in the Technical Guide, which is available in the local office of the Natural Resources Conservation Service.

Soil fertility varies in the soils of Jackson County, depending on the natural fertility and cropping history. Most of the soils are naturally acid. Applications of lime may be needed to neutralize the acidity of these soils. Available phosphorus and potassium levels are naturally low or medium in most of the soils. On all soils, additions of lime or fertilizer should be based on the results of soil tests, the needs of the crop, and the expected level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of nutrients and lime to be applied.

Soil tilth is an important factor affecting the germination of seeds, the emergence of seedlings, and the infiltration of water into the soils. Soils that have good tilth are granular and porous. Tilling and grazing during wet periods can result in poor tilth in areas of Jackson and Seaton soils and in areas of other soils that have a surface layer of silt loam. If the surface is bare, a surface crust can form during periods of heavy rainfall. This crust reduces the rate of water infiltration and increases the runoff rate and the hazard of erosion. Maintaining tilth is especially difficult on eroded soils because they have a lower content of organic matter than uneroded soils. Returning crop residue to the soil, growing green manure crops, and regularly adding manure improve tilth and minimize crusting.

Field crops suited to most of the soils and the climate of the county include corn, which is the most commonly grown row crop, and oats, the most common close-growing crop. A limited acreage is used for soybeans, barley, or wheat.

The most commonly grown hay and pasture species are mixtures of alfalfa and bromegrass and of red clover and timothy. Bluegrass is the most common native cool-season pasture species.

Specialty crops grown commercially in the county include sweet corn, peas, snap beans, cucumbers, strawberries, and apples. Most of the well drained soils are suited to these crops. Soils in low areas, where frost is frequent and air drainage is poor, are poorly suited to early vegetables, small fruits, and orchards. Cranberries are also grown in the county, typically in areas of the wetter soils, such as Psammaquents. The most current information about growing specialty crops can be obtained from local

offices of the Cooperative Extension Service and the Natural Resources Conservation Service.

Yields per Acre

David Holcomb, agricultural agent, University of Wisconsin Extension, helped prepare this section.

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops (USDA, 1961). Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

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

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c*

because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

More than 70,000 acres in Jackson County is prime farmland or potential prime farmland. Most of this land is in the western part of the county, mainly in areas of associations 2 and 5, which are described under the heading "General Soil Map Units." Most of the prime farmland is used for crops, mainly corn, soybeans, and alfalfa. These crops account for an estimated 50 percent of the total agricultural income of the county each year.

The map units in the survey area that are considered prime farmland are listed in table 6. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Woodland Management and Productivity

Robert J. Hess, Jackson County forester, helped prepare this section.

Before the survey area was settled, it consisted of three major plant communities—oak savanna in the western half of the county and pine savanna and a conifer-hardwood forest in the eastern half of the county (Curtis, 1959). Most of the original plant communities are gone as a result of logging, clearing the land for agriculture, cultivating, and other activities. At present, 378,000 acres, or about 59 percent of the county, is forest land. Of this acreage, 371,400 acres is commercial forest (Hahn, 1985).

Today, the woodland is dominated by three major forest types—oak-hickory, which makes up about 148,000 acres; conifers (mostly jack pine, red pine, white pine, black spruce, and tamarack), about 110,000 acres; and aspen, about 61,000 acres (Hahn, 1985). The rest of the woodland consists of mostly maple-birch, paper birch, and elm-ash-soft maple.

About 57 percent of the commercial forests are privately owned and are mostly farm woodlots. The rest is mainly county owned, but there are some extensive tracts of Federal and State lands. Most of the publicly owned land is in the eastern part of the county.

In the western part of the county, the oak-hickory forest type is the most important commercial forest (fig. 13). It is common in associations 2, 3, and 5, which are described under the heading "General Soil Map Units." The elm-ash-soft maple type is common in association 1. The northern pin oak and conifer types are common in associations 4 and 5. The conifer, aspen, and maple-birch types are common in associations 6, 7, 8, and 10. Conifers, such as black spruce and tamarack, are common in some areas of association 9.

Forest fires are controlled by a well organized

Figure 13.—Red oak in an area of the Seaton-Council association in western Jackson County.

suppression system. The most important management needs are the harvest of mature hardwood timber and the removal of defective trees and trees of less valuable species. Harvests should be followed by stand treatment that encourages proper forest reproduction. Also, many pine plantations on sandy soils are now old enough to need pruning and thinning. Improved forest management would greatly enhance many privately owned stands.

Management of the soils in Jackson County for wood crops should be based on the species in the stand, the suitability of the soils for the species, and the objectives of the landowners. The best alternative generally is even-aged management. In the past this type of management has proven acceptable for regenerating all hardwood species, including northern red oak. Even-aged management can also be used to favor white pine, red pine, and jack pine. Selective harvesting may be needed in stands that are

converting to northern hardwood species and in certain stands of northern red oak. Management should include controlling erosion, planting trees where natural regeneration is unreliable, controlling plant competition, improving seedling survival, minimizing windthrow on the wetter sites, harvesting in a timely manner, controlling the damage caused by insects and diseases, removing cull trees and undesirable species, and maintaining an optimum stocking of forest stands, either through thinning or planting (USDA, National Forestry Manual).

Erosion can occur as a result of site preparation and tree harvest if the soil is exposed along logging roads and skid trails and on landings. Burned areas also are subject to erosion. Erosion is accelerated where the runoff is concentrated on skid trails, log landings, and haul roads. Removing water with water bars, establishing out-sloping road surfaces, crowning the road surfaces, providing ditches and culverts, and establishing skid trails and haul roads on the contour help to control erosion. Erosion also can be controlled by seeding areas where logging activities have exposed the soil surface.

Slope may limit the use of forestry equipment if it is 15 percent or more. Equipment can be used more effectively if skid trails, log landings, and haul roads are designed so that they conform with the topography and so that grades are as low as possible. Also, equipment with flotation tires or with tracks has better traction than standard wheeled equipment. Machine planting on moderately steep slopes is difficult. Reforestation on steep and very steep slopes is generally limited to hand planting or natural regeneration. Special harvesting systems, such as skidding and yarding with cable, are needed on very steep slopes.

Soil wetness is a result of a high water table, flooding, or ponding. It causes seedling mortality, limits the use of equipment, increases the extent of undesirable plants following harvest, and increases the windthrow hazard by restricting the rooting depth of some trees. Wetness is a problem in forested areas of poorly drained and very poorly drained soils. It is also a problem to a lesser degree in forested areas of somewhat poorly drained soils. In most areas of these soils, trees can be harvested only when the ground is frozen or has an adequate snow cover or during dry periods of the growing season when the somewhat poorly drained or poorly drained soils are dried out. Traction can be improved on these wet soils if equipment with flotation tires or with tracks is used and if log landings and haul roads are stabilized with gravel or crushed rock. Installing culverts in intermittent and perennial streams also helps to stabilize haul roads.

In areas of poorly drained and very poorly drained soils, wetness during the planting season limits most reforestation to natural regeneration or hand planting on cradle knolls and in the small, drier included areas. Machine planting on prepared ridges is possible in a few areas. Selecting vigorous nursery stock for planting reduces the seedling mortality rate. Harvesting by clearcut, area-selection, or strip-cut methods helps to prevent windthrow of the remaining trees. Strip-cut harvest also promotes natural regeneration. Maintaining permanent haul roads in areas subject to windthrow allows quick salvage of downed trees after storms. Competing vegetation, which interferes with natural regeneration following harvest, can be controlled by herbicides or by mechanical removal. Skidding can also destroy competing vegetation and expose enough mineral soil for rapid regeneration.

Soil droughtiness can cause seedling mortality. Seedling survival during dry periods can be improved by planting vigorous nursery stock if natural regeneration is unreliable and by early planting and proper care of nursery stock prior to planting. Reinforcement planting may be needed. Containerized seedlings may be desirable on very dry sites. Steep and very steep slopes that face south and west are especially droughty because of high temperatures and the rapid evaporation rate. Applications of lime and fertilizer may improve seedling survival but are generally not considered economically feasible.

Tables 7 and 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. Table 7 lists the ordination symbol for each soil. Soils assigned the same ordination symbol, based on the same indicator tree species, require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce in a pure stand under natural conditions. The number 1 indicates low potential productivity; 2 or 3, moderate; 4 or 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted

rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; *L*, low strength; and *N*, snowpack. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, F, L, and N.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are the dominant texture in the upper 20 inches of the soil, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the upper 20 inches, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock or to other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in 50 years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It generally is the most common species on the soil and is the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Additional information about woodland management and productivity can be obtained from the county forester, the Wisconsin Department of Natural Resources, the local office of the Natural Resources Conservation Service, or the Cooperative Extension Service.

Table 8 gives information about operating forestry equipment in logging areas and on skid trails, log landings, and haul roads and in site preparation and planting, which includes row seeding. Limitations are given for the most limiting season, which generally is spring in Jackson County. The limitations can also

apply, however, during other excessively wet periods, such as after a heavy rainfall. The preferred operating season is the period when the use of forestry equipment causes the least amount of soil damage. This period generally is when the soil is not too wet or when the ground is frozen.

In table 8, the equipment limitations reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland harvesting and regeneration activities. The chief characteristics and conditions considered in the ratings are soil wetness, the hazard of flooding, rock outcrops, texture of the surface layer, slope, the depth to hard bedrock, the traffic-supporting capacity (or soil strength), and the potential for frost action. Soils that have a moderate or high content of silt have low strength in the extended spring thaw period and during extended periods of high rainfall. Ruts can form easily during these wet periods.

The ratings of *slight, moderate,* and *severe* in the table are based on the use of conventional equipment and procedures. Special procedures or types of equipment can sometimes be utilized to reduce or overcome the site limitations. If wetness is a limitation, for example, using equipment with flotation tires or with tracks helps to prevent the formation of ruts. Restrictions on the use of equipment indicate that accurate timing of operations is needed to avoid seasonal limitations. The cost of operations typically increases as the limitations become more severe. The ratings for log landings and haul roads can be used as a guide for establishing them in the least costly locations.

Logging areas and skid trails include areas where some or all of the trees are being cut. Generally, equipment traffic is least intensive in the logging areas. Skid trails, which generally are within the logging area, are roads or trails over which the logs are dragged or hauled from the stump to a log landing. A rating of slight indicates that the use of conventional equipment is not normally restricted by the physical site conditions. A rating of moderate indicates that the use of equipment or season of use is restricted because of one or more soil factors. A rating of severe indicates that special equipment or techniques are needed to overcome the limitations or that the time of efficient operation is very limited.

Log landings are areas where logs are assembled for transportation. Wheeled equipment may be used more frequently in these areas than in any other areas affected by logging. Considerable soil compaction can be expected in these areas. Good areas for landings require little or no surface preparation or cutting or filling. A rating of slight indicates that the soil is a good site for landings and the area can readily be returned to forest use. A rating of moderate indicates that the season of use is somewhat limited or that such practices as grading, cutting, filling, or drainage are usually required to make the site suitable for a landing and returning the site to forest use is difficult. A rating of severe indicates that the season of use is very limited or that special or expensive techniques are needed to overcome the limitations. There may also be significant risk of environmental damage that makes it very difficult or impossible to return the area to forest use.

Haul roads are access roads leading from log landings to primary or surfaced roads. The haul roads serve as transportation routes for wheeled logging equipment. Generally, they are unpaved roads and are not graveled. The wetter soils and the silty upland soils, which are slippery and can easily become rutted during wet periods, commonly provide poor locations for haul roads. A rating of slight indicates that no serious limitations affect the location, construction, and maintenance of haul roads or the season of use. A rating of moderate indicates some limitations, but the limitations generally can be overcome with routine construction techniques. A rating of severe indicates that establishing and maintaining haul roads on the soil are difficult or expensive or that the season of use may be severely restricted.

Site preparation and planting are the mechanized operations for establishing planted trees in an area. The ratings are based on limitations that affect the efficient use of equipment and the risk of damage to the site caused by the equipment. Operating techniques should not displace or remove topsoil from the site or create channels that can concentrate storm runoff. A rating of slight indicates that no serious limitations affect site preparation and planting. A rating of moderate indicates that the site conditions prevent the efficient use of the equipment or that the site may be damaged by the equipment. A rating of severe indicates that special equipment or techniques, such as hand planting of trees, are needed to overcome the limitations.

Additional information about woodland management and productivity can be obtained from the Wisconsin Department of Natural Resources, the local office of the Natural Resources Conservation Service, or the Cooperative Extension Service.

Forest Habitat Types

John Kotar, senior research scientist, Department of Forestry, University of Wisconsin-Madison, helped prepare this section.

The forest habitat type system used in Jackson County is derived from a field guide developed for northern Wisconsin (Kotar and others, 1988). Publication is planned for a similar guide for southern Wisconsin, which includes Jackson County. The system of habitat classification is based on the concept that plants, including trees, normally occur in predictable patterns or communities and that these communities reflect differences in site characteristics, primarily the moisture content and fertility of the soils. A forest habitat type is an association of dominant tree and ground flora species in a climax plant community. It encompasses all soils capable of producing similar plant communities at climax, which is the stage in ecological development when the vegetative community becomes stable and perpetuates itself.

A habitat type can be identified during most stages of successional growth by examining the reproductive success of various tree species and by inspecting the ground flora, which becomes relatively stable soon after the establishment of a forest canopy. In a young forest, the patterns or associations of understory plants can be used to predict the dominant tree species in the climax forest.

The successional stages and trends also are predictable for the various habitat types. This predictability allows forest managers to make accurate prescriptions for manipulating vegetation based on the ecological potential of the soil rather than on the current forest cover type, which can vary depending largely on how the forest has been managed or disturbed. Additional management implications for each habitat type are in the "Field Guide to Forest Habitat Types of Northern Wisconsin" (Kotar and others, 1988).

Habitat types have been determined for most of the upland map units in Jackson County. Habitat types were not determined for most of the poorly drained or very poorly drained soils. In the western part of the county, the natural vegetation on these soils commonly is grasses, sedges, and brush. In the eastern part the vegetation on the poorly drained or very poorly drained soils is commonly grasses, sedges, or mosses and some small stands of poorly shaped trees.

Habitat types are specified in table 9 and at the end of each map unit description in the section "Detailed Soil Map Units." Although the detailed soil map units do not coincide exactly with habitat types, there is a strong correlation between them. Some map units encompass two ecologically different habitat types. Where two habitat types are associated with a map unit, they are identified as primary and secondary. The primary habitat type is the one that is most common on the map unit. Some small included areas may have a different habitat type from that assigned to the map unit.

Within a given climatic region in Wisconsin, differences in habitat types can be attributed primarily to differences in the moisture-holding capacity and the fertility of the soils. Table 9 lists the forest habitat type for most of the soils in the survey area and the typical nutrient and moisture regime for each habitat type. Nutrient regimes describe the nutrient-supplying capacity of the soil, and moisture regimes describe the combination of the moisture-supplying capacity of the soil and the evaporative demand of the local climate.

The following paragraphs briefly describe the habitat types in Jackson County. The names are derived from the potential climax vegetation on a site. They represent a combination of tree species, which are listed first, and ground flora species. The order is from least productive to most productive.

PVGy—Pinus strobus/Vaccinium angustifolium-Gaylussacia baccata habitat type. The common name is White pine/Low sweet blueberry-Huckleberry. This habitat type represents the droughtiest and least fertile sandy soils in the county. Most stands are dominated by northern pin oak with white oak and red pine or jack pine as common associates. However, any of these species may occur in pure stands or in mixtures. In the absence of fire, white pine appears to be capable of dominating this habitat type.

Ground vegetation on this habitat type is generally sparse. The most abundant species are typically brackenfern, huckleberry, and blueberry. Generally, the PVGy habitat type has higher value for wildlife habitat than for commercial forestry. Only pines, particularly jack pine, have any potential for commercial forestry. Pine tree plantations also have commercial value as Christmas trees.

PVRh—Pinus strobus/Vaccinium angustifolium-Rubus hispidus habitat type. The common name is White pine/Low sweet blueberry-Dewberry. This habitat type represents sandy soils that have a seasonal high water table at a depth of about 1 to 3 feet. White pine appears to be most suited to this type. This species was abundant prior to the logging era. Red maple regenerates most successfully in secondary forests where a white pine seed source is

absent. Pin oak, white oak, and jack pine, individually or in mixtures, are common, but growth is poor.

The dominant understory vegetation is similar to that on the PVGy habitat type, but coverage is higher. The presence of any of the following diagnostic species also helps to distinguish between these two habitat types—swamp dewberry, bunchberry, wintergreen, goldthread, partridgeberry, or cinnamon fern.

Any combination of the naturally occurring tree species in this habitat type provides suitable wildlife habitat for some species. Only white pine, aspen, and red maple have potential for commercial forestry.

PVHa—Pinus strobus/Vaccinium angustifolium-Hamamelis virginiana habitat type. The common name is White pine/Low sweet blueberry-Witch hazel. This habitat type represents soils that formed mostly in sandy deposits and loamy and clayey residuum from the underlying interbedded sandstone and shale and soils that formed mostly in loamy sand that have a seasonal high water table at a depth of about 4 to 6 feet. This habitat type is generally the most productive of those that include sandy soils.

White pine is the presumed climax species on this habitat type, but red oak, white oak, red maple, and aspen also grow well and often occur in mixtures. Many management options for commercial forestry and wildlife habitat exist for this habitat type. The understory species composition is similar to that on the PVRh habitat type, with the following exceptions: mapleleaf viburnum and witch hazel are characteristic of the PVHa type but are not common on the PVRh type, and cinnamon fern, goldthread, bunchberry, and swamp dewberry are absent or scarce on the PVHa habitat type.

PVCr—Pinus strobus/Vaccinium angustifolium-Cornus racemosa habitat type. The common name is White pine/Low sweet blueberry-Gray dogwood. This habitat type is similar to the PVGy habitat type but has some important distinguishing characteristics, such as the presence of gray dogwood, chokecherry, Virginia creeper, or riverbank grape. Huckleberry is typically much less abundant and false Solomons seal more abundant than on the PVGy habitat type.

Pin oak and jack pine are the most common trees, but white oak and black oak commonly dominate second-growth stands. Red oak generally does not occur. White pine reproduces well where a seed source is present and appears to be the climax species on this habitat type. Mixed stands of oaks or of oaks and pines are good choices for wildlife habitat. Jack pine, red pine, and white pine are suited for commercial forestry on this habitat type.

ArDe-V—Acer rubrum/Desmodium glutinosum (Vaccinium angustifolium variant) habitat type. The common name is Red maple/Pointed leaved tick trefoil (Low sweet blueberry variant). This habitat type represents a transition from the predominantly sandy soils to loamy soils that have higher natural fertility and a more favorable moisture regime. A number of understory species characteristic of dry sites occur on this habitat type with relatively low frequency. These include blueberry, brackenfern, wild rose, and whorled loosestrife. The presence of several species that reach their best development on moister, more nutrient-rich sites, such as tick trefoil, hog peanut, wild geranium, and sweet cicely, clearly distinguishes this habitat type from the drier habitat types.

White oak and red maple are the most common dominant species in the present stand. Red oak and black oak are common associates. In the absence of disturbance, red maple would probably become the dominant species because of its shade tolerance. White pine, red pine, and jack pine grow well on this habitat type if red maple competition is controlled.

ArCi—Acer rubrum/Circaea quadrisculata habitat type. The common name is Red maple/Enchanter's nightshade. This habitat type represents the optimal soil conditions for forest productivity in Jackson County. It is the only habitat type where high-quality red oak management is feasible. Most second-growth stands are mixtures of red oak, white oak, and red maple. The presence of such species as basswood, white ash, and sugar maple further distinguishes this habitat type from the drier habitat types. White pine is also suited to this habitat type, but most of the white pine seed source was eliminated by early logging and fires. It is not clear whether sugar maple is capable of domination on this habitat type because its seed source is also scarce. Currently, red maple clearly shows the greatest potential as a climax species.

Regardless of the composition of current stands of trees, the ArCi habitat type can be identified by strong representation of any of the following understory species—enchanter's nightshade, lopseed, sweet cicely, black snakeroot, maidenhair fern, Jack in the pulpit, and elderberry.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 10 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 10 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service, the Wisconsin Department of Natural Resources, or the Cooperative Extension Service or from a commercial nursery.

Recreation

The soils of the survey area are rated in table 11 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 11, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in table 11 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 14 and interpretations for dwellings without basements and for local roads and streets in table 13.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Robert D. Weihrouch, biologist, Natural Resources Conservation Service, helped prepare this section.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

The paragraphs that follow provide information about wildlife habitat in the ten soil associations in the survey area. The associations themselves are described under the heading "General Soil Map Units."

Association 1.—Most areas of the Absco-Northbend-Kalmarville association are wooded or support native wetland vegetation. Tree species include river birch, silver maple, red maple, swamp white oak, northern pin oak, cottonwood, ash, white pine, and elm.

This association provides important habitat for many bird species, including the tree-nesting wood duck, the threatened red-shouldered hawk, bald eagles, and osprey. The massasauga rattlesnake is an endangered species that inhabits the area. The Black River, creeks, oxbows, and sloughs provide excellent habitat for migrating waterfowl, shorebirds, mink, otter, muskrat, and beaver. The woodland habitat is excellent for fox squirrel, gray squirrel, raccoon, turkeys, ruffed grouse, woodcock, and white-tailed deer.

Associations 2 and 5.—Most areas of the Seaton-Council and Bilson-Elevasil-Merit associations are used as cropland. Areas that are too steep for cultivation are used mostly as pasture or woodland. Northern red oak, hickory, basswood, and white oak are the major tree species. Scattered ash, paper birch, and aspen also occur. A few small, sandy, steep areas support stands of northern pin oak, white pine, or red pine. Wet, brushy or marshy drainageways support willow and alder. Because of the interspersion of woodland and cropland, these associations provide excellent habitat for many species of wildlife, including white-tailed deer, ruffed grouse, wild turkey, fox squirrel, gray squirrel, raccoon, badger, skunk, coyote, gray fox, red fox, and cottontail rabbit. Some pheasants and bobwhite quail are also in areas of these associations. In some areas excessive grazing of woodland limits the abundance of wildlife species that rely on small trees and shrubs. Wild turkeys, which were reintroduced in the area in the 1980's, are thriving.

Association 3.—Most of the more sloping areas of the Urne-Council-La Farge association are used as woodland. The less sloping areas are used mainly as cropland or pasture. Some areas are planted to pine trees. Major tree species include northern red oak, white oak, basswood, white ash, and hickory. Clearings contain aspen, paper birch, and sumac. Because of the interspersion of woodland and cropland, this association provides excellent habitat for many species of wildlife, including white-tailed deer, ruffed grouse, turkeys, cottontail rabbits, raccoon, skunks, red fox, gray fox, red squirrel, and gray squirrel.

Association 4.—Most of the acreage in the Tarr-Boone-Rockdam association is wooded. Some areas in the western part of the county are used as cropland or Christmas tree plantations. The major tree species are jack pine, red pine, white pine, and northern pin oak. Because there is not a large variety of vegetation, the abundance of wildlife species is not as great as in some of the other associations. White-tailed deer, ruffed grouse, turkey, gray fox, skunk, gray squirrel, fox squirrel, and coyote are common species. Some black bear also inhabit the area. The rare Kirtland's warbler, which is an endangered species, is found in the eastern part of the county. Bobwhite quail, red fox, badger, and pocket gophers inhabit the western part of the county.

Associations 6 and 7.—The sandy, mucky, and peaty soils in the Elm Lake-Fairchild and Ironrun-Ponycreek-Dawsil associations occur mostly in the Black River State Forest and the Jackson County Forest. The upland vegetation consists of jack pine, aspen, northern pin oak, and some birch and red maple. The Dike 17 wildlife area has several large developed flowages that attract migrating ducks, geese, sandhill cranes, and great blue heron. These associations are not major waterfowl-production areas, however, because the dark, acidic water is not conducive to waterfowl food production. A small, managed population of sharptail grouse is also thriving here, and beaver are abundant in these areas. White-tailed deer, ruffed grouse, woodcock, snowshoe hare, coyote, and gray fox are common upland species. Some black bear are also in these areas. Wild turkeys, which were reintroduced in the latter part of the 1980's, are thriving. Some rare species, such as the threatened bald eagle and osprey, and the endangered massasauga rattlesnake and Kirtland's warbler are in these associations.

Associations 8 and 10.—Most areas of the

Merrillan-Veedum-Humbird and Kert-Veedum associations are wooded, are used as cropland or pasture, or support native wetland vegetation. The major tree species in these associations are northern red oak, northern pin oak, swamp white oak, red maple, quaking aspen, and jack pine. These associations provide good habitat for many species of wildlife, including white-tailed deer, black bear, ruffed grouse, gray fox, skunk, gray squirrel, fox squirrel, coyote, and snowshoe hare. Generally, the more mature oaks on these soils provide more mast production than the trees in adjoining areas.

Association 9.—The acid organic bogs of the Loxley-Dawsil association are in the far eastern part of the county. The vegetation consists mostly of leatherleaf, sphagnum moss, black spruce, and tamarack. Some commercial cranberry beds are in this association. The ditches and reservoirs needed for cranberry beds provide some wetland habitat for ducks, geese, sandhill cranes, osprey, eagles, and other migratory birds. White-tailed deer and black bear are in areas of this association.

In table 12, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, foxtail, and ragweed.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, maple, cherry, apple, aspen, dogwood, birch, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, gray dogwood, highbush cranberry, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, and slope. Examples of wetland plants are smartweed, wild millet, wildrice, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, slope, and permeability. Examples of

shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, song sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, otter, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section (USDA, National Engineering Handbook). During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations (USDA, National Soil Survey Handbook).

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 13 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site

features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 14 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 14 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local

ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 14 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 14 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, and soil reaction affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 15 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by

large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 15, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 16 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment (fig. 14). Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured

Figure 14.—A pond reservoir area. The dam in the foreground is constructed of material from the surrounding soils.

bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders or organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement, permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, susceptibility to flooding, subsidence of organic layers, and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity in the root zone. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to

supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the depth of the root zone and by soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 20.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

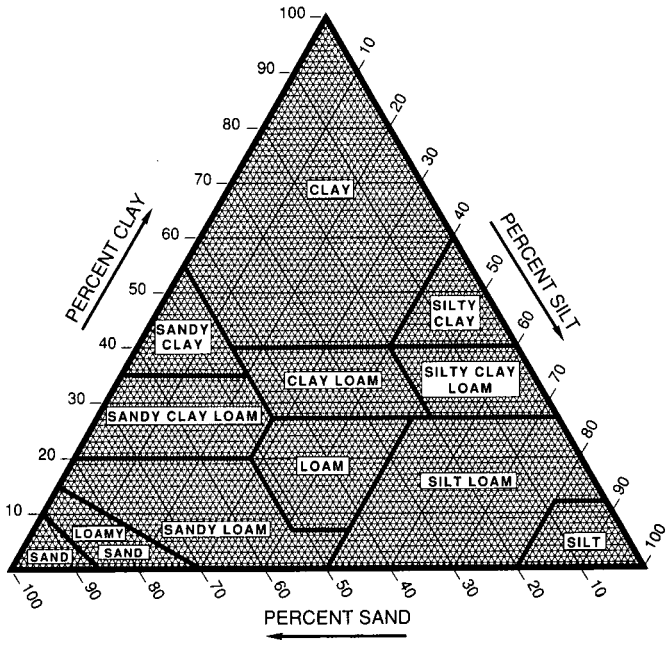

Figure 15.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Engineering Index Properties

Table 17 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 15). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils

exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 20.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are commonly rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 18 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of

irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, more than 6 percent; and *very high*, greater than 9 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. The soils assigned to group 1 are the most susceptible to soil blowing, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.
8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 18, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 19 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist

mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 19, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Table 19 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in table 19 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 19.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of

several years. Table 19 shows the expected total subsidence, which usually is a result of drainage and oxidation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 20 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are representative of the series described in the section "Soil Series and Their Morphology." The soil samples were tested by the Wisconsin Department of Transportation, Division of Highways and Transportation Facilities.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 422 (ASTM), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 4318 (ASTM); and Plasticity index—T 90 (AASHTO), D 4318 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1975). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 21 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Psamment (*Psamm*, meaning sand, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Quartzipsamments (*Quartzi*, meaning a high content of quartz, plus *psamment*, the suborder of the Entisols that are sandy).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Quartzipsamments.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is mesic, coated Typic Quartzipsamments.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (USDA, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA, 1975). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Absco Series

The Absco series consists of very deep, moderately well drained, rapidly permeable soils on flood plains along rivers and large streams. These soils formed in siliceous, dominantly sandy alluvium. Slopes range from 0 to 3 percent.

Typical pedon of Absco loamy sand, 0 to 3 percent slopes, approximately 300 feet north and 1,280 feet east of the southwest corner of sec. 33, T. 20 N., R. 5 W.

A—0 to 4 inches; dark brown (10YR 3/3) loamy sand, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; many very fine and fine roots; very strongly acid; abrupt wavy boundary.
Bw—4 to 14 inches; brown (10YR 4/3) sand; weak coarse subangular blocky structure; very friable; common very fine and fine roots; strongly acid; clear wavy boundary.
C1—14 to 35 inches; pale brown (10YR 6/3) sand; single grain; loose; few very fine and fine roots; thin strata of very dark grayish brown (10YR 3/2) fine sandy loam with a combined thickness of about 4 inches; strongly acid; gradual wavy boundary.
C2—35 to 42 inches; pale brown (10YR 6/3) loamy sand; single grain; loose; few very fine and fine roots; few medium prominent strong brown (7.5YR 5/8) masses of iron accumulation; thin strata of very dark grayish brown (10YR 3/2) silt loam and fine sandy loam with a combined thickness of about 2 inches; strongly acid; gradual wavy boundary.
C3—42 to 60 inches; very pale brown (10YR 7/3) sand; single grain; loose; common medium prominent strong brown (7.5YR 5/8) masses of iron accumulation; strongly acid.

The volume of gravel ranges from 0 to 10 percent throughout the pedon. The A horizon has value of 3 or 4 and chroma of 1 to 3. The Bw horizon has value of 4 or 5 and chroma of 3 to 6. It is sand or loamy sand. Some pedons do not have a Bw horizon. The C horizon has value of 4 to 7 and chroma of 2 to 6.

Adder Series

The Adder series consists of very deep, very poorly drained soils on backswamps of flood plains. These soils formed in organic material overlying siliceous sandy alluvium. Permeability is moderately slow to moderately rapid in the organic layers and rapid or very rapid in the sandy alluvium. Slopes are 0 to 1 percent.

Typical pedon of Adder muck, 0 to 1 percent slopes, approximately 900 feet south and 150 feet west of the northeast corner of sec. 11, T. 24 N., R. 6 W.

Oa—0 to 22 inches; muck (sapric material), black (N 2/0) broken face and rubbed; about 30 percent fiber, 5 percent rubbed; moderate medium subangular blocky structure; slightly sticky; many fine roots; primarily herbaceous fibers; strongly acid; abrupt smooth boundary.
C—22 to 60 inches; light brownish gray (10YR 6/2) sand; single grain; loose; slightly acid.

The thickness of the organic material ranges from 16 to 51 inches and coincides with the depth to sand. The Oa horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. It is dominantly muck, but some pedons have thin layers of mucky peat. The C horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 1 to 3. It is sand, coarse sand, or fine sand.

Arbutus Series

The Arbutus series consists of excessively drained soils on strath terraces. These soils are moderately deep to igneous or metamorphic bedrock. They formed in siliceous sandy alluvium overlying igneous or metamorphic bedrock. Permeability is rapid in the sandy subsoil and substratum and ranges from rapid to very slow in the underlying igneous bedrock. Slopes range from 2 to 6 percent.

Typical pedon of Arbutus loamy sand, in an area of Ironrun-Ponycreek-Arbutus complex, 0 to 6 percent slopes, approximately 500 feet east and 600 feet south of the northwest corner of sec. 3, T. 22 N., R. 2 W.

Oe—0 to 1 inch; very dark grayish brown (10YR 3/2) mucky peat (hemic material, which is a mat of partially decomposed leaf and grass litter); weak very thin platy structure; nonsticky; few light gray (10YR 7/2) uncoated sand grains; very strongly acid; abrupt irregular boundary.
A—1 to 3 inches; very dark grayish brown (10YR 3/2) loamy sand, grayish brown (10YR 5/2) dry; weak medium granular structure; very friable; many very fine and fine roots; many uncoated light gray (10YR 7/2) sand grains; very strongly acid; abrupt smooth boundary.
E—3 to 6 inches; grayish brown (10YR 5/2) loamy sand, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; very friable; many very fine and fine roots; very strongly acid; clear wavy boundary.
Bs—6 to 17 inches; dark brown (7.5YR 4/4) sand; weak fine subangular blocky structure; very friable; many very fine and fine roots; very strongly acid; clear wavy boundary.
Bw1—17 to 23 inches; brown (7.5YR 5/4) sand;

single grain; loose; few very fine and fine roots; moderately acid; abrupt smooth boundary.
Bw2—23 to 32 inches; yellowish brown (10YR 5/6) sand; single grain; loose; few very fine roots; moderately acid; abrupt smooth boundary.
R—32 inches; igneous bedrock.

Unless otherwise stated, depth and thickness in this paragraph are measured from the top of the mineral soil. The depth to bedrock ranges from 20 to 40 inches. The volume of gravel ranges from 0 to 10 percent throughout the profile. The volume of cobbles ranges from 0 to 3 percent.

The O horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 or 3. It is loamy sand or sand. The Bs horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 4. It is sand or loamy sand. The Bw or BC horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is sand or loamy sand. The R layer is igneous or metamorphic bedrock.

Arenzville Series

The Arenzville series consists of very deep, moderately well drained, moderately permeable soils in intermittent upland drainageways and on flood plains along small perennial streams. These soils formed in silty alluvium overlying a buried soil with a dark colored A horizon. Slopes range from 0 to 3 percent.

Typical pedon of Arenzville silt loam, 0 to 3 percent slopes, approximately 500 feet north and 800 feet west of the southeast corner of sec. 14, T. 19 N., R. 6 W.

Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak coarse subangular blocky structure; friable; many fine and very fine roots; neutral; abrupt smooth boundary.
C—9 to 32 inches; stratified dark brown (10YR 4/3 and 3/3) and brown (10YR 5/3) silt loam; massive but breaks to medium and thick plates along depositional strata; friable; common very fine and fine roots; neutral; clear smooth boundary.
Ab—32 to 42 inches; very dark brown (10YR 2/2) silt loam; weak thick and medium platy structure; friable; few very fine and fine roots; slightly acid; abrupt smooth boundary.
Cg—42 to 60 inches; light brownish gray (10YR 6/2) silt loam with a few thin lenses of fine sand; massive but breaks to very thick plates along depositional strata; friable; many medium prominent yellowish red (5YR 4/6) masses of iron accumulation; moderately acid.

The depth to the Ab horizon ranges from 20 to 60 inches. The Ap or A horizon has value of 3 or 4 and chroma of 2 or 3. The C horizon has value of 3 to 5 and chroma of 2 to 4. The Ab horizon has value of 2 or 3 and chroma of 1 or 2. The Cg or C′ horizon has value of 3 to 6 and chroma of 2 to 4. In some pedons the Cg or C′ horizon does not have thin lenses of fine sand.

Bertrand Series

The Bertrand series consists of very deep, well drained soils on stream terraces and pediments. These soils formed dominantly in silty alluvium overlying sandy alluvium. Permeability is moderate in the silty alluvium and rapid in the sandy alluvium. Slopes range from 1 to 6 percent.

Typical pedon of Bertrand silt loam, 1 to 6 percent slopes, approximately 2,300 feet north and 2,300 feet east of the southwest corner of sec. 4, T. 20 N., R. 5 W.

Ap—0 to 9 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak fine subangular blocky structure; friable; few very fine and fine roots; slightly acid; abrupt smooth boundary.
Bt1—9 to 14 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine subangular blocky structure; friable; few very fine and fine roots; few distinct dark brown (7.5YR 4/4) clay films on faces of peds; slightly acid; clear wavy boundary.
Bt2—14 to 24 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; friable; few very fine and fine roots; few distinct dark brown (7.5YR 4/4) clay films on faces of peds; moderately acid; clear wavy boundary.
Bt3—24 to 43 inches; dark brown (7.5YR 4/4) and brown (7.5YR 5/4) silt loam; moderate medium subangular blocky structure; friable; few very fine roots; common faint dark brown (7.5YR 3/4) clay films on faces of peds; strongly acid; clear wavy boundary.
2Bt4—43 to 48 inches; dark brown (7.5YR 4/4) fine sandy loam; weak coarse subangular blocky structure; friable; few very fine roots; few faint dark brown (7.5YR 3/4) clay films on faces of peds; strongly acid; gradual wavy boundary.

3C—48 to 60 inches; yellow (10YR 7/6) sand; single grain; loose; thin strata of strong brown (7.5YR 5/6) loamy fine sand; moderately acid.

The thickness of the silty mantle and the depth to the sandy substratum range from 40 to 60 inches. The Ap horizon has value of 3 or 4 and chroma of 2 or 3. The Bt and 2Bt horizons have value of 4 or 5 and chroma of 3 or 4. The Bt horizon is silt loam or silty clay loam. The 2Bt horizon is fine sandy loam, sandy loam, or loam. The 3C horizon has hue of 7.5YR or 10YR, value of 4 to 8, and chroma of 2 to 8. It is sand, fine sand, or loamy sand.

Bilmod Series

The Bilmod series consists of very deep, moderately well drained soils on stream terraces and pediments. These soils formed mostly in siliceous loamy alluvium underlain by siliceous sandy alluvium. Permeability is moderate or moderately rapid in the loamy alluvium and rapid in the sandy alluvium. Slopes range from 0 to 3 percent.

Typical pedon of Bilmod sandy loam, 0 to 3 percent slopes, approximately 1,020 feet south and 240 feet east of the northwest corner of sec. 27, T. 24 N., R. 6 W.

Ap—0 to 9 inches; dark brown (7.5YR 3/2) sandy loam, brown (7.5YR 5/2) dry; weak coarse subangular blocky structure; friable; many very fine and fine and few medium roots; neutral; abrupt wavy boundary.

Bt1—9 to 15 inches; dark brown (7.5YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; many very fine and fine and few medium roots; common faint dark brown (7.5YR 3/4) clay films on faces of peds; slightly acid; clear wavy boundary.

Bt2—15 to 24 inches; dark brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; common faint dark brown (7.5YR 3/4) clay films on faces of peds; slightly acid; clear irregular boundary.

BC—24 to 32 inches; strong brown (7.5YR 5/6) loamy sand; weak coarse subangular blocky structure; very friable; few very fine roots; moderately acid; gradual wavy boundary.

2C—32 to 60 inches; reddish yellow (7.5YR 7/6) sand; single grain; loose; common faint strong brown (7.5YR 5/6) and common distinct strong brown (7.5YR 5/8) masses of iron accumulation; moderately acid.

The thickness of the loamy mantle and the depth to siliceous sandy alluvium range from 20 to 40 inches. The Ap or A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. The Bt horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 4. It is sandy loam, fine sandy loam, or loam. The 2BC or 2Bt horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It is loamy sand or sand. The 2C horizon has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 3 to 8. It has thin strata of loamy sand or sandy loam in some pedons. The volume of sandstone channers ranges from 0 to 15 percent in the 2C horizon.

Bilson Series

The Bilson series consists of very deep, well drained soils on stream terraces and pediments. These soils formed in siliceous loamy alluvium overlying siliceous sandy alluvium. Permeability is moderate or moderately rapid in the loamy alluvium and rapid in the sandy alluvium. Slopes range from 0 to 20 percent.

Typical pedon of Bilson sandy loam, 0 to 6 percent slopes, approximately 1,200 feet north and 120 feet west of the southeast corner of sec. 17, T. 22 N., R. 4 W.

Ap—0 to 8 inches; very dark brown (10YR 2/2) sandy loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many very fine and fine and few medium roots; slightly acid; abrupt smooth boundary.

Bt1—8 to 12 inches; dark yellowish brown (10YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; few very fine roots; few distinct dark brown (7.5YR 4/4) and prominent dark reddish brown (5YR 3/2) clay films on faces of peds; slightly acid; clear wavy boundary.

Bt2—12 to 18 inches; dark brown (7.5YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; few very fine roots; common faint dark brown (7.5YR 3/4) and few distinct reddish brown (5YR 4/4) clay films on faces of peds; slightly acid; clear wavy boundary.

Bt3—18 to 32 inches; dark brown (7.5YR 4/4) and strong brown (7.5YR 5/6) sandy loam; weak coarse subangular blocky structure; friable; few very fine roots; common faint dark brown (7.5YR 3/4) and few distinct reddish brown (5YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

2C—32 to 60 inches; brownish yellow (10YR 6/6)

sand; single grain; loose; few thin (1/8 inch thick) strata of dark brown (7.5YR 4/4) loamy sand; strongly acid.

The thickness of the loamy mantle and the depth to siliceous sandy alluvium range from 20 to 40 inches. The Ap or A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. The Bt horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 4. It is sandy loam, fine sandy loam, or loam. Some pedons have a 2Bt or 2BC horizon. This horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It is loamy sand or sand. The 2C horizon has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 3 to 8. It contains thin strata of sandy loam in some pedons. The volume of sandstone channers in the 2C horizon ranges from 0 to 15 percent.

Boone Series

The Boone series consists of excessively drained soils that are moderately deep to sandstone bedrock on bedrock-controlled uplands. These soils formed in siliceous sandy residuum derived from the underlying sandstone. Permeability is rapid in the sandy residuum and moderately slow or moderate in the underlying sandstone. Slopes range from 2 to 50 percent.

Typical pedon of Boone sand, in an area of Boone-Elevasil complex, 15 to 50 percent slopes, approximately 1,640 feet north and 2,040 feet west of the southeast corner of sec. 24, T. 19 N., R. 6 W.

Oe—0 to 1 inch; dark grayish brown (10YR 4/2) mucky peat (hemic material, which is a mat of partially decomposed forest litter); weak thin platy structure; nonsticky; very strongly acid; abrupt smooth boundary.

A—1 to 3 inches; very dark grayish brown (10YR 3/2) sand, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; many very fine and fine roots; pale brown (10YR 6/3), uncoated sand grains throughout; strongly acid; abrupt wavy boundary.

E—3 to 8 inches; brown (10YR 4/3) sand, pale brown (10YR 6/3) dry; weak medium subangular blocky structure; very friable; common very fine and fine roots; about 14 percent sandstone channers; strongly acid; abrupt wavy boundary.

Bw—8 to 21 inches; dark yellowish brown (10YR 4/4) sand; weak coarse subangular blocky structure; very friable; few fine roots; about 13 percent sandstone channers; strongly acid; clear wavy boundary.

C—21 to 35 inches; brownish yellow (10YR 6/6) sand; single grain; loose; few fine roots; about 10 percent sandstone channers; strongly acid; gradual smooth boundary.

Cr—35 to 61 inches; white (10YR 8/2) sandstone.

Unless otherwise stated, thickness and depth in this paragraph are measured from the top of the mineral soil. The thickness of the solum and the depth to sandstone range from 20 to 40 inches. The volume of sandstone channers averages less than 15 percent in the sandy mantle but ranges to 35 percent in individual subhorizons.

The O horizon has hue of 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 1 or 2. The A horizon has value of 2 or 3 and chroma of 1 to 3. The E horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 or 3. It is sand, fine sand, loamy sand, or loamy fine sand. Some pedons do not have an E horizon. The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 4 to 6. It is typically sand or fine sand, but in some pedons it is loamy sand or loamy fine sand in the upper part. The C horizon has hue of 7.5YR or 10YR, value of 4 to 8, and chroma of 1 to 6. It is sand or fine sand or the channery analogs of these textures.

Citypoint Series

The Citypoint series consists of very poorly drained soils on pediments. These soils are moderately deep or deep to interbedded sandstone and shale bedrock. They formed in organic material overlying interbedded sandstone and shale. Permeability is moderately slow to moderately rapid in the organic layers, slow to rapid in the residuum, and extremely slow to moderately slow in the underlying interbedded sandstone and shale. Slopes are 0 to 1 percent.

Typical pedon of Citypoint mucky peat, 0 to 1 percent slopes, approximately 300 feet north and 300 feet east of the center of sec. 9, T. 22 N., R. 1 E.

Oe—0 to 12 inches; mucky peat, dark reddish brown (5YR 3/2) broken face and rubbed; about 60 percent fiber, 20 percent rubbed; nonsticky; many very fine to medium roots; primarily herbaceous fibers; extremely acid (pH 4.4 by the Truog method); clear wavy boundary.

Oa1—12 to 22 inches; muck, dark reddish brown (5YR 2.5/2) broken face and rubbed; about 35 percent fiber, 10 percent rubbed; slightly sticky; few very fine and fine roots; primarily herbaceous fibers; extremely acid (pH 4.4 by the Truog method); abrupt wavy boundary.

Oa2—22 to 26 inches; muck, black (N 2/0) broken face and rubbed; less than 10 percent fiber, less than 5 percent rubbed; slightly sticky; primarily herbaceous fibers; extremely acid (pH 4.4 by the Truog method); gradual wavy boundary.

Cg—26 to 34 inches; light brownish gray (10YR 6/2) fine sand; single grain; loose; slightly acid.

Cr—34 to 60 inches; greenish gray (5G 5/1) and olive yellow (2.5Y 6/8), interbedded sandstone and shale.

The thickness of the organic material ranges from 16 to 51 inches and coincides with the depth to the C horizon. Depth to the Cr horizon ranges from 20 to 51 inches. Below the surface layer the organic layers are dominantly muck (sapric material), but thin layers of mucky peat (hemic material) or peat (fibric material) are in some pedons. The mucky peat has hue of 5YR or 7.5YR, value of 2 to 4, and chroma of 2 or 3. The muck has hue of 5YR, 7.5YR, or 10YR or is neutral in hue. It has value of 2 to 4 and chroma of 0 to 2. Some pedons have thin layers of peat that has colors similar to those of the mucky peat. The texture of the C horizon ranges from sand to silty clay. The C horizon has hue of 2.5YR, 5YR, 7.5YR, 10YR, 2.5Y, 5Y, 5GY, or 5G, value of 4 to 7, and chroma of 1 to 4. The Cr horizon has hue of 2.5YR, 5YR, 7.5YR, 10YR, 2.5Y, 5Y, 5GY, or 5G, value of 3 to 7, and chroma of 1 to 4. It consists of interbedded sandstone and shale.

Coffton Series

The Coffton series consists of very deep, somewhat poorly drained soils on flood plains and alluvial fans. These soils formed in silty alluvium. Permeability is moderate. Slopes range from 0 to 3 percent.

Typical pedon of Coffton silt loam, 0 to 3 percent slopes, approximately 1,440 feet south and 500 feet west of the center of sec. 15, T. 19 N., R. 6 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate medium granular structure; friable; common very fine and fine roots; neutral; abrupt smooth boundary.

A—8 to 11 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; weak coarse subangular blocky structure parting to weak medium platy; friable; common very fine and fine roots; neutral; clear smooth boundary.

Bg1—11 to 23 inches; dark grayish brown (10YR 4/2) silt loam; weak medium subangular blocky structure; friable; common very fine and fine roots; few faint grayish brown (10YR 5/2) coatings of silt and fine sand on faces of peds; common fine prominent strong brown (7.5YR 5/8) masses of iron accumulation; neutral; clear wavy boundary.

Bg2—23 to 38 inches; grayish brown (10YR 5/2) silt loam; weak medium subangular blocky structure; friable; common very fine and fine roots; common distinct light brownish gray (2.5Y 6/2) silt coatings and few faint dark gray (10YR 4/1) organic coatings on faces of peds; many fine prominent strong brown (7.5YR 5/8) masses of iron accumulation; neutral; gradual smooth boundary.

Cg—38 to 60 inches; olive gray (5Y 5/2) silt loam; massive; friable; few thin strata of dark grayish brown (10YR 4/2) fine sandy loam; many fine prominent yellowish red (5YR 4/6) masses of iron accumulation; many prominent black (N 2/0) iron-manganese concretions; neutral.

The thickness of the solum ranges from 30 to 50 inches. The Ap or A horizon has value of 2 or 3 and chroma of 1 to 3. The Bg horizon has hue of 10YR or 2.5Y and value of 4 to 6. Some pedons have a thin Bw horizon, which has chroma of 3. The Cg horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. It is silt loam, or it is silt loam that has strata of loam, fine sandy loam, loamy fine sand, or fine sand.

Council Series

The Council series consists of very deep, well drained soils on bedrock-controlled uplands (fig. 16). These soils formed mostly in loamy colluvium. Permeability is moderate. Slopes range from 6 to 35 percent.

Typical pedon of Council loam, in an area of Council and Seaton soils, 12 to 20 percent slopes, eroded, about 1,900 feet west and 200 feet north of the southeast corner of sec. 5, T. 19 N., R. 6 W.

Ap—0 to 7 inches; dark brown (10YR 3/3) loam, pale brown (10YR 6/3) dry; weak coarse subangular blocky structure; common fragments of dark yellowish brown (10YR 4/4) subsoil material; friable; many fine and medium roots; moderately acid; abrupt smooth boundary.

Bt1—7 to 13 inches; dark yellowish brown (10YR 4/4) loam; moderate fine subangular blocky structure; friable; common very fine and fine roots; few distinct dark brown (7.5YR 4/4) clay films on faces of peds; few dark brown (10YR 4/3) silt coatings on faces of peds; strongly acid; clear wavy boundary.

Bt2—13 to 27 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

Bt3—27 to 35 inches; dark yellowish brown (10YR 4/4) loam; moderate coarse subangular blocky structure; friable; few very fine and fine roots; common distinct dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

Bt4—35 to 45 inches; dark yellowish brown (10YR 4/4) sandy loam; weak very coarse subangular blocky structure; friable; few very fine and fine roots; few distinct dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; abrupt irregular boundary.

C—45 to 60 inches; light yellowish brown (10YR 6/4) and dark yellowish brown (10YR 4/4) silt loam with pockets or layers of loam; massive; friable; common medium distinct brownish yellow (10YR 6/8) relict masses of iron accumulation and common fine distinct grayish brown (10YR 5/2) relict masses of iron depletion; about 5 percent sandstone channers; moderately acid.

Depth to the base of the argillic horizon ranges from 36 to more than 80 inches. The volume of sandstone channers or chert gravel ranges from 0 to 15 percent throughout the profile. The Ap horizon has value of 3 or 4 and chroma of 2 to 4. The A horizon, if it occurs, has value of 2 or 3 and chroma of 1 or 2. The Ap or A horizon is fine sandy loam or loam. The Bt and C horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. The Bt horizon is loam, silt loam, sandy loam, or fine sandy loam. The C horizon is loam, fine sandy loam, sandy loam, or silt loam or has pockets or layers with these textures.

Dawsil Series

The Dawsil series consists of very deep, very poorly drained soils on pediments and stream terraces. These soils formed in organic material overlying siliceous sandy alluvium. Permeability is moderately slow to moderately rapid in the organic layers and rapid in the sandy alluvium. Slopes are 0 to 1 percent.

Typical pedon of Dawsil mucky peat, 0 to 1 percent slopes, approximately 800 feet south and 500 feet west of the northeast corner of sec. 35, T. 20 N., R. 1 E.

Oe1—0 to 8 inches; mucky peat (hemic material), dark reddish brown (5YR 3/2) broken face and rubbed; about 80 percent fiber, 25 percent rubbed; nonsticky; many very fine to medium roots; primarily herbaceous fibers; extremely acid (pH 4.4 by the Truog method); clear wavy boundary.

Oe2—8 to 20 inches; mucky peat (hemic material), dark brown (7.5YR 3/2) broken face and rubbed; about 70 percent fiber, 20 percent rubbed; nonsticky; few very fine and fine roots; primarily herbaceous fibers; extremely acid (pH 4.4 by the Truog method); abrupt wavy boundary.

Oa—20 to 40 inches; muck (sapric material), black (10YR 2/1) broken face and rubbed; about 30 percent fiber, 5 percent rubbed; weak coarse subangular blocky structure; slightly sticky; primarily herbaceous fibers; extremely acid (pH 4.4 by the Truog method); gradual wavy boundary.

C—40 to 60 inches; light brownish gray (10YR 6/2) sand; single grain; loose; slightly acid.

The thickness of the organic material and the depth to sandy alluvium range from 16 to 51 inches. The mucky peat has hue of 5YR or 7.5YR, value of 2 to 4, and chroma of 2 or 3. The muck has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. Some pedons have thin layers of peat that has colors similar to those of the mucky peat. The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 1 to 4. The volume of gravel and sandstone channers ranges from 0 to 15 percent in the C horizon. The C horizon is sand, coarse sand, or loamy sand.

Dunnville Series

The Dunnville series consists of very deep, well drained soils on low stream terraces. These soils formed in loamy alluvium overlying sandy alluvium. Permeability is moderate or moderately rapid in the loamy alluvium and rapid or very rapid in the sandy alluvium. Slopes range from 0 to 3 percent.

Typical pedon of Dunnville sandy loam, 0 to 3 percent slopes, approximately 2,500 feet south and 400 feet east of the northwest corner of sec. 31, T. 20 N., R. 4 W.

Ap—0 to 9 inches; dark reddish brown (5YR 2.5/2) sandy loam, dark brown (7.5YR 4/2) dry; weak medium granular structure; friable; many very fine to medium roots; strongly acid; clear wavy boundary.

A1—9 to 12 inches; dark reddish brown (5YR 2.5/2) sandy loam, dark brown (10YR 4/2) dry; weak

medium subangular blocky structure; friable; many very fine to medium roots; strongly acid; gradual wavy boundary.

A2—12 to 16 inches; dark reddish brown (5YR 3/2) sandy loam, brown (10YR 4/3) dry; weak medium subangular blocky structure; friable; many very fine to medium roots; strongly acid; clear wavy boundary.

Bw—16 to 24 inches; dark reddish brown (5YR 3/4) sandy loam; moderate medium subangular blocky structure; friable; common very fine to medium roots; very strongly acid; clear wavy boundary.

2BC—24 to 27 inches; reddish brown (5YR 5/4) loamy sand; weak medium subangular blocky structure; very friable; few very fine and fine roots; very strongly acid; abrupt wavy boundary.

2C—27 to 60 inches; reddish yellow (7.5YR 6/6) sand; single grain; loose; moderately acid.

The thickness of the loamy alluvium and the depth to sandy alluvium range from 20 to 40 inches. The A horizon has hue of 5YR, 7.5YR, or 10YR and value and chroma of 2 or 3. The Bw horizon has hue of 2.5YR, 5YR, or 7.5YR and value and chroma of 3 or 4. It is sandy loam, fine sandy loam, or loam. The 2BC horizon has hue of 5YR, 7.5YR, or 10YR and value and chroma of 4 to 6. It is loamy sand or loamy coarse sand. The 2C horizon has hue of 5YR, 7.5YR, or 10YR, value of 6 to 8, and chroma of 4 to 8. It is sand, coarse sand, fine sand, or the gravelly analogs of these textures. The volume of gravel ranges from 0 to 35 percent in the 2C horizon.

Elevasil Series

The Elevasil series consists of well drained soils on pediments and bedrock-controlled uplands. These soils are moderately deep to sandstone bedrock. They formed mostly in siliceous loamy colluvium and siliceous sandy residuum derived from the underlying sandstone. Permeability is moderate or moderately rapid in the loamy colluvium, rapid in the sandy residuum, and moderately slow or moderate in the underlying sandstone. Slopes range from 2 to 30 percent.

Typical pedon of Elevasil sandy loam, in an area of Boone-Elevasil complex, 15 to 50 percent slopes, approximately 1,000 feet east and 1,300 feet south of the northwest corner of sec. 30, T. 19 N., R. 6 W.

Oe—0 to 1 inch; very dark grayish brown (10YR 3/2) mucky peat (hemic material, which is a mat of partially decomposed forest litter); about 50 percent fiber, 25 percent rubbed; weak thin platy structure; nonsticky; very strongly acid; abrupt smooth boundary.

A—1 to 3 inches; very dark brown (10YR 2/2) sandy loam, brown (10YR 5/3) dry; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; abrupt wavy boundary.

Bt1—3 to 9 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; few distinct dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; abrupt irregular boundary.

Bt2—9 to 27 inches; strong brown (7.5YR 5/6) sandy loam; moderate medium subangular blocky structure; friable; common very fine to medium roots; few distinct dark brown (7.5YR 4/4) clay films on faces of peds; about 5 percent sandstone channers in the lower part; very strongly acid; abrupt irregular boundary.

2BC—27 to 31 inches; strong brown (7.5YR 5/6) loamy sand; weak medium subangular blocky structure; very friable; few very fine roots; about 10 percent sandstone channers; very strongly acid; abrupt wavy boundary.

2C—31 to 39 inches; reddish yellow (7.5YR 6/6) sand; single grain; loose; about 14 percent sandstone channers; strongly acid; clear smooth boundary.

2Cr—39 to 60 inches; very pale brown (10YR 7/4) sandstone.

The thickness of the loamy mantle and the depth to sandstone range from 20 to 40 inches. The volume of sandstone channers ranges from 0 to 15 percent in the loamy colluvium and from 5 to 35 percent in the sandy residuum. The Ap or A horizon has value and chroma of 2 to 4. The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 or 3. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is sandy loam, fine sandy loam, or loam. The 2BC and 2C horizons have hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 2 to 6. The 2BC horizon is loamy sand, loamy fine sand, sand, or fine sand or the channery analogs of these textures. The 2C horizon has colors like those of the 2BC horizon. It is sand or fine sand or the channery analogs of these textures.

Elm Lake Series

The Elm Lake series consists of poorly drained soils on pediments. These soils are moderately deep to interbedded sandstone and shale bedrock. They formed dominantly in siliceous sandy alluvium

overlying loamy residuum derived from the underlying interbedded sandstone and shale. Permeability is rapid in the sandy alluvium, moderately slow or moderate in the loamy residuum, and extremely slow to moderately slow in the underlying interbedded sandstone and shale. Slopes range from 0 to 2 percent.

Typical pedon of Elm Lake muck, in an area of Fairchild-Elm Lake complex, 0 to 3 percent slopes, approximately 1,600 feet north and 105 feet west of the southeast corner of sec. 14, T. 23 N., R. 4 W.

Oa—0 to 4 inches; muck (sapric material), black (N 2/0) broken face and rubbed; about 50 percent fiber, 15 percent rubbed; moderate thick platy structure; nonsticky; many fine roots; extremely acid (pH 4.0 by the Truog method); abrupt smooth boundary.

A—4 to 8 inches; very dark gray (10YR 3/1) sand, gray (10YR 5/1) dry; weak medium subangular blocky structure; very friable; common fine roots; extremely acid; clear wavy boundary.

Cg1—8 to 15 inches; gray (10YR 5/1) sand; single grain; loose; strongly acid; clear wavy boundary.

Cg2—15 to 28 inches; grayish brown (10YR 5/2) loamy sand; single grain; loose; common medium prominent brownish yellow (10YR 6/8) masses of iron accumulation; strongly acid; clear wavy boundary.

2Cg3—28 to 38 inches; light brownish gray (10YR 6/2) clay loam; massive; firm; common medium prominent yellowish red (5YR 5/8) masses of iron accumulation; about 10 percent sandstone channers; very strongly acid; clear wavy boundary.

2Cr—38 to 60 inches; dark grayish brown (10YR 4/2) and light brownish gray (10YR 6/2), interbedded sandstone and shale.

The thickness of the siliceous sandy alluvium and the depth to loamy residuum range from 15 to 39 inches. The depth to interbedded sandstone and shale ranges from 20 to 40 inches. The Oa horizon has hue of 5YR, 7.5YR, or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. The A horizon has value of 2 or 3 and chroma of 1 or 2. It is sand or mucky sand. The Cg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 7, and chroma of 2 or 3. It is sand, fine sand, or loamy sand. The 2Cg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. It is dominantly loam, sandy clay loam, clay loam, or silty clay loam; in some pedons, however, it has subhorizons of coarser or finer textures, which reflect the interbedding of the sandstone and shale. The volume of sandstone channers ranges from 0 to 15 percent in the 2Cg horizon.

Ettrick Series

The Ettrick series consists of very deep, poorly drained soils on flood plains. These soils formed in silty alluvium. Permeability is moderately slow in the subsoil and moderate or moderately slow in the substratum. Slopes range from 0 to 2 percent.

Typical pedon of Ettrick silt loam, 0 to 2 percent slopes, approximately 1,100 feet east and 1,000 feet south of the center of sec. 17, T. 23 N., R. 6 W.

A1—0 to 4 inches; very dark gray (10YR 3/1) silt loam, dark grayish brown (10YR 4/2) dry; weak medium platy structure; friable; many very fine roots; slightly acid; clear smooth boundary.

A2—4 to 15 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak medium platy structure; friable; common very fine roots; common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation; slightly acid; clear wavy boundary.

Bg1—15 to 21 inches; gray (10YR 5/1) silt loam; weak very thick platy structure parting to weak medium subangular blocky; friable; few very fine and fine roots; common medium prominent strong brown (7.5YR 5/6 and 5/8) masses of iron accumulation; neutral; clear wavy boundary.

Bg2—21 to 28 inches; grayish brown (10YR 5/2) silt loam; weak medium subangular blocky structure; friable; few very fine and fine roots; common medium prominent strong brown (7.5YR 5/6) and yellowish red (5YR 4/6) masses of iron accumulation; neutral; clear wavy boundary.

Bg3—28 to 40 inches; grayish brown (10YR 5/2) silt loam; weak very coarse prismatic structure; friable; few very fine roots; many fine and medium prominent yellowish red (5YR 5/6) masses of iron accumulation; neutral; clear wavy boundary.

Cg1—40 to 46 inches; gray (10YR 6/1) silt loam; massive; friable; many coarse prominent yellowish red (5YR 4/6) masses of iron accumulation; neutral; clear wavy boundary.

Cg2—46 to 60 inches; gray (5Y 6/1) silt loam; massive; friable; many coarse prominent yellowish red (5YR 4/6) masses of iron accumulation; neutral.

The thickness of the solum ranges from 30 to 50 inches. The thickness of the mollic epipedon ranges from 10 to 18 inches. The A horizon has value of 2 or 3 and chroma of 1 or 2. The Bg and Cg horizons have

hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. The Bg horizon is silt loam or silty clay loam. The Cg horizon is silt loam, or it is silt loam that has thin strata of fine sand, loamy fine sand, fine sandy loam, or silt.

Fairchild Series

The Fairchild series consists of somewhat poorly drained soils on pediments. These soils are moderately deep to interbedded sandstone and shale bedrock. They formed in siliceous sandy alluvium and in loamy residuum derived from the underlying interbedded sandstone and shale. Permeability is rapid in the sandy alluvium, moderately slow or moderate in the loamy residuum, and extremely slow to moderately slow in the underlying interbedded sandstone and shale. Slopes range from 0 to 3 percent.

Typical pedon of Fairchild sand, in an area of Fairchild-Elm Lake complex, 0 to 3 percent slopes, approximately 1,400 feet south and 300 feet west of the northeast corner of sec. 35, T. 22 N., R. 3 W.

Oe—0 to 2 inches; very dark grayish brown (10YR 3/2) mucky peat (hemic material, which is a mat of partially decomposed leaf and grass litter); about 40 percent fiber, 25 percent rubbed; weak thin platy structure; nonsticky; very strongly acid; abrupt wavy boundary.

A—2 to 4 inches; black (10YR 2/1) sand, dark brown (7.5YR 3/2) dry; weak fine granular structure; very friable; common very fine and fine roots; very strongly acid; abrupt smooth boundary.

E—4 to 13 inches; grayish brown (10YR 5/2) sand, light gray (10YR 7/2) dry; weak medium subangular blocky structure; very friable; common very fine and fine roots; strongly acid; abrupt wavy boundary.

Bhs—13 to 16 inches; dark reddish brown (5YR 3/3) sand; weak medium subangular blocky structure; very friable; common very fine and fine roots; strongly acid; abrupt smooth boundary.

Bs—16 to 21 inches; dark brown (7.5YR 4/4) sand; weak coarse subangular blocky structure; very friable; few very fine and fine roots; few fine distinct strong brown (7.5YR 5/6) masses of iron accumulation; strongly acid; clear wavy boundary.

Bw—21 to 32 inches; brownish yellow (10YR 6/6) sand; weak coarse subangular blocky structure; very friable; few very fine and fine roots; common medium distinct brownish yellow (10YR 6/8) and common medium prominent yellowish red (5YR 5/8) masses of iron accumulation; strongly acid; abrupt wavy boundary.

2Bt—32 to 39 inches; pale olive (5Y 6/3) clay loam; weak coarse subangular blocky structure; firm; few very fine and fine roots; few faint olive gray (5Y 5/2) clay films on faces of peds; coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation; about 10 percent sandstone channers; extremely acid; gradual wavy boundary.

2Cr—39 to 60 inches; light gray (5Y 7/2) and light olive gray (5Y 6/2), interbedded sandstone and shale.

Thickness and depth in this paragraph are measured from the top of the mineral soil. The thickness of the sandy alluvium over the residuum ranges from 15 to 39 inches. The thickness of the solum and the depth to interbedded sandstone and shale range from 20 to 40 inches.

The O horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. The A horizon has value of 2 or 3 and chroma of 1 or 2. The E horizon has hue of 7.5YR or 10YR and value of 5 or 6. It is sand or loamy sand. The Bhs horizon has hue of 5YR or 7.5YR, value of 2 or 3, and chroma of 1 to 3. It is sand or loamy sand. The Bs horizon has hue of 5YR or 7.5YR and value of 3 or 4. The Bw horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6. The Bw and Bs horizons are sand or loamy sand. The 2Bt horizon has hue of 2.5YR, 5YR, 7.5YR, 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 2 to 4. It is dominantly clay loam, loam, or sandy clay loam; in some pedons, however, it has subhorizons of coarser or finer textures, which reflect the interbedding of the sandstone and shale. The volume of sandstone channers in the 2Bt horizon ranges from 3 to 15 percent.

Fordum Series

The Fordum series consists of very deep, poorly drained soils on flood plains. These soils formed in silty and loamy alluvium overlying sandy alluvium. Permeability is moderate or moderately rapid in the silty and loamy alluvium and rapid or very rapid in the underlying sandy alluvium. Slopes range from 0 to 2 percent.

Typical pedon of Fordum silt loam, in an area of Moppet-Fordum complex, 0 to 3 percent slopes, approximately 2,600 feet north and 400 feet west of the southeast corner of sec. 19, T. 22 N., R. 1 E.

A—0 to 6 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium

granular structure; very friable; many very fine and fine roots; very strongly acid; clear smooth boundary.

Cg1—6 to 12 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak coarse subangular blocky structure; very friable; common very fine roots; common coarse prominent reddish brown (5YR 4/4) masses of iron accumulation; very strongly acid; gradual smooth boundary.

Cg2—12 to 35 inches; grayish brown (10YR 5/2) fine sandy loam; weak coarse subangular blocky structure; very friable; few very fine roots; many coarse prominent yellowish red (5YR 5/6) masses of iron accumulation; common thin strata of brown (10YR 5/3) sand; very strongly acid; clear wavy boundary.

Cg3—35 to 60 inches; dark grayish brown (10YR 4/2) sand; single grain; loose; common thin strata of dark gray (10YR 4/1) fine sandy loam; strongly acid.

The thickness of silty and loamy alluvium and the depth to sandy alluvium range from 24 to 40 inches. The A horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 3. The Cg horizons that formed in loamy alluvium have hue of 2.5YR, 7.5YR, or 10YR, value of 3 to 5, and chroma of 1 or 2. They are silt loam and are commonly stratified with loam, sandy loam, or fine sandy loam or the gravelly analogs of these textures. Thin strata of sand or fine sand are commonly in the loamy alluvium. The 2Cg or 2C3 horizon that formed in sandy alluvium has hue of 5YR, 7.5YR, or 10YR, value of 2 to 5, and chroma of 1 to 4. It is sand, fine sand, loamy sand, or loamy fine sand or the gravelly analogs of these textures and has thin strata of fine sandy loam or loam. The volume of gravel ranges from 0 to 30 percent in the sandy alluvium.

Gale Series

The Gale series consists of well drained soils on bedrock-controlled uplands. These soils are moderately deep to sandstone bedrock. They formed dominantly in loess overlying sandy residuum derived from the underlying sandstone. Permeability is moderate in the silty and loamy mantle, rapid in the sandy residuum, and moderately slow or moderate in the sandstone. Slopes range from 6 to 25 percent.

Typical pedon of Gale silt loam, 12 to 25 percent slopes, eroded, approximately 2,340 feet south and 460 feet east of the northwest corner of sec. 22, T. 22 N., R. 6 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; weak coarse subangular blocky structure; friable; common fragments of dark yellowish brown (10YR 4/4) subsoil material; many very fine to coarse roots; slightly acid; abrupt smooth boundary.

Bt1—8 to 12 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium and coarse subangular blocky structure; friable; common very fine to coarse roots; common distinct dark brown (7.5YR 4/4) clay films on faces of peds; slightly acid; clear wavy boundary.

Bt2—12 to 22 inches; yellowish brown (10YR 5/4) silt loam; moderate medium and fine subangular blocky structure; friable; common very fine to medium roots; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

Bt3—22 to 27 inches; yellowish brown (10YR 5/4) silt loam; moderate coarse subangular blocky structure; friable; common very fine to medium roots; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear irregular boundary.

2Bt4—27 to 31 inches; yellowish brown (10YR 5/4) sandy loam; weak coarse subangular blocky structure; friable; few fine roots; few distinct dark brown (7.5YR 4/4) clay films on faces of peds; common prominent strong brown (7.5YR 5/6) iron coatings on faces of peds; strongly acid; abrupt wavy boundary.

3C—31 to 39 inches; brownish yellow (10YR 6/6) sand; single grain; loose; few strata of yellowish red (5YR 5/8) loamy sand; about 10 percent sandstone channers; strongly acid; clear wavy boundary.

3Cr—39 to 60 inches; brownish yellow (10YR 6/6) and strong brown (7.5YR 5/8) sandstone.

The thickness of the loess mantle and the depth to sandy residuum range from 15 to 39 inches. The depth to sandstone bedrock ranges from 20 to 40 inches. The volume of sandstone channers in the lower part of the solum and in the 3C horizon ranges from 0 to 35 percent. The Ap or A horizon has value of 3 or 4 and chroma of 2 or 3. The Bt horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 4 to 6. It is silt loam or silty clay loam. The 2Bt horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It is loam or sandy loam or the channery analogs of these textures. The 3C horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 3 to 8. It is sand or loamy sand or the channery analogs of these textures.

Gardenvale Series

The Gardenvale series consists of well drained soils on bedrock-controlled pediments. These soils are deep to sandstone bedrock. They formed in silty and loamy eolian deposits or alluvium overlying siliceous sandy residuum derived from the underlying sandstone. Permeability is moderate in the silty and loamy mantle, rapid in the sandy residuum, and moderately slow or moderate in the underlying sandstone. Slopes range from 1 to 6 percent.

Typical pedon of Gardenvale silt loam, in an area of Merit-Gardenvale silt loams, 1 to 6 percent slopes, approximately 700 feet north and 800 feet west of the center of sec. 15, T. 22 N., R. 5 W.

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; friable; many very fine and fine roots; moderately acid; abrupt wavy boundary.

Bt1—8 to 14 inches; dark brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; many faint dark brown (7.5YR 3/4) clay films on faces of most peds; moderately acid; clear wavy boundary.

Bt2—14 to 26 inches; dark brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; common faint dark brown (7.5YR 3/4) clay films on faces of most peds; very strongly acid; gradual irregular boundary.

2Bt3—26 to 30 inches; brown (7.5YR 5/4) sandy loam; moderate medium subangular blocky structure; friable; few very fine and fine roots; few faint dark brown (7.5YR 4/4) clay films on faces of some peds; moderately acid; clear wavy boundary.

3C—30 to 50 inches; reddish yellow (7.5YR 6/8) fine sand; single grain; loose; very strongly acid; clear wavy boundary.

3Cr—50 to 60 inches; reddish yellow (7.5YR 6/8) sandstone.

The thickness of the silty mantle ranges from 10 to 30 inches. The depth to sandy residuum ranges from 24 to 40 inches. The depth to sandstone ranges from 40 to 60 inches. The volume of sandstone channers ranges from 0 to 15 percent in the residuum. The A or Ap horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. The Bt horizon has hue of 7.5YR or 10YR and value of 3 to 5. The 2Bt horizon has colors like those of the Bt horizon. It is typically sandy loam or loam but is sandy clay loam in some pedons. Some pedons have a 3Bt or 3BC horizon, which has hue of 7.5YR or 10YR and value and chroma of 4 to 6. This horizon is loamy sand or sand. The 3C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 8. It is fine sand or sand. The 3Bt or 3BC horizon has less than 10 percent weatherable minerals in the sand fraction. In some pedons, the 3C horizon has few to many strata of sandy loam or loam.

Gosil Series

The Gosil series consists of very deep, excessively drained, rapidly permeable soils on stream terraces and pediments. These soils formed in siliceous sandy alluvium or siliceous residuum derived from sandstone. Slopes range from 0 to 12 percent.

Typical pedon of Gosil loamy sand, 0 to 6 percent slopes, approximately 1,640 feet south and 2,240 feet east of the northwest corner of sec. 35, T. 22 N., R. 5 W.

Ap—0 to 9 inches; dark brown (10YR 3/3) loamy sand, pale brown (10YR 6/3) dry; moderate medium subangular blocky structure parting to moderate fine granular; very friable; many very fine and fine roots; strongly acid; abrupt wavy boundary.

Bw1—9 to 14 inches; dark brown (7.5YR 4/4) loamy sand; moderate coarse subangular blocky structure; very friable; common very fine and fine roots; strongly acid; gradual wavy boundary.

Bw2—14 to 23 inches; brown (7.5YR 5/4) loamy sand; weak coarse subangular blocky structure; very friable; common very fine and fine roots; strongly acid; gradual wavy boundary.

BC—23 to 27 inches; strong brown (7.5YR 5/6) sand; weak coarse subangular blocky structure; very friable; few very fine roots; strongly acid; clear smooth boundary.

C1—27 to 33 inches; reddish yellow (7.5YR 6/8) sand; single grain; loose; strongly acid; gradual wavy boundary.

C2—33 to 60 inches; very pale brown (10YR 7/4) sand; single grain; loose; moderately acid.

The thickness of the solum ranges from 20 to 40 inches. The volume of sandstone channers ranges from 0 to 15 percent throughout the profile. The Ap horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. Some pedons have an A horizon, which has colors and textures like those of the Ap horizon. The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 4 to 6. It is

loamy sand or loamy fine sand. The BC horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is sand or fine sand. The C horizon has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 2 to 8. It is sand or fine sand. Some pedons contain reddish strata 1/8 to 1 inch thick in the lower part of the C horizon. These strata are loamy sand, loamy fine sand, or sand.

Hiles Series

The Hiles series consists of moderately well drained soils on pediments. These soils are moderately deep to interbedded sandstone and shale bedrock. They formed in loess and in residuum derived from the underlying interbedded sandstone and shale. Permeability is moderate in the loess, moderately slow or moderate in the residuum, and extremely slow to moderately slow in the underlying interbedded sandstone and shale. Slopes range from 1 to 6 percent.

Typical pedon of Hiles silt loam, in an area of Hiles-Kert silt loams, 0 to 6 percent slopes, approximately 2,500 feet east of the center of sec. 9, T. 23 N., R. 4 W.

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable; many very fine and fine roots; strongly acid; abrupt wavy boundary.

E—8 to 12 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; moderate medium platy structure; friable; common very fine and fine roots; strongly acid; clear wavy boundary.

B/E—12 to 20 inches; about 60 percent dark yellowish brown (10YR 4/4) silt loam (Bt); moderate fine subangular blocky structure; friable; common faint dark brown (7.5YR 4/4) clay films on faces of peds; penetrated by tongues of brown (10YR 5/3) silt loam (E), very pale brown (10YR 7/3) dry; weak medium platy structure; friable; common very fine and fine roots; strongly acid; clear wavy boundary.

2Bt—20 to 28 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; common distinct dark brown (7.5YR 4/3) clay films on faces of peds; few fine prominent reddish yellow (5YR 6/6) masses of iron accumulation; about 5 percent sandstone channers; very strongly acid; clear wavy boundary.

2Cr—28 to 60 inches; light gray (5Y 7/2), light greenish gray (5GY 7/1), and reddish yellow (7.5YR 6/8), interbedded sandstone and shale.

The depth to the base of the argillic horizon and to interbedded sandstone and shale ranges from 20 to 40 inches. Thickness of the loess mantle ranges from 12 to 24 inches. The volume of sandstone channers ranges from 2 to 10 percent in the residuum. The Ap or A horizon has value of 2 to 4 and chroma of 1 to 3. The E horizon has value of 4 to 6 and chroma of 2 or 3. Some pedons have an E/B horizon. The E part of the E/B or B/E horizon has colors and textures like those of the E horizon. The Bt part of the E/B or B/E horizon has value of 3 to 5 and chroma of 4 to 6. Some pedons have a Bt horizon. The 2Bt horizon has hue of 2.5YR, 5YR, 7.5YR, 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 2 to 4. It is dominantly loam, clay loam, or sandy clay loam, but in some pedons it has subhorizons of finer or coarser textures, which reflect the interbedding of the sandstone and shale.

Hixton Series

The Hixton series consists of well drained soils on bedrock-controlled uplands. These soils are moderately deep to sandstone bedrock. They formed dominantly in loamy colluvium overlying siliceous sandy residuum derived from the underlying sandstone. Permeability is moderate in the loamy colluvium, rapid in the sandy residuum, and moderately slow or moderate in the underlying sandstone. Slopes range from 2 to 20 percent.

Typical pedon of Hixton loam, 6 to 12 percent slopes, eroded, approximately 1,240 feet north and 2,240 feet east of the southwest corner of sec. 24, T. 24 N., R. 5 W.

Ap—0 to 9 inches; dark brown (10YR 3/3) loam, pale brown (10YR 6/3) dry; moderate medium subangular blocky structure; friable; common very fine and fine roots; common fragments of dark yellowish brown (10YR 4/4) subsoil material; slightly acid; abrupt smooth boundary.

Bt1—9 to 17 inches; dark yellowish brown (10YR 4/4) loam; moderate fine subangular blocky structure; friable; common very fine and fine roots; common distinct dark brown (7.5YR 4/4) clay films on faces of peds; moderately acid; clear wavy boundary.

Bt2—17 to 28 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

2Bt3—28 to 32 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium subangular blocky structure; friable; few very fine roots; common distinct dark brown (7.5YR 4/4) clay films on faces of peds; about 5 percent sandstone channers; strongly acid; clear wavy boundary.

3C—32 to 39 inches; brownish yellow (10YR 6/6) sand; single grain; loose; about 5 percent channers; strongly acid; abrupt smooth boundary.

3Cr—39 to 60 inches; strong brown (7.5YR 5/6) sandstone.

The thickness of the loamy mantle and the depth to siliceous sandy residuum range from 15 to 39 inches. The depth to sandstone ranges from 20 to 40 inches. The volume of sandstone channers ranges from 0 to 35 percent in the 2Bt horizon and in the sandy residuum. The Ap or A horizon has value of 3 or 4 and chroma of 2 to 4. Some pedons have an E horizon, which has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. This horizon is loam. The Bt and 2Bt horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. The Bt horizon is loam or sandy clay loam. The 2Bt horizon is sandy loam or loam or the channery analogs of these textures. The 3C horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 3 to 8. It is sand or fine sand or the channery analogs of these textures.

Hoop Series

The Hoop series consists of very deep, somewhat poorly drained soils on stream terraces and pediments. These soils formed in siliceous loamy alluvium overlying siliceous sandy alluvium. Permeability is moderate in the loamy alluvium and rapid or very rapid in the sandy alluvium. Slopes range from 0 to 3 percent.

Typical pedon of Hoop sandy loam, 0 to 3 percent slopes, approximately 500 feet south and 300 feet east of the northwest corner of sec. 36, T. 22 N., R. 4 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) sandy loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure parting to weak medium granular; friable; common very fine and fine roots; slightly acid; abrupt smooth boundary.

A—7 to 11 inches; very dark grayish brown (10YR 3/2) sandy loam, brown (10YR 5/3) dry; moderate coarse subangular blocky structure; friable; common very fine and fine roots; slightly acid; abrupt wavy boundary.

Bt1—11 to 17 inches; dark yellowish brown (10YR 4/4) sandy loam; moderate coarse subangular blocky structure; friable; common very fine and fine roots; few faint brown (10YR 4/3) clay films on faces of peds; few medium distinct grayish brown (10YR 5/2) masses of iron depletion; moderately acid; clear irregular boundary.

Bt2—17 to 24 inches; grayish brown (10YR 5/2) sandy loam; weak coarse subangular blocky structure; friable; common very fine and fine roots; few faint brown (10YR 4/3) clay films on faces of peds; many coarse distinct yellowish brown (10YR 5/6) and prominent red (2.5YR 4/6) masses of iron accumulation; strongly acid; abrupt irregular boundary.

2BC—24 to 34 inches; brownish yellow (10YR 6/6) sand; single grain; loose; few very fine and fine roots; common coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation; moderately acid; clear wavy boundary.

2C—34 to 60 inches; light brownish gray (10YR 6/2) sand; single grain; loose; common coarse distinct yellow (10YR 7/6) masses of iron accumulation; moderately acid.

The thickness of the loamy mantle and the depth to siliceous sandy alluvium range from 20 to 35 inches. The thickness of the mollic epipedon ranges from 8 to 14 inches. The Ap or A horizon has value of 2 or 3 and chroma of 1 to 3. The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 4. It is sandy loam or fine sandy loam. The 2BC or 2Bt horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 2 to 8. It is sand, coarse sand, loamy sand, or loamy coarse sand. The 2C horizon has hue of 7.5YR or 10YR, value of 4 to 8, and chroma of 2 to 6. It is sand or coarse sand.

Houghton Series

The Houghton series consists of very deep, very poorly drained soils on flood plains. These soils formed in organic material more than 51 inches thick. Permeability is moderately slow to moderately rapid. Slopes are 0 to 1 percent.

Typical pedon of Houghton muck, 0 to 1 percent slopes, approximately 1,400 feet north and 640 feet west of the center of sec. 22, T. 22 N., R. 6 W.

Oa1—0 to 4 inches; muck (sapric material), very dark brown (10YR 2/2) broken face and rubbed; about 30 percent fiber, 15 percent rubbed; nonsticky; many very fine to medium roots; slightly acid (pH 6.4 in water); clear smooth boundary.

Oa2—4 to 16 inches; muck (sapric material), black (10YR 2/1) broken face and rubbed; about 20 percent fiber, 5 percent rubbed; weak medium subangular blocky structure; nonsticky; common very fine and fine roots; strongly acid; (pH 5.5 in water); gradual wavy boundary.

Oa3—16 to 22 inches; muck (sapric material), black (10YR 2/1) broken face and rubbed; about 35 percent fiber, 10 percent rubbed; weak coarse subangular blocky structure; nonsticky; few very fine and fine roots; strongly acid (pH 5.5 in water); clear wavy boundary.

Oe—22 to 28 inches; mucky peat (hemic material), dark brown (7.5YR 3/2) broken face and rubbed; about 80 percent fiber, 20 percent rubbed; massive parting to weak thick platy structure; nonsticky; strongly acid (pH 5.5 in water); clear wavy boundary.

O'a1—28 to 40 inches; muck (sapric material), black (10YR 2/1) broken face and rubbed; about 40 percent fiber, 10 percent rubbed; massive; nonsticky; strongly acid (pH 5.1 in water); clear wavy boundary.

O'a2—40 to 60 inches; muck (sapric material), black (10YR 2/1) broken face and rubbed; about 40 percent fiber, 10 percent rubbed; massive; nonsticky; strongly acid (pH 5.1 in water).

The organic material is more than 51 inches thick. It is dominantly muck, but some pedons have thin layers of mucky peat or peat. The muck has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2.

Humbird Series

The Humbird series consists of moderately well drained soils on pediments. These soils are moderately deep to interbedded sandstone and shale bedrock (fig. 17). They formed in loamy alluvium and in clayey residuum derived from the underlying interbedded sandstone and shale. Permeability is moderate or moderately rapid in the loamy alluvium, slow in the clayey residuum, and extremely slow to moderately slow in the underlying interbedded sandstone and shale. Slopes range from 1 to 6 percent.

Typical pedon of Humbird fine sandy loam, in an area of Humbird-Merrillan fine sandy loams, 0 to 6 percent slopes, approximately 2,440 feet west of the center of sec. 3, T. 23 N., R. 1 W.

Oe—0 to 1 inch; partially decomposed, very dark grayish brown (10YR 3/2) mucky peat (hemic material, which is a mat of forest litter); about 40 percent fiber, 20 percent rubbed; weak thin platy structure; nonsticky; common very fine and fine roots; extremely acid; abrupt smooth boundary.

A—1 to 3 inches; black (10YR 2/1) fine sandy loam, dark gray (10YR 4/1) dry; weak fine granular structure; very friable; many fine roots; extremely acid; abrupt smooth boundary.

E—3 to 6 inches; grayish brown (10YR 5/2) fine sandy loam, light brownish gray (10YR 6/2) dry; moderate thin platy structure; very friable; common coarse to fine roots; extremely acid; clear wavy boundary.

Bs—6 to 18 inches; dark brown (7.5YR 4/4) fine sandy loam; weak fine and medium subangular blocky structure; very friable; common coarse to fine roots; very strongly acid; abrupt wavy boundary.

2Bt—18 to 24 inches; reddish brown (5YR·4/4) silty clay; strong medium angular blocky structure; firm; few fine and medium roots; many distinct dusky red (2.5YR 3/2) clay films on faces of peds; about 5 percent sandstone channers; extremely acid; clear wavy boundary.

2Btg—24 to 30 inches; light olive gray (5Y 6/2) silty clay; common fine prominent strong brown (7.5YR 5/8) masses of iron accumulation; moderate medium subangular blocky structure; few fine roots; common faint olive gray (5Y 5/2) clay films on faces of peds; about 10 percent sandstone channers; firm; extremely acid; clear wavy boundary.

2Cr—30 to 60 inches; interbedded light gray (5Y 7/2) sandstone and red (2.5YR 4/6) shale.

Thickness and depth in this paragraph are measured from the top of the mineral soil. The thickness of the solum and the depth to interbedded sandstone and shale range from 24 to 40 inches. The thickness of the loamy mantle and the depth to clayey residuum range from 12 to 30 inches. The volume of sandstone channers ranges from 0 to 15 percent throughout the profile.

The O horizon has hue of 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 3. The A horizon has value of 2 or 3 and chroma of 1 or 2. Some pedons have an Ap horizon, which has value of 3 or 4 and chroma of 2 or 3. The E horizon has value of 4 or 5 and chroma of 2 or 3. It is fine sandy loam or sandy loam. The Bs horizon has value and chroma of 3 or 4. It is fine sandy loam or sandy loam. The 2Bt horizon has hue of 2.5YR, 5YR, 7.5YR, 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 2 to 4. It is dominantly clay loam, silty clay loam, silty clay, or clay, but thin subhorizons of coarser textures are in some pedons .

Impact Series

The Impact series consists of very deep, excessively drained, rapidly permeable soils on stream terraces and pediments. These soils formed in siliceous sandy alluvium or residuum. Slopes range from 0 to 3 percent.

Typical pedon of Impact sand, 0 to 3 percent slopes, approximately 1,600 feet north and 600 feet west of the southeast corner of sec. 31, T. 19 N., R. 5 W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) sand, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; very friable; common very fine to medium roots; slightly acid; abrupt smooth boundary.

A1—6 to 9 inches; very dark grayish brown (10YR 3/2) sand, brown (10YR 5/3) dry; weak coarse subangular blocky structure; very friable; common very fine to medium roots; slightly acid; clear wavy boundary.

A2—9 to 14 inches; dark brown (10YR 3/3) sand, brown (10YR 5/3) dry; weak coarse subangular blocky structure; very friable; common fine and medium roots; strongly acid; clear irregular boundary.

Bw—14 to 24 inches; dark brown (7.5YR 4/4) sand; weak coarse subangular blocky structure; very friable; few fine roots; strongly acid; gradual wavy boundary.

BC—24 to 30 inches; strong brown (7.5YR 5/6) sand; weak medium subangular blocky structure; very friable; moderately acid; clear wavy boundary.

C—30 to 60 inches; brownish yellow (10YR 6/6) sand; single grain; loose; moderately acid.

The thickness of the solum ranges from 20 to 40 inches. The thickness of the umbric epipedon ranges from 10 to 16 inches. The Ap or A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. The Bw horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 4 to 6. It is sand, fine sand, loamy sand, or loamy fine sand. The BC horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. The C horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 1 to 8. The BC and C horizons are sand or fine sand.

Ironrun Series

The Ironrun series consists of very deep, somewhat poorly drained soils on stream terraces and pediments (fig. 18). These soils formed in siliceous sandy alluvium. Permeability is rapid or very rapid. Slopes range from 0 to 3 percent.

Typical pedon of Ironrun sand, in an area of Ironrun-Ponycreek complex, 0 to 3 percent slopes, approximately 1,000 feet north and 175 feet west of the southeast corner of sec. 15, T. 20 N., R. 2 W.

Oe—0 to 2 inches; very dark grayish brown (10YR 3/2) mucky peat (hemic material, which is a mat of partially decomposed forest litter); about 50 percent fiber, 25 percent rubbed; weak thin platy structure; nonsticky; extremely acid; abrupt smooth boundary.

A—2 to 4 inches; black (N 2/0) sand, black (10YR 2/1) dry; weak fine and medium granular structure; very friable; many fine and medium roots; extremely acid; abrupt smooth boundary.

E—4 to 12 inches; gray (10YR 5/1) sand, light brownish gray (10YR 6/2) dry; weak coarse subangular blocky structure; very friable; common very fine and fine roots; common distinct very dark gray (10YR 3/1) organic coatings on sand grains; strongly acid; abrupt irregular boundary.

Bhs—12 to 16 inches; dark reddish brown (5YR 3/2) sand; weak coarse subangular blocky structure; very friable; common very fine and fine roots; very strongly acid; clear wavy boundary.

Bs1—16 to 24 inches; reddish brown (5YR 4/4) sand; weak coarse subangular blocky structure; very friable; common very fine and fine roots; few fine distinct brown (7.5YR 5/4) masses of iron accumulation; strongly acid; clear wavy boundary.

Bs2—24 to 30 inches; dark brown (7.5YR 4/4) sand; weak coarse subangular blocky structure; very friable; few fine roots; few fine faint brown (7.5YR 5/4) masses of iron accumulation; strongly acid; clear wavy boundary.

C—30 to 62 inches; yellow (10YR 7/6) sand; single grain; loose; common medium prominent (7.5YR 5/8) masses of iron accumulation; moderately acid.

Thickness is measured from the top of the mineral soil. The thickness of the solum ranges from 20 to 40 inches. The volume of gravel and channers ranges from 0 to 15 percent throughout the profile.

The O horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 3. The A horizon has hue of 5YR, 7.5YR, or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. The E horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 1 or 2. It is sand or

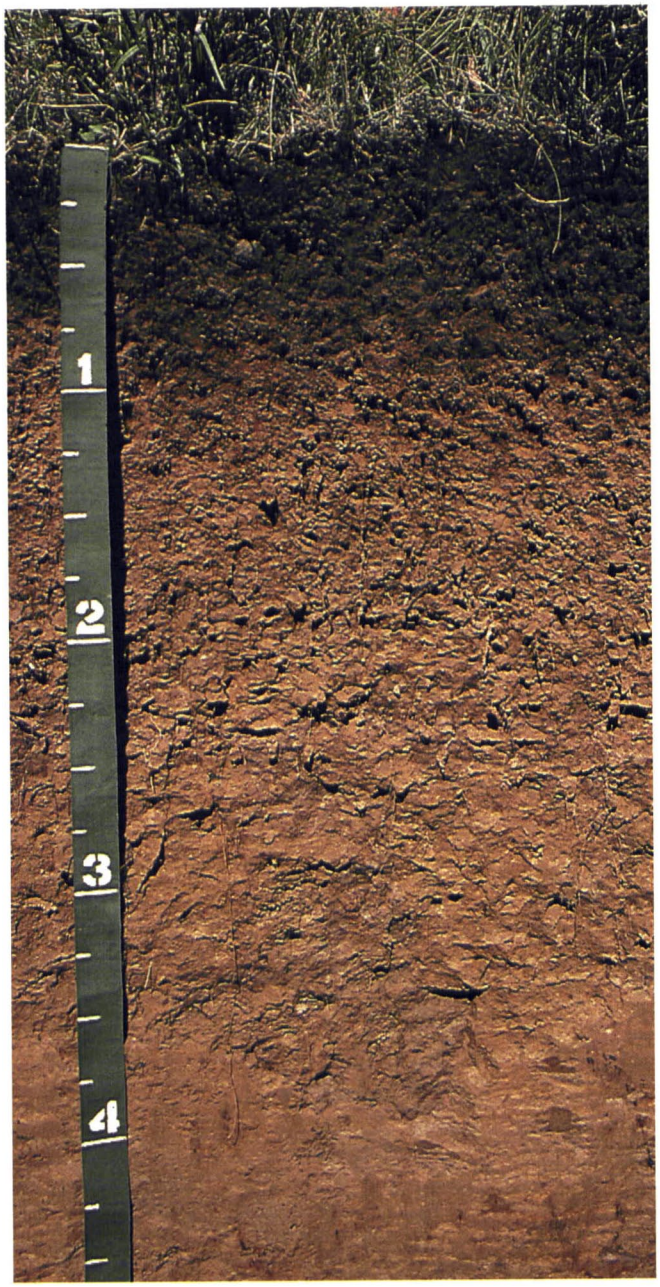

Figure 16.—Profile of a Council soil. This soil formed mostly in loamy colluvium. Depth is marked in feet.

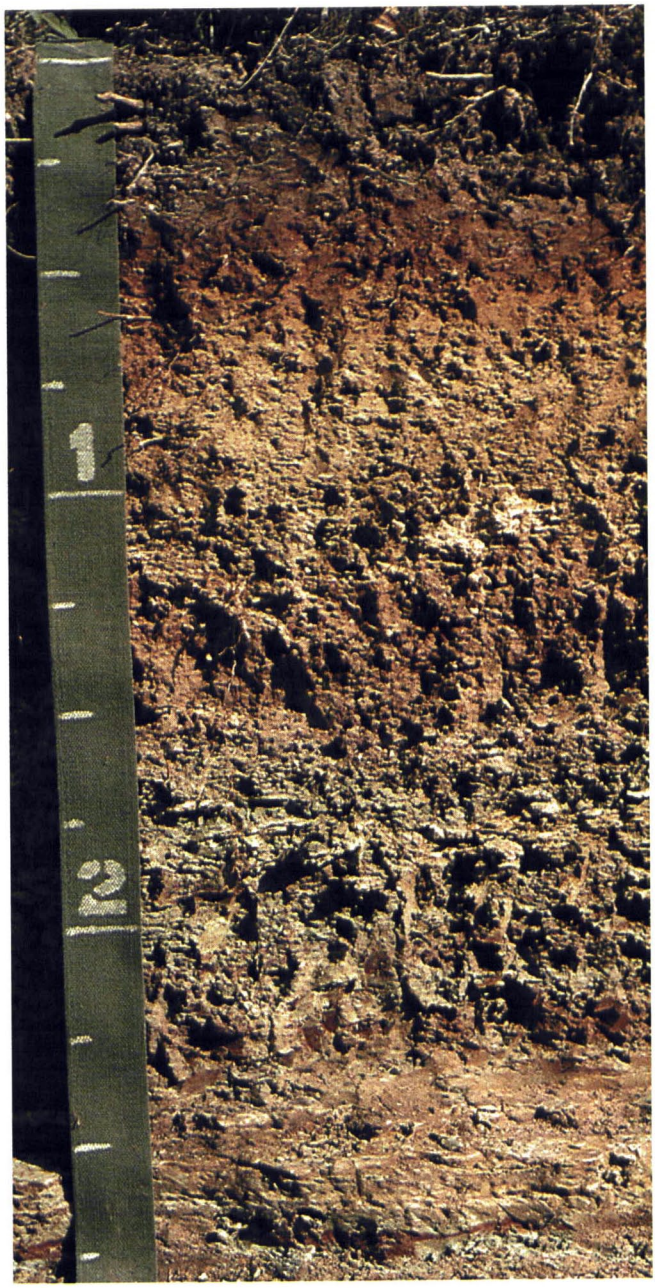

Figure 17.—Profile of a Humbird soil. Interbedded sandstone and shale are at a depth of about 33 inches. Depth is marked in feet.

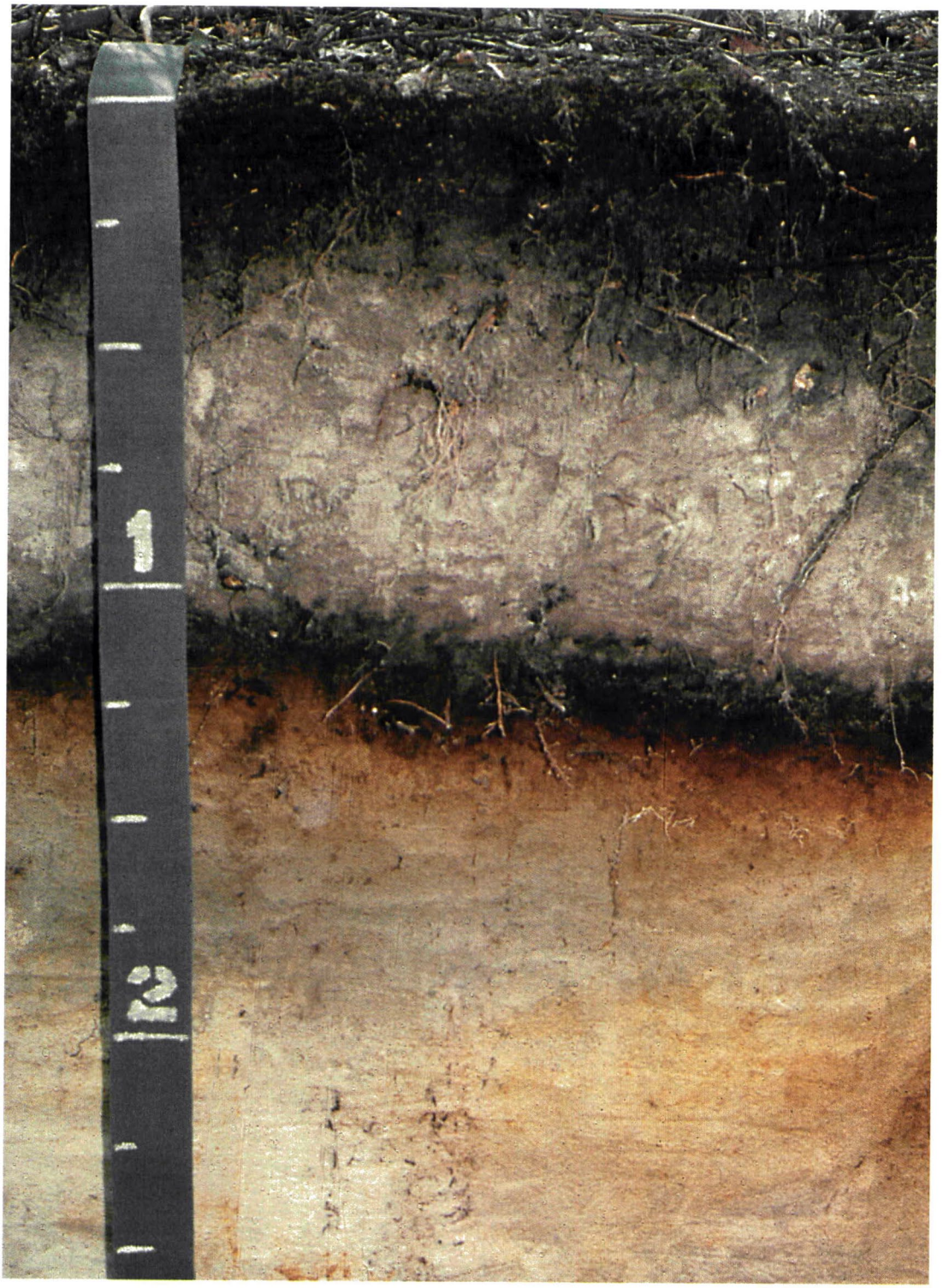

Figure 18.—Profile of an Ironrun soil. Organic matter and iron and aluminum compounds have been leached from the light colored subsurface layer and deposited in the dark upper part of the subsoil. Depth is marked in feet.

Figure 19.—Profile of a La Farge soil. Fine grained glauconitic sandstone is at a depth of about 35 inches. Depth is marked in feet.

Figure 20.—Profile of a Merimod soil. Siliceous sandy alluvium is at a depth of about 36 inches. Depth is marked in feet.

Figure 21.—Profile of a Rockdam soil. This soil formed in siliceous sandy deposits or residuum derived from sandstone. Depth is marked in feet.

coarse sand. The Bhs horizon has hue of 5YR or 7.5YR and value and chroma of 2 or 3. It is sand or coarse sand. The Bs horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 4 to 6. It is sand or coarse sand. Some pedons have up to 30 percent weakly to strongly cemented ortstein in the B horizon. The C horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 1 to 8. It is sand or coarse sand.

Jackson Series

The Jackson series consists of very deep, moderately well drained soils on stream terraces and pediments. These soils formed mostly in silty alluvium overlying stratified sandy alluvium. Permeability is moderate in the silty and loamy alluvium and rapid in the sandy alluvium. Slopes range from 0 to 6 percent.

Typical pedon of Jackson silt loam, 2 to 6 percent slopes, approximately 2,540 feet west and 40 feet south of the center of sec. 26, T. 19 N., R. 6 W.

Ap—0 to 9 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak medium and fine subangular blocky structure parting to weak medium granular; friable; many fine roots; moderately acid; abrupt smooth boundary.

Bt1—9 to 15 inches; dark brown (7.5YR 4/4) silt loam; weak medium and fine subangular blocky structure; friable; common fine roots; few faint dark brown (7.5YR 4/4) clay films on faces of peds; moderately acid; clear wavy boundary.

Bt2—15 to 24 inches; dark brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common fine roots; common faint dark brown (7.5YR 4/4) clay films on faces of peds; moderately acid; clear irregular boundary.

Bt3—24 to 34 inches; dark brown (7.5YR 4/4) silt loam; weak medium subangular blocky structure; friable; common fine roots; few faint dark brown (7.5YR 4/4) clay films on faces of peds; moderately acid; clear wavy boundary.

Bt4—34 to 50 inches; dark yellowish brown (10YR 4/4) silt loam; common coarse faint brown (10YR 5/3) and common fine prominent yellowish red (5YR 4/6) masses of iron accumulation; weak coarse subangular blocky structure; friable; common fine roots; few faint dark yellowish brown (10YR 3/4) clay films on faces of peds; moderately acid; clear wavy boundary.

3C—50 to 60 inches; stratified brownish yellow (10YR 6/6) and yellowish brown (10YR 5/4) fine sand; thin strata of yellowish brown (10YR 5/4) loamy fine sand; single grain; loose; moderately acid.

The thickness of the silty alluvium, the depth to the base of the argillic horizon, and the depth to sandy alluvium range from 40 to 60 inches. The Ap or A horizon has value of 3 or 4 and chroma of 2 or 3. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam. The 3C horizon has hue of 7.5YR or 10YR, value of 4 to 8, and chroma of 2 to 6. It is stratified fine sand, sand, loamy fine sand, or loamy sand. Some pedons have thin strata of fine sandy loam or silt loam in the C horizon.

Kalmarville Series

The Kalmarville series consists of very deep, poorly drained soils on flood plains. These soils formed in recent loamy alluvium over sandy alluvium. Permeability is moderate or moderately rapid in the loamy alluvium and rapid in the sandy alluvium. Slopes are 0 to 1 percent.

Typical pedon of Kalmarville silt loam, 0 to 1 percent slopes, approximately 1,640 feet north and 440 feet east of the center of sec. 5, T. 19 N., R. 5 W.

A1—0 to 6 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; weak coarse granular structure; friable; many very fine to medium roots; few fine prominent dark red (2.5YR 3/6) masses of iron accumulation; slightly acid; clear smooth boundary.

A2—6 to 37 inches; dark gray (10YR 4/1) very fine sandy loam; common thin strata of grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) silt loam and fine sandy loam; massive but breaks to medium plates along depositional strata; friable; common very fine to medium roots; few coarse prominent dark red (2.5YR 3/6) masses of iron accumulation; slightly acid; clear smooth boundary.

Cg1—37 to 42 inches; light brownish gray (10YR 6/2) fine sandy loam; a few thin strata of grayish brown (10YR 5/2) very fine sandy loam and silt loam; massive but breaks to thick plates along depositional strata; friable; few medium prominent yellowish red (5YR 4/6) masses of iron accumulation; slightly acid; abrupt smooth boundary.

Cg2—42 to 60 inches; light brownish gray (10YR 6/2) sand; single grain; loose; slightly acid.

The thickness of the loamy alluvium and the depth

to sandy alluvium range from 40 to 60 inches. The A horizon has value of 2 or 3 and chroma of 1 or 2. The loamy upper part of the Cg horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is commonly stratified very fine sandy loam, silt loam, loam, fine sandy loam, or sandy loam but has thin strata of coarser textures in some pedons. The sandy lower part of the Cg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is sand, fine sand, or coarse sand.

Kert Series

The Kert series consists of somewhat poorly drained soils on pediments. These soils are moderately deep to interbedded sandstone and shale. They formed in loess and residuum derived from the underlying interbedded sandstone and shale. Permeability is moderate in the loess, moderately slow or moderate in the residuum, and extremely slow to moderately slow in the underlying interbedded sandstone and shale. Slopes range from 0 to 3 percent.

Typical pedon of Kert silt loam, 0 to 3 percent slopes, approximately 300 feet north and 2,300 feet west of the center of sec. 4, T. 22 N., R. 1 E.

Oe—0 to 1 inch; partially decomposed, very dark grayish brown (10YR 3/2) mucky peat (hemic material, which is a mat of forest litter); about 45 percent fiber, 20 percent rubbed; weak thin platy structure; nonsticky; many fine roots; very strongly acid; abrupt smooth boundary.

A—1 to 3 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; weak coarse granular structure; friable; many fine roots; very strongly acid; abrupt wavy boundary.

E—3 to 8 inches; brown (10YR 5/3) silt loam, light gray (10YR 7/2) dry; moderate medium subangular blocky structure parting to weak thin platy; friable; common fine roots; very strongly acid; clear wavy boundary.

B/E—8 to 19 inches; about 70 percent dark yellowish brown (10YR 4/4) silt loam (Bt); moderate medium subangular blocky structure; friable; common faint dark yellowish brown (10YR 3/4) clay films on faces of peds; penetrated by tongues of brown (10YR 5/3) silt loam (E), very pale brown (10YR 7/3) dry; weak medium subangular blocky structure; friable; common fine roots; few fine distinct and faint dark grayish brown (10YR 4/2) masses of iron depletion; common fine prominent yellowish red (5YR 5/8) masses of iron accumulation; very strongly acid; clear wavy boundary.

2Bt—19 to 31 inches; olive gray (5Y 5/2) silty clay loam; strong medium subangular blocky structure; firm; common fine roots; few prominent dark grayish brown (10YR 4/2) clay films on faces of peds; common fine prominent yellowish red (5YR 5/8) masses of iron accumulation; about 10 percent sandstone channers; more than 15 percent fine sand or coarser; very strongly acid; gradual wavy boundary.

2Cr—31 to 60 inches; light gray (5Y 7/2), interbedded sandstone and shale.

Thickness in this paragraph is measured from the top of the mineral soil. The thickness of the solum and the depth to interbedded sandstone and shale range from 20 to 40 inches. The thickness of the loess mantle and the depth to loamy residuum range from 12 to 24 inches.

The O horizon has hue of 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. The A or Ap horizon has value of 2 or 3 and chroma of 1 to 3. The E horizon has value of 4 to 6 and chroma of 2 or 3. It is silt loam or silt. Some pedons have an E/B horizon. The E part of the E/B or B/E horizon has colors and textures like those of the E horizon. The Bt horizon or the Bt part of the E/B or B/E horizon has hue of 7.5YR or 10YR and value and chroma of 4 or 5. Some pedons have a 2E/B or 2B/E horizon. The 2E part has hue of 5YR, 7.5YR, 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 2 or 3. It is loam, silty clay loam, or sandy clay loam. The 2Bt part has colors and textures like those of the 2Bt horizon. The 2Bt horizon has hue of 2.5YR, 5YR, 7.5YR, 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 2 to 6. It is dominantly silty clay loam, clay loam, sandy clay loam, or loam; in some pedons, however, it contains thin subhorizons of coarser or finer textures, which reflect the interbedding of the sandstone and shale. The volume of sandstone channers ranges from 0 to 15 percent in the 2Bt horizon.

La Farge Series

The La Farge series consists of well drained soils on bedrock-controlled uplands. These soils are moderately deep to sandstone bedrock (fig. 19). They formed mostly in loess and in loamy residuum derived from the underlying fine grained glauconitic sandstone. Permeability is moderate in the subsoil and slow to moderate in the underlying sandstone. Slopes range from 4 to 25 percent.

Typical pedon of La Farge silt loam, 4 to 12 percent slopes, eroded, approximately 700 feet north and 1,940 feet west of the center of sec. 34, T. 21 N., R. 6 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, brown (10YR 5/3) dry; moderate coarse subangular blocky structure; friable; common coarse and medium fragments of yellowish brown (10YR 5/4) subsoil material; many fine or medium roots; neutral; abrupt smooth boundary.

Bt1—6 to 10 inches; yellowish brown (10YR 5/4) silt loam; moderate very thick platy structure parting to moderate medium subangular blocky; friable; common very fine to medium roots; few faint dark yellowish brown (10YR 4/4) clay films on faces of peds; slightly acid; clear wavy boundary.

Bt2—10 to 22 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common very fine to medium roots; common faint dark yellowish brown (10YR 4/4) clay films on faces of peds; moderately acid; clear wavy boundary.

Bt3—22 to 28 inches; dark yellowish brown (10YR 4/4) silt loam; moderate coarse subangular blocky structure; friable; common very fine and fine roots; few faint dark yellowish brown (10YR 3/4) clay films on faces of peds; strongly acid; clear wavy boundary.

2Bt4—28 to 37 inches; olive brown (2.5Y 4/4) loam; weak coarse subangular blocky structure; friable; few very fine and fine roots; few distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; about 5 percent sandstone channers; strongly acid; abrupt wavy boundary.

2Cr—37 to 60 inches; yellowish brown (10YR 5/6), fine grained glauconitic sandstone.

The thickness of the loess mantle and the depth to sandstone bedrock range from 20 to 40 inches. The Ap horizon has value of 3 or 4 and chroma of 1 or 2. Some pedons have an E horizon, which has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam. The Bt horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 or 4. It is silt loam or silty clay loam. The 2Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 or 4. It is loam, sandy clay loam, sandy loam, or fine sandy loam. The volume of sandstone channers ranges from 0 to 15 percent in the 2Bt and 2BC horizons.

Loxley Series

The Loxley series consists of very deep, very poorly drained soils on lake plains. These soils formed in organic material more than 51 inches thick. Permeability is moderately slow to moderately rapid. Slopes are 0 to 1 percent.

Typical pedon of Loxley peat, 0 to 1 percent slopes, approximately 1,800 feet north and 800 feet east of the southwest corner of sec. 34, T. 20 N., R. 1 W.

Oi—0 to 4 inches; peat (fibric material), reddish brown (2.5YR 4/4) broken face and rubbed; about 70 percent fiber, 50 percent rubbed; weak very thick platy structure; nonsticky; many very fine to medium roots; some woody stems; extremely acid (pH 4.4 in water); abrupt smooth boundary.

Oa1—4 to 10 inches; muck (sapric material), black (5YR 2.5/1) broken face and rubbed; about 10 percent fibers, less than 5 percent rubbed; weak coarse granular structure; slightly sticky; many very fine and fine roots; extremely acid (pH 4.0 in water); clear wavy boundary.

Oa2—10 to 16 inches; muck (sapric material), black (N 2/0) broken face and rubbed; about 10 percent fibers, less than 5 percent rubbed; massive; slightly sticky; common very fine and fine roots; extremely acid (pH 4.2 in water); clear wavy boundary.

Oa3—16 to 52 inches; muck (sapric material), black (10YR 2/1) broken face and rubbed; about 40 percent fibers, 10 percent rubbed; massive; slightly sticky; extremely acid (pH 4.4 in water); clear wavy boundary.

Oe—52 to 60 inches; mucky peat (hemic material), very dark grayish brown (10YR 3/2) broken face and rubbed; about 70 percent fibers, about 20 percent rubbed; massive; nonsticky; extremely acid (pH 4.4 in water).

The thickness of the organic material is more than 51 inches. The peat and mucky peat have hue of 2.5YR, 5YR, 7.5YR, or 10YR, value of 3 to 5, and chroma of 2 to 4. The muck has hue of 5YR, 7.5YR, or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2.

Ludington Series

The Ludington series consists of moderately well drained soils on pediments. These soils are moderately deep to interbedded sandstone and shale bedrock. They formed in siliceous sandy alluvium and in loamy residuum derived from the underlying interbedded sandstone and shale. Permeability is rapid in the sandy alluvium, moderately slow or moderate in the loamy residuum, and extremely slow to moderately slow in the underlying interbedded

sandstone and shale. Slopes range from 1 to 6 percent.

Typical pedon of Ludington sand, 1 to 6 percent slopes, approximately 1,700 feet south and 400 feet east of the northwest corner of sec. 8, T. 22 N., R. 1 W.

Oe—0 to 2 inches; very dark grayish brown (10YR 3/2) mucky peat (hemic material, which is a mat of partially decomposed leaf and grass litter); about 50 percent fiber, 25 percent rubbed; weak thin platy structure; nonsticky; very strongly acid; abrupt wavy boundary.

A—2 to 4 inches; very dark gray (10YR 3/1) sand, dark gray (10YR 4/1) dry; weak fine granular structure; very friable; common very fine and fine roots; strongly acid; abrupt smooth boundary.

E—4 to 6 inches; grayish brown (10YR 5/2) sand, light gray (10YR 7/2) dry; weak fine subangular blocky structure; very friable; common fine roots; strongly acid; abrupt wavy boundary.

Bs1—6 to 12 inches; dark brown (7.5YR 4/4) sand; weak fine subangular blocky structure; very friable; common fine roots; strongly acid; abrupt wavy boundary.

Bs2—12 to 20 inches; brown (7.5YR 5/4) sand; weak fine subangular blocky structure; very friable; common fine roots; strongly acid; clear wavy boundary.

Bw—20 to 28 inches; yellowish brown (7.5YR 5/6) sand; weak fine subangular blocky structure; very friable; common fine roots; common medium faint brownish yellow (7.5YR 6/6) masses of iron accumulation; strongly acid; clear smooth boundary.

2Bt—28 to 39 inches; pale olive (5Y 6/3) clay loam; strong medium subangular blocky structure; firm; few very fine roots; common distinct dark grayish brown (2.5Y 4/2) clay films on faces of peds; many fine prominent yellowish brown (10YR 5/8) masses of iron accumulation; about 5 percent sandstone channers; very strongly acid; abrupt smooth boundary.

2Cr—39 to 60 inches; very pale brown (10YR 7/4), interbedded sandstone and shale.

Thickness and depth in this paragraph are measured from the top of the mineral soil. The thickness of the sandy mantle and the depth to loamy residuum range from 15 to 39 inches. The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The volume of sandstone channers ranges from 0 to 15 percent in the sandy alluvium and from 3 to 15 percent in the residuum.

The O horizon has hue of 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 or 1. The A or Ap horizon has value of 2 or 3 and chroma of 1 or 2. The E horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 or 3. It is sand or loamy sand. The Bs horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 3 or 4. It is sand or loamy sand. The Bw horizon has hue of 7.5YR or 10YR and value and chroma of 5 or 6. It is sand or loamy sand. The 2Bt horizon has hue of 2.5YR, 5YR, 7.5YR, 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 2 to 4. It is mostly clay loam, loam, sandy clay loam, sandy loam, fine sandy loam, or very fine sandy loam; in some pedons, however, it has subhorizons of coarser or finer textures, which reflect the interbedding of the sandstone and shale.

Mahtomedi Series

The Mahtomedi series consists of very deep, excessively drained, rapidly permeable soils on stream terraces. These soils formed in sandy outwash. Slopes range from 0 to 6 percent.

Typical pedon of Mahtomedi loamy sand, 0 to 6 percent slopes, approximately 75 feet south and 50 feet east of the northwest corner of sec. 16, T. 22 N., R. 3 W.

A—0 to 4 inches; very dark brown (10YR 2/2) loamy sand, very dark grayish brown (10YR 3/2) dry; weak medium granular structure; very friable; many fine roots; about 5 percent gravel; strongly acid; clear wavy boundary.

Bw1—4 to 7 inches; dark yellowish brown (10YR 3/4) sand, pale brown (10YR 6/3) dry; weak coarse subangular blocky structure; very friable; common fine roots; about 5 percent gravel; strongly acid; clear wavy boundary.

Bw2—7 to 20 inches; dark brown (7.5YR 4/4) sand; weak fine subangular blocky structure; very friable; common fine roots; about 10 percent gravel; strongly acid; clear smooth boundary.

BC—20 to 26 inches; strong brown (7.5YR 5/6) gravelly coarse sand; single grain; loose; about 20 percent gravel; strongly acid; clear smooth boundary.

C—26 to 60 inches; light brown (7.5YR 6/4), stratified gravelly sand and very gravelly sand; single grain; loose; an average of about 30 percent gravel; moderately acid.

The thickness of the solum ranges from 20 to 36 inches. The volume of gravel ranges from 0 to 20 percent in the upper part of the solum and from 10 to 50 percent in the lower part of the solum and in the substratum. The A horizon has hue of 7.5YR or

10YR, value of 2 or 3, and chroma of 1 or 2. The Bw and BC horizons have hue of 5YR, 7.5YR, or 10YR, value of 3 to 5, and chroma of 4 to 6. The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. The Bw horizon is typically sand, coarse sand, or loamy sand, but it is the gravelly analogs of these textures in some pedons. The BC and C horizons are mainly gravelly or very gravelly sand or coarse sand.

Majik Series

The Majik series consists of very deep, somewhat poorly drained, rapidly permeable soils on stream terraces. These soils formed in siliceous sandy alluvium. Slopes range from 0 to 3 percent.

Typical pedon of Majik loamy fine sand, 0 to 3 percent slopes, approximately 200 feet north and 200 feet east of the southwest corner of sec. 5, T. 21 N., R. 5 W.

A—0 to 4 inches; very dark brown (10YR 2/2) loamy fine sand, dark grayish brown (10YR 4/2) dry; weak very fine subangular blocky structure; very friable; many very fine to coarse roots; common clean sand grains; extremely acid; abrupt wavy boundary.

E—4 to 7 inches; dark grayish brown (10YR 4/2) loamy fine sand, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; very friable; many very fine to coarse roots; extremely acid; abrupt wavy boundary.

Bw1—7 to 14 inches; dark yellowish brown (10YR 4/4) loamy fine sand; weak medium subangular blocky structure; very friable; many very fine to coarse roots; extremely acid; clear wavy boundary.

Bw2—14 to 18 inches; yellowish brown (10YR 5/4) fine sand; weak coarse subangular blocky structure; very friable; common very fine and fine roots; common medium prominent strong brown (7.5YR 5/8) masses of iron accumulation; extremely acid; clear wavy boundary.

Bw3—18 to 23 inches; yellowish brown (10YR 5/6) fine sand; weak coarse subangular blocky structure; very friable; common very fine and fine roots; many coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation; very strongly acid; clear wavy boundary.

BC—23 to 29 inches; reddish yellow (7.5YR 6/8) fine sand; single grain; loose; few very fine and fine roots; many coarse prominent red (2.5YR 4/6) masses of iron accumulation; very strongly acid; clear wavy boundary.

C—29 to 60 inches; white (10YR 8/2) fine sand; single grain; loose; common medium prominent reddish yellow (7.5YR 6/8) masses of iron accumulation; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches. The volume of gravel or sandstone channers ranges from 0 to 15 percent throughout the profile. The A horizon has hue of 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. Some pedons have an Ap horizon, which has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. This horizon is loamy fine sand. The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 or 3. It is fine sand, loamy fine sand, or sand. The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. It is loamy fine sand, fine sand, loamy sand, or sand. The BC horizon has hue of 7.5YR or 10YR, value of 4 to 8, and chroma of 2 to 8. It is sand or fine sand. The C horizon has hue of 7.5YR or 10YR, value of 4 to 8, and chroma of 2 to 8. It is fine sand or sand.

Merimod Series

The Merimod series consists of very deep, moderately well drained soils on stream terraces and pediments (fig. 20). These soils formed in silty alluvium and in the underlying loamy alluvium, which is underlain by siliceous sandy alluvium. Permeability is moderate in the silty and loamy alluvium and rapid in the sandy alluvium. Slopes range from 0 to 3 percent.

Typical pedon of Merimod silt loam, 0 to 3 percent slopes, about 1,100 feet south and 1,600 feet east of the northwest corner of sec. 8, T. 23 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; friable; common fine and medium roots; slightly acid; clear smooth boundary.

Bt1—9 to 13 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine subangular blocky structure; friable; common very fine and fine roots; few faint dark brown (7.5YR 4/3) clay films on faces of peds; strongly acid; clear wavy boundary.

Bt2—13 to 17 inches; dark brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; many faint dark brown (7.5YR 4/3) clay films on faces of peds; very strongly acid; clear wavy boundary.

2Bt3—17 to 29 inches; dark brown (7.5YR 4/4) loam;

moderate medium subangular blocky structure; friable; common very fine and fine roots; many faint dark brown (7.5YR 4/3) clay films on faces of peds; very strongly acid; abrupt smooth boundary.

2Bt4—29 to 32 inches; dark yellowish brown (10YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; few very fine and fine roots; common distinct dark brown (7.5YR 4/4) clay films on faces of peds; very strongly acid; abrupt wavy boundary.

3C1—32 to 52 inches; yellowish brown (10YR 5/6) sand; single grain; loose; few strata of dark yellowish brown (10YR 4/4) loamy sand (1/8 inch thick); strongly acid; clear wavy boundary.

3C2—52 to 60 inches; brownish yellow (10YR 6/6) sand; single grain; loose; common medium distinct light yellowish brown (10YR 6/4) masses of iron depletion and many coarse distinct yellowish brown (10YR 5/8) masses of iron accumulation; moderately acid.

The thickness of the silty alluvium ranges from 10 to 24 inches. The depth to siliceous sandy alluvium ranges from 25 to 40 inches. The Ap or A horizon has value of 2 or 3 and chroma of 1 to 3. Some pedons have an E horizon, which has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 or 3. This horizon is silt loam. The Bt horizon has hue of 7.5YR or 10YR and value of 3 or 4. The 2Bt horizon has colors like those of the Bt horizon. It is loam, sandy loam, or sandy clay loam. Some pedons have a 3Bt or 3BC horizon, which has hue of 7.5YR or 10YR and value and chroma of 4 to 6. The 3C horizon has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 3 to 8. It is sand or fine sand. Some pedons have thin strata of sandy loam, fine sandy loam, loamy sand, or loamy fine sand in the 3C horizon.

Merit Series

The Merit series consists of very deep, well drained soils on stream terraces and pediments. These soils formed in silty alluvium and in the underlying loamy alluvium, which is underlain by siliceous sandy alluvium. Permeability is moderate in the silty and loamy alluvium and rapid in the sandy alluvium. Slopes range from 0 to 6 percent.

Typical pedon of Merit silt loam, in an area of Merit-Gardenvale silt loams, 1 to 6 percent slopes, approximately 2,100 feet south and 400 feet west of the northeast corner of sec. 15, T. 22 N., R. 5 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; friable; common fine and medium roots; very strongly acid; clear smooth boundary.

Bt1—9 to 12 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine subangular blocky structure; friable; common fine and medium roots; common faint dark yellowish brown (10YR 3/4) clay films on faces of peds; clean silt grains coating faces of peds; very strongly acid; clear wavy boundary.

2Bt2—12 to 20 inches; dark brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; common distinct dark reddish brown (5YR 3/3) clay films on faces of peds; very strongly acid; clear wavy boundary.

2Bt3—20 to 30 inches; dark brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable; few very fine roots; common distinct dark reddish brown (5YR 3/3) clay films on faces of peds; very strongly acid; gradual wavy boundary.

3C—30 to 60 inches; strong brown (7.5YR 5/6) sand; single grain; loose; very strongly acid.

The thickness of the solum ranges from 25 to 35 inches. The Ap or A horizon has value of 2 or 3 and chroma of 1 to 3. Some pedons have an E horizon, which has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 or 3. It is silt loam. The Bt horizon has hue of 7.5YR or 10YR and value of 4 or 5. The 2Bt horizon has colors like those of the Bt horizon. It is loam, sandy loam, or sandy clay loam. Some pedons have a 3Bt or 3BC horizon, which has hue of 7.5YR or 10YR and value and chroma of 4 to 6. This horizon is loamy sand or sand. The 3C horizon has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 3 to 6. It is sand or fine sand. Some pedons have thin strata of sandy loam, fine sandy loam, loamy sand, or loamy fine sand in the 3C horizon.

Merrillan Series

The Merrillan series consists of somewhat poorly drained soils on pediments. These soils are moderately deep to interbedded sandstone and shale bedrock. They formed in loamy alluvium and in clayey residuum derived from the underlying interbedded sandstone and shale. Permeability is moderate or moderately rapid in the loamy alluvium, slow in the clayey residuum, and extremely slow to moderately slow in the underlying interbedded sandstone and shale. Slopes range from 0 to 3 percent.

Typical pedon of Merrillan fine sandy loam, in an area of Merrillan-Veedum complex, 0 to 3 percent

slopes, approximately 2,310 feet north and 150 feet east of the southwest corner of sec. 13, T. 22 N., R. 1 E.

Oe—0 to 1 inch; very dark grayish brown (10YR 3/2) mucky peat (hemic material, which is a mat of partially decomposed leaf and grass litter); weak thin platy structure; nonsticky; very strongly acid; abrupt wavy boundary.

A—1 to 4 inches; very dark brown (10YR 2/2) fine sandy loam, very dark grayish brown (10YR 4/2) dry; weak medium granular structure; very friable; many very fine to coarse roots; very strongly acid; abrupt smooth boundary.

E—4 to 6 inches; grayish brown (10YR 5/2) fine sandy loam, light gray (10YR 7/2) dry; weak thick platy structure; very friable; many very fine to coarse roots; very strongly acid; abrupt smooth boundary.

Bs1—6 to 10 inches; dark brown (7.5YR 3/4) fine sandy loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; strongly acid; clear wavy boundary.

Bs2—10 to 15 inches; dark brown (7.5YR 4/4) fine sandy loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; common fine distinct grayish brown (10YR 5/2) masses of iron accumulation; extremely acid; clear wavy boundary.

2Bt1—15 to 21 inches; pale brown (10YR 6/3) silty clay loam; moderate medium subangular blocky structure; firm; few very fine and fine roots; many faint grayish brown (10YR 5/2) clay films on faces of peds; common fine prominent strong brown (7.5YR 5/8) masses of iron accumulation; extremely acid; clear wavy boundary.

2Bt2—21 to 31 inches; light brownish gray (2.5Y 6/2) clay loam; moderate coarse subangular blocky structure; firm; few very fine roots; few faint grayish brown (2.5Y 5/2) clay films on faces of peds; common coarse prominent reddish yellow (7.5YR 6/8) masses of iron accumulation; about 8 percent sandstone channers; extremely acid; gradual wavy boundary.

2Cr—31 to 60 inches; light olive gray (5Y 6/2) and olive gray (5Y 5/2), interbedded sandstone and shale.

Thickness and depth in this paragraph are measured from the top of the mineral soil. The thickness of the solum and the depth to interbedded sandstone and shale range from 20 to 40 inches. The volume of channers and gravel ranges from 0 to 10 percent in the residuum. The depth to residuum derived from the underlying interbedded sandstone and shale ranges from 15 to 34 inches.

The O horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 3. The A horizon has value of 2 or 3 and chroma of 1 or 2. The E horizon has value of 4 to 6 and chroma of 2 or 3. It is fine sandy loam or sandy loam. The Bs horizon has value of 3 to 5 and chroma of 3 or 4. Some pedons have a Bhs horizon, which has value and chroma of 2 or 3. The Bs or Bhs horizon is fine sandy loam or sandy loam. The 2Bt horizon has hue of 2.5YR, 5YR, 7.5YR, 10YR, 2.5Y, or 5Y, value of 4 to 8, and chroma of 2 to 6. It is dominantly silty clay loam, clay loam, silty clay, or clay loam; in some pedons, however, it has subhorizons of coarser or finer textures, which reflect the interbedding of the sandstone and shale.

Moppet Series

The Moppet series consists of very deep, moderately well drained soils on flood plains. These soils formed in loamy alluvium overlying sandy alluvium. Permeability is moderate or moderately rapid in the loamy alluvium and rapid in the sandy alluvium. Slopes range from 0 to 3 percent.

Typical pedon of Moppet fine sandy loam, in an area of Moppet-Fordum complex, 0 to 3 percent slopes, approximately 2,600 feet north of the southwest corner of sec. 20, T. 22 N., R. 1 E.

A—0 to 4 inches; dark brown (7.5YR 3/2) fine sandy loam, pinkish gray (7.5YR 6/2) dry; weak medium subangular blocky structure; very friable; common fine and very fine roots; very strongly acid; abrupt wavy boundary.

Bw1—4 to 19 inches; dark brown (7.5YR 3/4) fine sandy loam; weak medium subangular blocky structure; very friable; common fine and very fine roots; few thin strata of loamy fine sand in the lower 4 inches; very strongly acid; clear wavy boundary.

Bw2—19 to 32 inches; strong brown (7.5YR 4/6) fine sandy loam; weak coarse subangular blocky structure; very friable; few fine and very fine roots; few fine distinct yellowish brown (10YR 5/6) masses of iron accumulation; few thin strata of pale brown (10YR 6/3) loamy fine sand; very strongly acid; gradual wavy boundary.

2C1—32 to 45 inches; strong brown (7.5YR 5/6) loamy fine sand; single grain; loose; common medium distinct strong brown (7.5YR 5/8) masses of iron accumulation; moderately acid; gradual wavy boundary.

2C2—45 to 60 inches; strong brown (7.5YR 6/6) sand; single grain; loose; common coarse distinct reddish yellow (7.5YR 6/8) masses of iron accumulation; slightly acid.

The thickness of the loamy mantle and the depth to sandy alluvium range from 24 to 40 inches. The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 or 3. The Bw horizon has hue of 5YR, 7.5YR, or 10YR, value of 3 to 5, and chroma of 4 to 6. It is mostly fine sandy loam, sandy loam, or loam in the upper part and sand, loamy sand, or loamy fine sand in the lower part. The volume of gravel in the C horizon ranges from 0 to 15 percent.

Newlang Series

The Newlang series consists of very deep, poorly drained, rapidly permeable soils on flood plains. These soils formed dominantly in siliceous sandy alluvium. Slopes range from 0 to 2 percent.

Typical pedon of Newlang muck, 0 to 2 percent slopes, approximately 1,700 feet east of the center of sec. 20, T. 21 N., R. 5 W.

Oa—0 to 3 inches; black (10YR 2/1) muck, black (10YR 2/1) dry; weak coarse granular structure; very friable; many very fine and fine roots; few clean sand grains; very strongly acid; clear wavy boundary.

A—3 to 6 inches; black (10YR 2/1) loamy sand, black (10YR 2/1) dry; weak medium granular structure; very friable; many very fine to coarse roots; many clean sand grains; extremely acid; clear wavy boundary.

Bg—6 to 22 inches; dark grayish brown (10YR 4/2) sand; weak coarse subangular blocky structure; very friable; common very fine to coarse roots; many faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine prominent reddish brown (5YR 4/4) masses of iron accumulation along root channels; very strongly acid; clear wavy boundary.

C—22 to 63 inches; pale brown (10YR 6/3) sand; single grain; loose; the color is that of the uncoated sand grains; slightly acid.

Thickness in this paragraph is measured from the top of the mineral soil. The thickness of the solum ranges from 20 to 30 inches. The volume of chert gravel or sandstone channers ranges from 0 to 15 percent throughout the profile.

The O horizon has hue of 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. Some pedons do not have an Oa horizon. The A horizon has hue of 7.5YR, 10YR, or 2.5Y or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. The texture is mucky sand, mucky loamy sand, sand, or loamy sand. The Bg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. It is sand or loamy sand. The C or Cg horizon has hue of 10YR or 2.5Y, value of 4 to 8, and chroma of 2 to 6. It is sand or loamy sand.

Northbend Series

The Northbend series consists of very deep, somewhat poorly drained soils on flood plains along rivers and large streams. These soils formed in mostly silty and loamy alluvium and in the underlying sandy alluvium. Permeability is moderate or moderately rapid in the silty and loamy alluvium and rapid in the sandy alluvium. Slopes range from 0 to 3 percent.

Typical pedon of Northbend silt loam, in an area of Absco-Northbend complex, 0 to 3 percent slopes, approximately 700 feet south and 100 feet east of the northwest corner of sec. 20, T. 19 N., R. 5 W.

A—0 to 7 inches; dark brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; weak medium granular structure; friable; many very fine, fine, and medium roots; extremely acid; abrupt irregular boundary.

Bw1—7 to 19 inches; dark brown (7.5YR 4/4) silt loam; weak medium subangular blocky structure; friable; common very fine and fine and few medium roots; few medium prominent yellowish red (5YR 5/6) masses of iron accumulation; extremely acid; clear wavy boundary.

Bw2—19 to 34 inches; dark brown (7.5YR 4/4) loam; weak medium subangular blocky structure; friable; few very fine and fine roots; few fine prominent yellowish red (5YR 5/6) masses of iron accumulation; common fine prominent light brownish gray (10YR 6/2) masses of iron depletion; few thin (less than 1/8 inch) discontinuous strata of very dark grayish brown (10YR 3/2) silt loam; extremely acid; clear wavy boundary.

2BC—34 to 36 inches; dark brown (7.5YR 4/4) loamy fine sand; weak coarse subangular blocky structure; very friable; few very fine and fine roots; common medium prominent yellowish red (5YR 5/6) masses of iron accumulation and light brownish gray (10YR 6/2) masses of iron depletion; very strongly acid; clear wavy boundary.

2C1—36 to 44 inches; brown (10YR 5/3) sand; single

grain; loose; common medium prominent yellowish red (5YR 5/6) masses of iron accumulation; very strongly acid; clear wavy boundary.

2C2—44 to 60 inches; very pale brown (10YR 7/4) sand; single grain; loose; common medium prominent yellowish red (5YR 5/6) masses of iron accumulation; few thin (less than 1/2 inch) discontinuous strata of dark brown (7.5YR 6/3) loamy sand; very strongly acid.

The thickness of the loamy mantle and the depth to sand range from 20 to 40 inches. The A horizon has hue of 7.5YR or 10YR and value and chroma of 2 or 3. The Bw horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is typically silt loam or loam, but in some pedons it is very fine sandy loam, fine sandy loam, or sandy loam. The 2BC horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 to 8, and chroma of 1 to 8. It is loamy sand or loamy fine sand. The 2C horizon has colors like those of the 2BC horizon. It is sand or fine sand. Some pedons have thin strata of finer textured material in the 2C horizon.

Orion Series

The Orion series consists of very deep, somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in light colored, mostly silty alluvium overlying a buried soil with a dark A horizon. Slopes range from 0 to 3 percent.

Typical pedon of Orion silt loam, 0 to 3 percent slopes, approximately 1,040 feet south and 2,340 feet east of the northwest corner of sec. 8, T. 19 N., R. 6 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak coarse subangular blocky structure; friable; common very fine to coarse roots; slightly acid; abrupt smooth boundary.

C—8 to 32 inches; stratified dark brown (10YR 4/3) and dark grayish brown (10YR 4/2) silt loam that has thin strata of light brownish gray (10YR 6/2) very fine sand; massive breaking to thick plates along depositional strata; friable; common very fine and fine roots; few medium prominent dark reddish brown (5YR 3/4) masses of iron accumulation and few medium faint light brownish gray (10YR 6/2) masses of iron depletion; neutral; abrupt smooth boundary.

Ab—32 to 40 inches; black (10YR 2/1) silt loam; common medium distinct grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure breaking to very thick plates along depositional strata; friable; slightly acid; clear smooth boundary.

Cg—40 to 60 inches; light brownish gray (10YR 6/2) silt loam; massive; friable; common coarse prominent yellowish red (5YR 5/6) masses of iron accumulation; slightly acid.

The thickness of the light colored silty alluvium and the depth to the Ab horizon range from 20 to 60 inches. The Ap or A horizon has value of 3 to 6 and chroma of 2 or 3. It is mostly silt loam, but thin strata of silt, loam, very fine sandy loam, loamy very fine sand, or very fine sand are in the A horizon in some pedons. The C horizon typically has color or texture strata, or both. Individual strata have value of 3 to 5 and chroma of 2 or 3. The texture is mostly silt loam, but thin strata of silt, loam, very fine sandy loam, loamy very fine sand, or very fine sand are in most pedons. The Ab horizon has value of 2 or 3 and chroma of 1 or 2. It is silt loam or silty clay loam. Some pedons have a Bgb horizon. This horizon has colors and textures like those of the Cg horizon. The Cg horizon has hue of 10YR, 2.5Y, 5Y, 5GY, 5G, 5BG, or 5B or is neutral in hue. It has value of 4 to 6 and chroma of 0 to 2. It is typically silt loam, but in some pedons it has thin strata of silt loam, very fine sandy loam, loamy very fine sand, or very fine sand.

Palms Series

The Palms series consists of very deep, very poorly drained soils on flood plains. These soils formed in organic material overlying silty or loamy deposits. Permeability is moderately slow to moderately rapid in the organic layers and moderately slow or moderate in the loamy substratum. Slopes are 0 to 1 percent.

Typical pedon of Palms muck, 0 to 1 percent slopes, approximately 300 feet south and 2,350 feet east of the northwest corner of sec. 22, T. 22 N., R. 6 W.

Oa1—0 to 4 inches; muck (sapric material), black (N 2/0) broken face and rubbed; about 70 percent fiber, about 12 percent rubbed; weak fine subangular blocky structure; nonsticky; primarily herbaceous fibers; many fine to coarse roots; strongly acid (pH 5.5 in water); clear smooth boundary.

Oa2—4 to 22 inches; muck (sapric material), black (N 2/0) broken face and rubbed; about 35 percent fiber, about 5 percent rubbed; weak medium subangular blocky structure; nonsticky; primarily herbaceous fibers; many fine to coarse roots;

moderately acid (pH 5.8 in water); clear wavy boundary.

Oa3—22 to 32 inches; muck (sapric material), black (10YR 2/1) broken face and rubbed; about 75 percent fiber, about 7 percent rubbed; weak thick platy structure; nonsticky; primarily herbaceous fibers; moderately acid (pH 5.8 in water); clear smooth boundary.

Oa4—32 to 40 inches; muck (sapric material), black (10YR 2/1) broken face and rubbed; about 20 percent fiber, about 3 percent rubbed; weak coarse subangular blocky structure; nonsticky; primarily herbaceous fibers; 10 to 15 percent mineral material; moderately acid (pH 5.8 in water); abrupt smooth boundary.

C—40 to 60 inches; dark gray (5Y 4/1) silt loam; massive; friable; neutral.

The thickness of the organic material ranges from 16 to 51 inches and coincides with the depth to the silty or loamy deposits. The organic material is dominantly muck, but some pedons have thin layers of mucky peat or peat. The muck has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. The 2C horizon has hue of 10YR, 2.5Y, or 5Y, value of 3 to 7, and chroma of 1 or 2. It is silt loam, loam, or sandy loam.

Ponycreek Series

The Ponycreek series consists of very deep, poorly drained soils on stream terraces and pediments. These soils formed in siliceous sandy alluvium. Permeability is rapid or very rapid. Slopes range from 0 to 2 percent.

Typical pedon of Ponycreek muck, in an area of Ironrun-Ponycreek complex, 0 to 3 percent slopes, approximately 2,000 feet south and 400 feet west of the center of sec. 23, T. 21 N., R. 1 W.

Oa—0 to 4 inches; muck (sapric material), black (10YR 2/1) broken face and rubbed; about 10 percent fiber, 5 percent rubbed; weak medium granular structure; nonsticky; many fine roots; a few clean sand grains; very strongly acid; abrupt wavy boundary.

A—4 to 6 inches; black (10YR 2/1) mucky sand, very dark gray (10YR 3/1) dry; moderate medium subangular blocky structure; very friable; common very fine and fine roots; very strongly acid; abrupt wavy boundary.

Bg—6 to 29 inches; dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) sand; weak coarse subangular blocky structure; very friable; common very fine and fine roots; few medium prominent yellowish brown (10YR 5/8) masses of iron accumulation; strongly acid; clear irregular boundary.

C—29 to 64 inches; light yellowish brown (2.5Y 6/4) sand; single grain; loose; the color is that of the uncoated sand grains; strongly acid.

The thickness of the solum, measured from the top of the mineral soil, ranges from 20 to 36 inches. The Oa horizon has hue of 5YR, 7.5YR, or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. The A horizon has hue of 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. The Bg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. It is sand or coarse sand. The C or Cg horizon has hue of 10YR or 2.5Y, value of 4 to 8, and chroma of 1 to 8. It is sand or coarse sand.

Rockdam Series

The Rockdam series consists of very deep, moderately well drained soils on stream terraces and pediments. These soils formed in siliceous sandy alluvium or residuum derived from sandstone (fig. 21). Permeability is rapid or very rapid. Slopes range from 0 to 3 percent.

Typical pedon of Rockdam sand, 0 to 3 percent slopes, approximately 2,400 feet north and 1,640 feet east of the southwest corner of sec. 34, T. 20 N., R. 1 E.

Oe—0 to 1 inch; very dark grayish brown (10YR 3/2) mucky peat (hemic material, which is a mat of partially decomposed forest litter); about 60 percent fiber, 20 percent rubbed; weak thin platy structure; nonsticky; very strongly acid; abrupt wavy boundary.

A—1 to 3 inches; very dark gray (10YR 3/1) sand, gray (10YR 5/1) dry; weak fine granular structure; very friable; many fine to coarse roots; very strongly acid; abrupt smooth boundary.

E—3 to 6 inches; dark grayish brown (10YR 4/2) sand, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; very friable; many fine and medium roots; very strongly acid; abrupt wavy boundary.

Bs1—6 to 10 inches; dark brown (7.5YR 3/4) sand; weak medium and coarse subangular blocky structure; very friable; common very fine and fine roots; very strongly acid; clear wavy boundary.

Bs2—10 to 19 inches; dark brown (7.5YR 4/4) sand; weak medium subangular blocky structure; very friable; common very fine and fine roots; strongly acid; clear wavy boundary.

Bw—19 to 27 inches; yellowish brown (10YR 5/4) sand; weak coarse subangular blocky structure; very friable; few fine roots; strongly acid; clear wavy boundary.
C1—27 to 43 inches; brownish yellow (10YR 6/6) sand; single grain; loose; moderately acid; clear wavy boundary.
C2—43 to 53 inches; yellow (10YR 7/6) sand; single grain; loose; common fine prominent reddish yellow (7.5YR 6/8) masses of iron accumulation; slightly acid; clear smooth boundary.
C3—53 to 61 inches; light gray (10YR 7/2) sand; single grain; loose; common coarse distinct very pale brown (10YR 7/4) masses of iron accumulation; slightly acid.

The thickness of the solum, measured from the top of the mineral soil, ranges from 20 to 40 inches. The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 or 3. It is sand or coarse sand. The Bs horizon has hue of 7.5YR and value of 3 or 4. It is sand or coarse sand. The Bw or BC horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is sand or coarse sand. The C horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 2 to 8. It is sand or coarse sand.

Rowley Series

The Rowley series consists of very deep, somewhat poorly drained soils on stream terraces and pediments. These soils formed dominantly in silty alluvium overlying sandy alluvium. Permeability is moderate in the silty and loamy alluvium and rapid in the sandy alluvium. Slopes range from 0 to 3 percent.

Typical pedon of Rowley silt loam, 0 to 3 percent slopes, approximately 350 feet north and 1,600 feet west of the southeast corner of sec. 25, T. 23 N., R. 5 W.

Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; common very fine roots; neutral; abrupt smooth boundary.
Btg1—11 to 16 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium subangular blocky structure; friable; common very fine roots; common faint dark brown (10YR 4/3) clay films on faces of peds; common medium prominent yellowish red (5YR 5/6) masses of iron accumulation; moderately acid; clear wavy boundary.
Btg2—16 to 26 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium subangular blocky structure; friable; few very fine roots; many faint dark brown (10YR 4/3) clay films on faces of peds; many medium prominent strong brown (7.5YR 5/6 and 5/8) masses of iron accumulation and many medium faint light brownish gray (10YR 6/2) masses of iron depletion; moderately acid; clear wavy boundary.
Btg3—26 to 38 inches; grayish brown (10YR 5/2) silt loam; moderate fine subangular blocky structure; friable; many faint brown (10YR 4/3) clay films on faces of peds; few fine prominent strong brown (7.5YR 5/6) masses of iron accumulation and common medium faint light gray (10YR 7/2) masses of iron depletion; moderately acid; clear wavy boundary.
2Btg4—38 to 50 inches; light brownish gray (10YR 6/2) silt loam that has strata of yellowish brown (10YR 5/6) sand; weak medium subangular blocky structure; friable; few faint brown (10YR 4/3) clay films on faces of peds; common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation; moderately acid; abrupt smooth boundary.
3C—50 to 60 inches; yellowish brown (10YR 5/6) sand; single grain; loose; slightly acid.

The thickness of the solum and the depth to sandy alluvium range from 40 to 60 inches. The Ap or A horizon, if it occurs, has value of 2 or 3 and chroma of 1 to 3. The Btg or Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3. The 2Btg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. It is typically stratified, dominantly with silt loam, loam, or sandy loam that has strata of coarser textured material. The 3C horizon has hue of 10YR or 2.5Y, value of 4 to 8, and chroma of 2 to 6. It is sand or fine sand.

Seaton Series

The Seaton series consists of very deep, well drained soils on uplands. These soils formed in loess. Permeability is moderate. Slopes range from 2 to 30 percent.

Typical pedon of Seaton silt loam, 6 to 12 percent slopes, eroded, approximately 1,740 feet west and 740 feet south of the center of sec. 19, T. 19 N., R. 5 W.

Ap—0 to 9 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak medium subangular blocky structure; friable; many fine roots; common coarse and medium fragments of

dark brown (7.5YR 4/4) subsoil material; neutral; abrupt smooth boundary.

Bt1—9 to 24 inches; brown (7.5YR 4/4) silt loam; moderate fine subangular blocky structure; friable; common fine roots; many faint dark brown (7.5YR 3/4) clay films on faces of peds; slightly acid; clear wavy boundary.

Bt2—24 to 34 inches; brown (7.5YR 3/4) silt loam; moderate medium subangular blocky structure; friable; common fine roots; many faint dark brown (7.5YR 4/4) clay films on faces of peds; moderately acid; clear wavy boundary.

Bt3—34 to 46 inches; dark yellowish brown (10YR 4/4) silt loam; moderate coarse subangular blocky structure; friable; few fine roots; common distinct dark brown (7.5YR 4/4) clay films on faces of peds and in pores; common coarse prominent strong brown (7.5YR 5/8) and common coarse prominent yellowish red (5YR 5/6) relict masses of iron accumulation; moderately acid; clear wavy boundary.

C—46 to 60 inches; pale brown (10YR 6/3) silt loam; massive; friable; common coarse prominent strong brown (7.5YR 5/8) relict masses of iron accumulation; few fine roots; moderately acid.

The thickness of the solum ranges from 42 to 70 inches. The Ap or A horizon, if it occurs, has value of 2 to 4 and chroma of 2 or 3. Some pedons have an E horizon, which has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. This horizon is silt loam. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. The C horizon has value of 4 to 6 and chroma of 3 to 6.

Sebbo Series

The Sebbo series consists of very deep, moderately well drained soils on stream terraces and pediments. These soils formed in loamy and silty colluvium. Permeability is moderate. Slopes range from 1 to 6 percent.

Typical pedon of Sebbo loam, 1 to 6 percent slopes, approximately 2,425 feet south and 2,455 feet west of the northeast corner of sec. 9, T. 19 N., R. 5 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, pale brown (10YR 5/3) dry; weak coarse subangular blocky structure; friable; common very fine roots; moderately acid; abrupt wavy boundary.

Bt1—9 to 24 inches; dark brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable; common very fine roots; few faint dark brown (7.5YR 3/4) clay films on faces of peds; common distinct strong brown (7.5YR 5/6), clean sand grains coating vertical faces of some peds; moderately acid; clear wavy boundary.

Bt2—24 to 32 inches; dark brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable; few very fine roots; common faint dark brown (7.5YR 3/4) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt3—32 to 38 inches; yellowish brown (10YR 5/4) loam; weak medium subangular blocky structure; friable; few very fine roots; common prominent dark brown (7.5YR 3/4) clay films on faces of peds; common medium prominent dark reddish brown (5YR 3/4) and common coarse prominent brownish yellow (10YR 6/8) masses of iron accumulation; few thin (less than 1/8 inch) strata of brownish yellow (10YR 6/8) fine sand; strongly acid; clear wavy boundary.

Bt4—38 to 44 inches; light yellowish brown (10YR 6/4) silt loam; weak coarse subangular blocky structure; friable; few very fine roots; common prominent dark brown (7.5YR 3/4) clay films on faces of peds; few fine prominent yellowish red (5YR 5/6) and common medium prominent strong brown (7.5YR 5/8) masses of iron accumulation; strongly acid; clear wavy boundary.

C—44 to 60 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; common medium distinct yellowish brown (10YR 5/8) masses of iron accumulation; strongly acid.

Depth to the base of the argillic horizon ranges from 40 to more than 80 inches. The Ap horizon has value and chroma of 2 or 3. Pedons in uncultivated areas have an A horizon, which has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. Some pedons have an E horizon, which has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. This horizon is silt loam or loam. The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. It is silt loam or loam. The C horizon has colors and textures like those of the Bt horizon.

Sechler Series

The Sechler series consists of very deep, somewhat poorly drained soils on flood plains. These soils formed in siliceous loamy and sandy alluvium that has a high content of iron nodules. Permeability is moderate in the loamy alluvium and moderately rapid over rapid in the sandy alluvium. Slopes range from 0 to 3 percent.

Typical pedon of Sechler loam, 0 to 3 percent

slopes, approximately 100 feet west and 2,000 feet north of the southeast corner of sec. 5, T. 21 N., R. 6 W.

Ap—0 to 9 inches; black (5YR 2.5/1) loam, dark reddish brown (5YR 3/2) dry; moderate medium and fine granular structure; friable; common very fine and fine roots; about 5 percent gravel consisting entirely of extremely firm, irregular, very dusky red (2.5YR 2.5/2) iron nodules; moderately acid; clear wavy boundary.

Ac—9 to 12 inches; black (5YR 2.5/1) loam, dark reddish gray (5YR 4/2) dry; moderate medium subangular blocky structure parting to moderate medium granular; friable; common very fine and fine roots; 12 percent gravel consisting entirely of extremely firm, irregular, very dusky red (2.5YR 2.5/2) iron nodules; strongly acid; clear wavy boundary.

Bwc1—12 to 16 inches; dark reddish brown (2.5YR 2/4) very gravelly loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; 48 percent gravel consisting entirely of extremely firm, irregular, very dusky red (2.5YR 2.5/2) iron nodules; very strongly acid; clear wavy boundary.

Bwc2—16 to 22 inches; reddish brown (5YR 4/3) very gravelly fine sandy loam; moderate fine subangular blocky structure; friable; common very fine and fine roots; common fine faint reddish brown (5YR 4/4) masses of iron accumulation; 42 percent gravel and 3 percent cobbles consisting entirely of extremely firm, irregular, very dusky red (2.5YR 2.5/2) iron nodules; very strongly acid; clear wavy boundary.

2Bwg—22 to 27 inches; pinkish gray (7.5YR 6/2) loamy fine sand; weak fine subangular blocky structure; very friable; few very fine roots; many medium prominent yellowish red (5YR 5/8) masses of iron accumulation; common thin (less than 1/8 inch) strata of silt loam; very strongly acid; clear wavy boundary.

2C—27 to 60 inches; very pale brown (10YR 7/3) fine sand; single grain; loose; many coarse prominent red (2.5YR 4/8) and yellowish red (5YR 5/8) masses of iron accumulation; few thin strata of reddish gray (5YR 5/2) loamy fine sand and fine sandy loam with many medium prominent dark reddish brown (2.5YR 3/4) masses of iron accumulation; very strongly acid.

The thickness of the loamy mantle and the depth to siliceous sandy alluvium range from 20 to 40 inches. The thickness of the umbric epipedon ranges from 10 to 20 inches. Coarse fragments in the loamy mantle consist entirely of irregularly shaped iron nodules. The volume of coarse fragments averages less than 35 percent in the particle-size control section but averages 35 percent or more in the cambic horizon.

The Ap or A horizon has hue of 5YR, 7.5YR, or 10YR, value of 2 or 3, and chroma of 1 or 2. The Bwc horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 2.5 to 4, and chroma of 3 or 4. It is typically very gravelly loam or very gravelly silt loam in the upper part and grades to very gravelly fine sandy loam or very gravelly sandy loam in the lower part. The 2Bg or 2Bw horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 2 or 3. It is loamy fine sand or loamy sand. The 2C or 2Cg horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 2 to 8. It is sand or fine sand that typically has a few thin strata of finer textured material.

Silverhill Series

The Silverhill series consists of well drained soils that are deep to sandstone bedrock on bedrock-controlled pediments. These soils formed mostly in loamy colluvium over siliceous sandy residuum derived from the underlying sandstone. Permeability is moderate or moderately rapid in the loamy colluvium, rapid in the sandy residuum, and moderately slow or moderate in the sandstone. Slopes range from 1 to 6 percent.

Typical pedon of Silverhill sandy loam, in an area of Bilson-Silverhill sandy loams, 1 to 6 percent slopes, approximately 200 feet south and 1,850 feet east of the center of sec. 34, T. 24 N., R. 5 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) sandy loam, pale brown (10YR 5/3) dry; moderate medium subangular blocky structure; friable; many very fine to coarse roots; strongly acid; abrupt wavy boundary.

Bt1—8 to 14 inches; dark yellowish brown (10YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; many very fine and fine roots; common distinct dark brown (7.5YR 3/4) clay films on faces of peds; moderately acid; clear wavy boundary.

Bt2—14 to 26 inches; dark brown (7.5YR 4/4) sandy loam; moderate coarse subangular blocky structure parting to moderate medium subangular blocky; friable; common very fine and fine roots; many faint dark brown (7.5YR 3/4) clay films on faces of peds; strongly acid; gradual irregular boundary.

2BC—26 to 32 inches; strong brown (7.5YR 5/6)

sand; single grain; loose; few fine roots; very strongly acid; gradual irregular boundary.
2C—32 to 50 inches; brownish yellow (10YR 6/6) sand; single grain; loose; few thin strata of dark brown (7.5YR 4/4) sandy loam; very strongly acid; gradual wavy boundary.
2Cr—50 to 60 inches; very pale brown (10YR 8/3) sandstone.

The thickness of the loamy mantle and the depth to siliceous sandy residuum range from 20 to 40 inches. The depth to sandstone ranges from 40 to 60 inches. The volume of sandstone channers ranges from 0 to 15 percent in the sandy residuum. The Ap or A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. Some pedons have an E horizon, which has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 or 3. This horizon is sandy loam or fine sandy loam. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is sandy loam or fine sandy loam. The 2BC horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 4 to 6. It is loamy sand or sand. The 2C horizon has hue of 7.5YR or 10YR, value of 4 to 8, and chroma of 2 to 6. It is sand but typically has a few thin strata of loamy sand or loam.

Sooner Series

The Sooner series consists of very deep, somewhat poorly drained soils on stream terraces and pediments. These soils formed in silty alluvium and in the underlying loamy alluvium, which is underlain by siliceous sandy alluvium. Permeability is moderate in the silty and loamy alluvium and rapid or very rapid in the sandy alluvium. Slopes range from 0 to 3 percent.

Typical pedon of Sooner silt loam, 0 to 3 percent slopes, approximately 1,150 feet south and 700 feet east of the northwest corner of sec. 33, T. 23 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate medium granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.
Bt1—9 to 15 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium and fine subangular blocky structure; friable; few fine roots; few faint brown (10YR 4/3) clay films on faces of peds; few fine faint yellowish brown (10YR 5/6) masses of iron accumulation; strongly acid; clear smooth boundary.
2Bt2—15 to 23 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; friable; few fine roots; common faint brown (10YR 4/3) clay films on faces of peds; many medium distinct yellowish brown (10YR 5/6) masses of iron accumulation and many medium distinct light brownish gray (10YR 6/2) masses of iron depletion; very strongly acid; clear smooth boundary.
2Bt3—23 to 27 inches; yellowish brown (10YR 5/4) loam; moderate medium subangular blocky structure; friable; few fine roots; few faint brown (10YR 4/3) clay films on faces of peds; many medium distinct yellowish brown (10YR 5/6) masses of iron accumulation and many medium distinct light brownish gray (10YR 6/2) masses of iron depletion; strongly acid; clear smooth boundary.
2Bt4—27 to 31 inches; yellowish brown (10YR 5/4) sandy loam; weak medium subangular blocky structure; friable; few fine roots; few faint brown (10YR 4/3) clay films on faces of peds; many medium prominent strong brown (7.5YR 5/6) masses of iron accumulation and many medium distinct light brownish gray (10YR 6/2) masses of iron depletion; very strongly acid; abrupt smooth boundary.
3C—31 to 60 inches; yellowish brown (10YR 5/6) sand; single grain; loose; common coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation; moderately acid.

The thickness of the silty alluvium ranges from 10 to 24 inches. The depth to siliceous sandy alluvium ranges from 25 to 40 inches. The Ap or A horizon has value of 2 or 3 and chroma of 1 or 2. The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 4. The 2Bt horizon has colors like those of the Bt horizon. It is typically loam or sandy clay loam in the upper part and grades to sandy loam in the lower part. Some pedons have a 3BC horizon or a thin 3Bt horizon. This horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 6. It is loamy sand, loamy coarse sand, sand, or coarse sand. The 3C horizon has hue of 7.5YR or 10YR, value of 4 to 8, and chroma of 2 to 6. It is sand or coarse sand and has less than 10 percent weatherable minerals.

Sparta Series

The Sparta series consists of very deep, excessively drained, rapidly permeable soils on low stream terraces. These soils formed in sandy outwash. Slopes range from 0 to 3 percent.

Typical pedon of Sparta sand, 0 to 3 percent

slopes, approximately 1,200 feet north and 1,200 feet west of the southeast corner of sec. 36, T. 19 N., R. 6 W.

Ap—0 to 8 inches; very dark brown (7.5YR 2/2) sand, dark brown (7.5YR 4/2) dry; weak coarse subangular blocky structure; very friable; common very fine and fine roots; slightly acid; abrupt irregular boundary.

A—8 to 11 inches; very dark brown (7.5YR 2/2) sand, dark brown (7.5YR 4/3) dry; weak coarse subangular blocky structure; very friable; common very fine and fine roots; slightly acid; abrupt irregular boundary.

AB—11 to 16 inches; dark brown (7.5YR 3/3) sand, dark brown (7.5YR 4/3) dry; weak coarse subangular blocky structure; very friable; common very fine and fine roots; slightly acid; abrupt irregular boundary.

Bw1—16 to 28 inches; dark brown (7.5YR 3/4) sand; weak coarse subangular blocky structure; very friable; common very fine and fine roots; moderately acid; clear smooth boundary.

Bw2—28 to 42 inches; dark yellowish brown (10YR 3/4) sand; single grain; loose; common very fine and fine roots; moderately acid; clear smooth boundary.

C—42 to 60 inches; light yellowish brown (10YR 6/4) sand; single grain; loose; slightly acid.

The A or Ap horizon has hue of 7.5YR or 10YR and value and chroma of 2 or 3. The Bw horizon has hue of 7.5YR or 10YR and value and chroma of 3 to 6. The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. The Bw and C horizons are sand or fine sand.

Tarr Series

The Tarr series consists of very deep, excessively drained, rapidly permeable soils on stream terraces and pediments. These soils formed in siliceous sandy alluvium or siliceous residuum derived from sandstone. Slopes range from 0 to 45 percent.

Typical pedon of Tarr sand, 0 to 6 percent slopes, approximately 400 feet south and 900 feet east of the northwest corner of sec. 12, T. 24 N., R. 6 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) sand, brown (10YR 5/3) dry; weak fine granular structure; very friable; common fine roots; moderately acid; abrupt smooth boundary.

Bw1—8 to 18 inches; dark brown (7.5YR 4/4) sand; single grain; loose; few fine roots; moderately acid; gradual smooth boundary.

Bw2—18 to 36 inches; strong brown (7.5YR 5/4) sand; single grain; loose; few very fine roots; moderately acid; gradual smooth boundary.

C—36 to 60 inches; yellow (10YR 7/6) sand; single grain; loose; slightly acid.

The thickness of the solum ranges from 20 to 40 inches. The volume of chert gravel or sandstone channers ranges from 0 to 5 percent throughout the pedon. The Ap horizon has value of 3 or 4 and chroma of 2 or 3. Pedons in uncultivated areas have an A horizon, which has value of 2 or 3 and chroma of 1 or 2. Some pedons have an E horizon, which has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 or 3. The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 3 to 8. The C horizon has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 1 to 8. The E, Bw, and C horizons are sand or fine sand.

Tint Series

The Tint series consists of very deep, moderately well drained, rapidly permeable soils on stream terraces and pediments. These soils formed in siliceous sandy alluvium or siliceous residuum derived from sandstone. Slopes range from 0 to 3 percent.

Typical pedon of Tint sand, 0 to 3 percent slopes, approximately 1,980 feet south and 245 feet east of the northwest corner of sec. 5, T. 21 N., R. 5 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) sand, brown (10YR 5/3) dry; weak coarse subangular blocky structure; very friable; many very fine and fine roots; strongly acid; abrupt wavy boundary.

Bw1—9 to 17 inches; dark yellowish brown (10YR 3/4) sand; weak medium subangular blocky structure; very friable; common very fine and fine roots; moderately acid; clear smooth boundary.

Bw2—17 to 24 inches; dark yellowish brown (10YR 4/4) sand; weak medium subangular blocky structure; very friable; few very fine and fine roots; moderately acid; clear smooth boundary.

BC—24 to 34 inches; yellowish brown (10YR 5/4) sand; single grain; loose; few very fine and fine roots; moderately acid; clear wavy boundary.

C1—34 to 38 inches; very pale brown (10YR 7/4) sand; common medium prominent reddish yellow (7.5YR 6/8) masses of iron accumulation; single grain; loose; few fine and very fine roots; slightly acid; gradual smooth boundary.

C2—38 to 60 inches; brownish yellow (10YR 6/6) sand; many medium prominent yellow (10YR 7/8)

masses of iron accumulation; single grain; loose; slightly acid.

The thickness of the solum ranges from 20 to 40 inches. The volume of gravel or sandstone channers ranges from 0 to 15 percent throughout the profile. The Ap or A horizon has value of 2 to 4 and chroma of 1 to 3. The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 4 to 6. The BC horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. The Bw and BC horizons are sand or fine sand. The C horizon has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 2 to 8. It is sand or fine sand.

Tintson Series

The Tintson series consists of very deep, moderately well drained soils on stream terraces and pediments. These soils formed in siliceous sandy alluvium overlying loamy alluvium. Permeability is rapid in the sandy alluvium and moderate in the loamy alluvium. Slopes range from 0 to 6 percent.

Typical pedon of Tintson sand, 0 to 6 percent slopes, approximately 2,100 feet east and 350 feet north of the center of sec. 16, T. 21 N., R. 6 W.

Ap—0 to 8 inches; dark brown (10YR 3/3) sand, brown (10YR 5/3) dry; weak coarse subangular blocky structure; very friable; many very fine and fine roots; moderately acid; abrupt wavy boundary.

Bw1—8 to 14 inches; dark yellowish brown (10YR 4/4) sand; weak coarse subangular blocky structure; very friable; common very fine and fine roots; moderately acid; clear wavy boundary.

Bw2—14 to 24 inches; yellowish brown (10YR 5/4) sand; weak medium subangular blocky structure; very friable; common very fine and fine roots; moderately acid; clear wavy boundary.

BC—24 to 28 inches; yellowish brown (10YR 5/4) sand; single grain; loose; common very fine and fine roots; moderately acid; clear wavy boundary.

C1—28 to 46 inches; yellow (10YR 7/6) sand; single grain; loose; few very fine and fine roots; few medium prominent strong brown (7.5YR 5/8) masses of iron accumulation; moderately acid; abrupt smooth boundary.

2C2—46 to 60 inches; yellowish brown (10YR 5/4) loam; common medium faint very pale brown (10YR 7/3) and prominent dark reddish brown (5YR 3/2) masses of iron depletion; massive; friable; few very fine and fine roots; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches. The thickness of the sandy mantle and the depth to loamy alluvium range from 40 to 60 inches. The volume of gravel or sandstone channers ranges from 0 to 5 percent throughout the profile. The Ap horizon has value of 3 or 4 and chroma of 2 or 3. Some pedons have an A horizon, which has value of 2 or 3 and chroma of 1 or 2. The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. The BC horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 8. The C horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 2 to 8. The Bw, BC, and C horizons are sand or fine sand. The 2C horizon has hue of 7.5YR or 10YR, value of 4 to 8, and chroma of 2 to 8. It is sandy loam, loam, or silt loam.

Toddville Series

The Toddville series consists of very deep, moderately well drained soils on stream terraces. These soils formed dominantly in silty alluvium overlying stratified sandy alluvium. Permeability is moderate in the subsoil and rapid in the sandy alluvium. Slopes range from 0 to 3 percent.

Typical pedon of Toddville silt loam, 0 to 3 percent slopes, approximately 2,440 feet north and 40 feet west of the center of sec. 36, T. 23 N., R. 5 W.

Ap—0 to 8 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium subangular blocky structure; friable; many very fine and fine roots; neutral; abrupt wavy boundary.

A—8 to 15 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate coarse subangular blocky structure; friable; common very fine and fine roots; neutral; abrupt wavy boundary.

AB—15 to 17 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure parting to moderate medium and thin platy; friable; common very fine and fine roots; slightly acid; abrupt irregular boundary.

Bt1—17 to 36 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; slightly acid; clear wavy boundary.

Bt2—36 to 42 inches; brown (10YR 5/3) silt loam; weak coarse subangular blocky structure; friable; common very fine and fine roots; few faint dark

yellowish brown (10YR 4/4) clay films on faces of peds; many medium prominent yellowish red (5YR 5/6) masses of iron accumulation; moderately acid; clear wavy boundary.

2Bt3—42 to 55 inches; yellowish brown (10YR 5/4) and brown (10YR 5/3), stratified silt loam, loam, sandy loam, and sand; weak coarse subangular blocky structure; friable; few very fine roots; few faint dark yellowish brown (10YR 4/4) clay films on faces of peds; many medium distinct yellowish brown (10YR 5/8) masses of iron accumulation; moderately acid; clear wavy boundary.

3C—55 to 60 inches; brownish yellow (10YR 6/6) sand; single grain; loose; few medium prominent (7.5YR 5/8) masses of iron accumulation; few thin strata of strong brown (7.5YR 5/6) sandy loam; moderately acid.

The thickness of the silty mantle and the depth to sandy alluvium range from 40 to 60 inches. The thickness of the mollic epipedon ranges from 10 to 20 inches. The Ap or A horizon has value of 2 or 3 and chroma of 1 or 2. The AB horizon has chroma of 2 or 3. The Bt horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 3 to 5, and chroma of 3 or 4. It is mostly silt loam but has subhorizons of silty clay loam in some pedons. The 2Bt horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 3 or 4. It is typically stratified, dominantly with silt loam, loam, fine sandy loam, or sandy loam that has thin strata of coarser textured material. The 3C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 8, and chroma of 2 to 6. It is stratified sand or fine sand and typically has a few thin strata of finer textured material.

Urne Series

The Urne series consists of well drained soils that are moderately deep to sandstone bedrock on bedrock-controlled uplands. These soils formed in loamy residuum derived from the underlying fine grained glauconitic sandstone or in loamy colluvium and residuum. Permeability is moderate or moderately rapid in the subsoil and slow to moderate in the underlying sandstone. Slopes range from 6 to 50 percent.

Typical pedon of Urne fine sandy loam, in an area of Urne-Council complex, 25 to 50 percent slopes, approximately 700 feet south and 2,440 feet east of the northwest corner of sec. 29, T. 22 N., R. 6 W.

Oe—0 to 1 inch; very dark grayish brown (10YR 3/2) mucky peat (hemic material, which is a mat of partially decomposed forest litter); about 60 percent fiber, 25 percent rubbed; weak thin platy structure; nonsticky; very strongly acid; abrupt wavy boundary.

A—1 to 3 inches; black (10YR 2/1) fine sandy loam, very dark gray (10YR 3/1) dry; moderate medium granular structure; very friable; common very fine to coarse roots; very strongly acid; abrupt wavy boundary.

Bw1—3 to 8 inches; olive brown (2.5Y 4/4) fine sandy loam; moderate medium subangular blocky structure; friable; common very fine to medium roots; strongly acid; clear wavy boundary.

Bw2—8 to 29 inches; light olive brown (2.5Y 5/4) fine sandy loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; some dark olive gray (5Y 3/2) grains of glauconite in the lower part; strongly acid; clear wavy boundary.

Bw3—29 to 37 inches; light olive brown (2.5Y 5/4) fine sandy loam; weak medium subangular blocky structure; friable; common dark olive gray (5Y 3/2) grains of glauconite; about 14 percent sandstone channers; strongly acid; clear smooth boundary.

Cr—37 to 60 inches; strata of olive brown (2.5Y 4/4) and light olive brown (2.5Y 5/6), fine grained glauconitic sandstone with common dark olive brown (5Y 3/2) grains of glauconite; few thin (1/8 inch) yellowish red (5YR 5/6) strata.

Thickness and depth in this paragraph are measured from the top of the mineral soil. The thickness of the solum and the depth to sandstone range from 20 to 40 inches. The volume of sandstone channers ranges from 0 to 5 percent in the upper part of the solum and from 0 to 20 percent in the lower part of the solum.

The O horizon has hue of 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 1 or 2. The A horizon has value of 2 or 3 and chroma of 1 or 2. Some pedons have an Ap horizon, which has value of 3 or 4 and chroma of 2 or 3. This horizon is fine sandy loam. The Bw horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6. It is fine sandy loam, very fine sandy loam, loam, or sandy loam or the channery analogs of these textures.

Veedum Series

The Veedum series consists of poorly drained soils that are moderately deep to sandstone bedrock on pediments. These soils formed in silty alluvium and loamy residuum derived from the underlying interbedded sandstone and shale. Permeability is

moderate in the silty alluvium, moderately slow or moderate in the residuum, and extremely slow to moderately slow in the underlying interbedded sandstone and shale. Slopes range from 0 to 2 percent.

Typical pedon of Veedum muck, in an area of Merrillan-Veedum complex, 0 to 3 percent slopes, approximately 2,470 feet north and 30 feet east of the southwest corner of sec. 13, T. 22 N., R. 1 E.

Oa—0 to 3 inches; muck (sapric material), black (10YR 2/1) broken face and rubbed; about 20 percent fiber, 10 percent rubbed; weak coarse subangular blocky structure; nonsticky; many very fine and fine roots; very strongly acid; abrupt wavy boundary.

A—3 to 9 inches; black (10YR 2/1) silt loam, very dark grayish brown (10YR 3/2) dry; weak fine granular structure; very friable; many very fine and fine roots; very strongly acid; abrupt wavy boundary.

Bg1—9 to 17 inches; dark grayish brown (10YR 4/2) silt loam; weak medium subangular blocky structure; friable; common very fine and fine roots; common medium prominent brownish yellow (10YR 6/8) masses of iron accumulation; extremely acid; clear wavy boundary.

2Bg2—17 to 33 inches; grayish brown (10YR 5/2) clay loam; weak medium subangular blocky structure; firm; few fine roots; common medium prominent brownish yellow (10YR 6/8) masses of iron accumulation; extremely acid; gradual wavy boundary.

2Cr—33 to 60 inches; light brownish gray (10YR 6/2), interbedded sandstone and shale.

The thickness of the solum and the depth to interbedded sandstone and shale range from 20 to 40 inches. The thickness of the silty alluvium and the depth to loamy residuum range from 12 to 30 inches. The Oa horizon has hue of 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. The A horizon has colors similar to those of the Oa horizon. Some pedons have an E horizon, which has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 0 to 2. This horizon is silt loam. The Bg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. The 2Bg horizon has hue of 2.5YR, 5YR, 7.5YR, 10YR, 2.5Y, or 5Y or is neutral in hue. It has value of 4 to 7 and chroma of 0 to 6. It is clay loam, silty clay loam, loam, sandy clay loam, or sandy loam. The volume of sandstone channers ranges from 0 to 15 percent in the 2Bg horizon.

Whitehall Series

The Whitehall series consists of very deep, moderately well drained soils on low stream terraces. These soils formed dominantly in silty alluvium overlying siliceous sandy alluvium. Permeability is moderate in the silty alluvium and rapid or very rapid in the sandy alluvium. Slopes range from 0 to 3 percent.

Typical pedon of Whitehall silt loam, 0 to 3 percent slopes, approximately 600 feet north and 300 feet west of the southeast corner of sec. 36, T. 20 N., R. 5 W.

Ap—0 to 9 inches; dark brown (7.5YR 3/2) silt loam, brown (7.5YR 5/2) dry; moderate medium granular structure; friable; many very fine and fine roots; strongly acid; abrupt smooth boundary.

A—9 to 12 inches; dark brown (7.5YR 3/2) silt loam, brown (7.5YR 5/2) dry; moderate coarse subangular blocky structure; friable; common very fine and fine roots; very strongly acid; abrupt wavy boundary.

Bt1—12 to 16 inches; dark brown (7.5YR 4/4) silt loam; weak coarse subangular blocky structure; friable; common very fine and fine roots; few faint dark brown (7.5YR 3/3) clay films on faces of peds; common prominent dark brown (7.5YR 3/2) silt loam coatings on faces of some peds; very strongly acid; clear wavy boundary.

Bt2—16 to 28 inches; reddish brown (5YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; many faint dark reddish brown (5YR 3/3) clay films on faces of peds; very strongly acid; clear wavy boundary.

2Bt3—28 to 32 inches; reddish brown (5YR 4/4) loam; weak medium subangular blocky structure; friable; common very fine and fine roots; common faint dark reddish brown (5YR 3/3) clay films on faces of peds; very strongly acid; clear irregular boundary.

3C—32 to 60 inches; reddish yellow (7.5YR 7/6) sand; single grain; loose; common medium distinct yellowish red (5YR 5/6) masses of iron accumulation; strongly acid.

The thickness of the silty mantle and the depth to siliceous sandy alluvium range from 20 to 40 inches. The thickness of the mollic epipedon ranges from 10 to 20 inches. The Ap or A horizon has hue of 5YR, 7.5YR, or 10YR, value of 2 or 3, and chroma of 1 to 3. At least part of the Bt horizon has hue of 2.5YR or 5YR, but hue of 7.5YR occurs in subhorizons in

some pedons. The Bt horizon has value of 3 to 5 and chroma of 4 to 8. It is mostly silt loam but has subhorizons of silty clay loam in some pedons. The 2Bt horizon has hue of 2.5YR, 5YR, 7.5YR, or 10YR, value of 4 to 8, and chroma of 3 to 8. It is loam or sandy loam. Some pedons have a 3BC or 3Bt horizon, which has hue of 5YR, 7.5YR, or 10YR, value of 4 to 8, and chroma of 3 to 8. This horizon is loamy sand, loamy coarse sand, sand, or coarse sand. The 3C horizon has colors like those of the 3BC horizon. It is sand or coarse sand. The volume of sandstone channers ranges from 0 to 15 percent in the 3B and 3C horizons.

Formation of the Soils

This section describes the geology and underlying material in Jackson County. It also relates the factors of soil formation to the soils in the county and describes the processes of soil formation.

Geology and Underlying Material

Robert N. Cheetham, Jr., geologist, Natural Resources Conservation Service, helped prepare this section.

Outcrops of rocks of Precambrian to Ordovician age occur in the area west of the Black River and in the Black River channel. The Precambrian rocks are igneous or metamorphic, principally granite, gneiss, and gabbro. The Upper Cambrian rocks are shale, siltstone, sandstone, and glauconitic sandstone. The best exposures of both Precambrian and Upper Cambrian rocks are in roadcuts, along the main streams, and on mounds and river bluffs. The numerous mounds have discontinuous slope outcrops and small ledge outcrops. In western Jackson County there are a few mound tops at elevations of 1,300 feet or more with remnants of a calcitic-dolomite cap rock of Ordovician age. Most of the Upper Cambrian outcrops are covered with loess, windblown sand, colluvium, or alluvium. The Paleozoic rocks have a low dip to the west-southwest at about 1 degree. Small-scale faulting may have occurred but is obscured by vegetative cover and extensive slopewashed sand from the sandstone formations. The total thickness of the Paleozoic rocks is more than 600 feet.

Jackson County is mostly within the Driftless Area. The soil survey party observed only a few very small areas of glacial drift and till; most of the till is in the north-central and northeastern parts of the county. These areas of glacial drift and till were too small to delineate as separate map units at the scale selected for mapping. They were included as minor components in map units that formed in nonglacial materials.

In eastern Jackson County the landscape is relatively flat, except for scattered sandstone mounds. The meltwater and streams discharging from the glacial margin formed a temporary but extensive water body known as Glacial Lake Wisconsin. Lacustrine deposits from this lake cover more than 1,800 square miles in Adams, Juneau, Monroe, Jackson, and Wood Counties. During deglaciation the lacustrine silts were mostly eroded as the Black River and its tributaries acquired their present location. The severe climate resulted in a mass wastage of the exposed Upper Cambrian sandstones and the transport by water of eroded sands. The size and shape of many sandstone mounds, then interfluves, were reduced to more symmetrical mesalike forms.

Current economic mineral resources in Jackson County are sand and gravel associated with Pleistocene deposits and reworked sands of Upper Cambrian age. These materials are used as industrial sand and construction sand and gravel. Small amounts of Upper Cambrian shale are used on town roads. Very small amounts of the Ordovician Oneota calcitic-dolomite are quarried in the southwestern part of the county.

The Jackson County Iron Company operated a taconite mine near Black River Falls from 1969 to 1983. The mine was closed because of depressed steel prices. Peat deposits are numerous but scattered, and many peat beds had been burned over by the early part of the 20th century. The thickness of the remaining peat beds ranges from a few inches to more than 15 feet. Currently, there are some areas where sphagnum moss is harvested from the peat beds.

East of the Black River are scattered lacustrine clays mixed with sand and gravel from Glacial Lake Wisconsin. Clay deposits about 8 miles north of Black River Falls once provided clay for several brickyards. Presently no clay deposits are being worked.

Factors of Soil Formation

Soil forms through processes that act on deposited or accumulated geologic material. The characteristics of the soil at any given point are determined by the physical and mineral composition of the parent material; the climate under which the soil material

has accumulated and weathered; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time that the forces of soil formation have acted on the soil material (Simonson, 1959).

Climate and vegetation are active factors of soil formation. They act on the parent material that has accumulated through the weathering or physical disintegration of rocks and slowly change it into a natural body that has genetically related horizons. The effects of climate and of plant and animal life are conditioned by relief. The parent material affects the kind of soil profile that forms and in some areas determines it almost entirely. Finally, time is needed for the transformation of the parent material into a soil. Some time is always needed for the differentiation of soil horizons. Usually, a long time is needed for the development of distinct horizons.

The factors of soil formation are so closely interrelated that few generalizations can be made regarding the effects of any one factor on soil formation unless conditions are specified for the other four.

Parent Material

Parent material is the unconsolidated mass of weathered geologic material from which a soil forms. It largely determines the chemical and mineralogical composition of the soil.

In the western part of Jackson County, the soils on ridgetops and valley slopes formed mostly in silty or loamy deposits, loess, and loamy and sandy material weathered from sandstone. Seaton soils formed in loess. Gale and La Farge soils formed mostly in loess and in the underlying sandy or loamy residuum derived from sandstone. Hixton soils formed in loamy colluvium overlying siliceous sandy residuum derived from sandstone. Boone soils formed in siliceous sandy residuum derived from the underlying sandstone. Elevasil soils formed mostly in loamy colluvium and siliceous sandy residuum derived from the underlying sandstone. Urne soils formed in loamy colluvium and loamy residuum derived from the underlying fine grained glauconitic sandstone.

Soils on foot slopes and toe slopes of valley sides and on stream terraces formed in loess or in silty, loamy, or sandy deposits. Council soils formed in loamy colluvium. Bilmod, Dunnville, Jackson, and Sooner soils formed mostly in loamy or silty alluvium overlying sandy alluvium. Gosil, Ironrun, Rockdam, and Tarr soils formed in siliceous sandy alluvium or siliceous sandy residuum derived from sandstone. Mahtomedi and Sparta soils formed in sandy outwash deposits.

Most soils on flood plains formed in recent alluvial deposits. Arenzville, Coffton, Ettrick, and Orion soils formed mostly in silty alluvium. Fordum, Kalmarville, Northbend, and Sechler soils formed mainly in loamy or silty alluvium overlying sandy alluvium. Absco soils formed in siliceous, dominantly sandy alluvium.

Most soils on uplands of low relief formed in silty, loamy, or sandy deposits and in residuum derived from the underlying interbedded sandstone and shale. Hiles and Kert are examples of the silty soils, Humbird and Merrillan are examples of the loamy soils, and Elm Lake and Ludington are examples of the sandy soils.

Climate

Climate affects soil formation through its effect on the moisture supply in the soil and on soil temperature. It affects the weathering of rocks and the alteration of the parent material through the mechanical action of freezing and thawing and the chemical action generated by the leaching of water.

Climate indirectly influences soil formation through its effect on plant and animal life. Climatic factors influence the amount, kind, and rate of plant growth, and thus they also influence the accumulation of organic matter in the soil and the level of soil fertility.

Jackson County has a cool, subhumid continental climate that favors the growth of trees and the formation of leached, acid soils with a thin, dark surface layer. Climatic differences within the county are too small to have resulted in major differences among the soils.

Wind can affect the development of soil by adding or removing fine particles of soil or organic matter. It affects the moisture content of soils by influencing the rate of evaporation. Climate can also have more localized effects. North- and east-facing slopes tend to be cooler and wetter than south- and west-facing slopes. For example, depressional areas generally have cooler temperatures for a longer part of the year than ridgetops and valley slopes.

Plant and Animal Life

Living organisms, such as plants, bacteria, fungi, insects, earthworms, and rodents, are important factors of soil formation. Earthworms, ants, and rodents continually mix the soil. They bring subsoil materials to the surface and surface materials down into lower layers. They also help to keep the soil porous, thus enhancing air and water movement. Plants obtain nutrients from the soil, incorporate them into their tissues, and later release them as

dead leaves and twigs fall to the soil surface. Bacteria and fungi decompose this organic matter. This process recycles nutrients that were leached into the lower layers of the soil and adds organic matter to the surface layer.

The influence of different kinds of vegetation on the formation of soils is shown by the differences in color between soils that formed under trees and those that formed under prairie grasses. La Farge soils, for example, formed under trees. They have a lighter colored or thinner surface layer than the soils that formed under grass, and they are generally more acid. Toddville soils formed under grass. These soils have a thick, dark surface layer. Soils that formed under grass accumulate more organic matter and retain it longer than soils that formed under trees, and this organic matter contributes to their darker color. Soils that formed where the vegetation is a mixture of trees and grasses generally have characteristics intermediate between those of woodland and grassland soils.

During the past 125 years, human activities have significantly influenced the soils by disturbing and altering the soil-forming processes. Clearing, burning, and cultivating activities have altered the original condition of many soils, and the removal of plant cover has accelerated erosion. Cultivation has often contributed to a loss of organic matter, and the use of heavy equipment has compacted the soil and reduced the rate of water infiltration.

Adding animal manure and planting alfalfa and grasses, such as bromegrass, have increased the content of nutrients and organic matter in the surface layer. The addition of lime has altered the natural acidity of the soils. The lime has not only improved plant growth but has also created a more favorable environment for soil bacteria. The increased bacterial action, in turn, has hastened decomposition of the organic matter. Adding fertilizers to the soil has increased the supply of plant nutrients.

The drainage of some soils has been improved by the construction of waterways and water-control structures. Draining wet areas has permitted the cultivation of some high-potential soils but has contributed to the loss of some valuable wetlands and a general lowering of the water table throughout the area. Some of the effects of human activities may not be evident for many years.

Relief

The ridgetops, valleys, stream terraces, and glacial lake basins of Jackson County have been formed by wind, rain, running water, and glacial meltwater. Where bedrock controls the topography, the resistance or lack of resistance of the underlying rock has determined the relief. Relief, in turn, influences soil formation by controlling drainage, runoff, and other direct or indirect effects of water, including erosion. In many places the relief of a given soil can be correlated closely with the drainage, the thickness and organic matter content of the surface layer, the thickness of the solum, and the differentiation of horizons in the soil profile.

In Jackson County, the surface layer is generally thinner and lighter colored in the more sloping soils and is successively thicker and darker in the less sloping soils and in areas where the slope changes from convex to concave. Where the slopes are more gentle, runoff is slower, and thus more water soaks into the soil. As a result, there is generally more plant growth on the more gentle slopes and more organic matter accumulates in the surface layer. Also, surface material eroded from the steep upper slopes accumulates on the lower, more gentle slopes.

Soil drainage is greatly affected by relief. Runoff water from sloping to very steep, excessively drained to well drained soils accumulates on the nearly level toe slopes and flood plains, where the soils are mostly somewhat poorly drained to very poorly drained. Drainage characteristics are generally reflected in the color, degree, and kind of mottling or gleying in the soil. The well drained Bertrand and La Farge soils are dominantly free of mottles throughout the subsoil and the upper part of the substratum. The moderately well drained Jackson and Toddville soils have mottles in the lower part of the subsoil. The somewhat poorly drained Coffton and Sooner soils are mottled throughout the subsoil. The poorly drained Elm Lake and Ettrick soils are gleyed and mottled below the surface layer.

Time

The effects of the soil-forming factors are modified by time. The longer the other soil-forming factors have interacted, the more highly developed the soils can become. Arenzville soils, for example, are relatively young soils in Jackson County. These soils have few or no genetic differences between horizons because they have not been in place long enough for the soil-forming processes to take full effect. La Farge soils are considered mature because they have well defined horizons. The soil-forming processes have been active in these soils for thousands of years.

Processes of Soil Formation

A combination of basic processes is responsible for horizon differentiation. The main processes are gains, losses, transfers, and transformations. These processes generally do not act alone, and each one can affect all soils. Some changes promote horizon differentiation, and some retard it. The nature of the soil at any given point is the net result of all changes (Simonson, 1959).

The interaction among these soil-forming processes is evident in Seaton soils. These soils are well drained because they are high on the landscape and are underlain by porous sandstone. They formed in very deep loess. The climate favored the growth of plants. Plants and animals contributed to the accumulation of organic matter and organic acids, and they mixed the soil to some extent. These processes accelerated as more and higher forms of organisms grew in the soil and produced more organic residue and acids. The decomposed organic matter darkened the surface layer of these soils.

While organic matter was being decomposed, minerals within the soil were being chemically weathered by organic acids and iron was being oxidized, giving the soil a brownish color. Percolating water moved suspended particles of clay downward. As a result, the middle part of the subsoil has more clay than other parts of the profile. The loess in the substratum, at a depth of about 4 feet, is generally unweathered and has changed little since it was deposited.

As a result of the soil-forming processes, the Seaton soils have a dark brown surface layer and have clay films with dark brown colors in the subsoil. The processes that were active in the formation of these soils include gains in organic matter in the surface layer, the movement of clay from the upper part of the profile to the subsoil, and the transformation of iron compounds in the subsoil. All of these processes are active in the soils of the county. In some soils certain processes are more active than others. To a great extent, the kind of parent material and the relief have determined the kinds of processes that are dominant in the formation of the soils.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Back slopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use

of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil material. Soil material that is, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clayey. General term for the soil textural classes clay, silty clay, and sandy clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that

follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has

the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glauconite. A complex potassium-iron-silicate disseminated as green flakes or grains in marine sedimentary rocks of all ages.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head slope. A geomorphic component of side slopes of hills, mounds, valleys, and ridges. Forms the concave surface at the head of a drainageway where the flow of water converges downward toward the center.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.
A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.
E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.
B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.
C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.
Cr horizon.—Soft, consolidated bedrock beneath the soil.
R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy. General term for the soil textural classes very fine sandy loam, fine sandy loam, sandy loam, coarse sandy loam, loam, clay loam, and sandy clay loam.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by the wind.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesa. A broad, nearly flat topped and commonly

isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Organic soil. A soil that contains 12 to more than 18 percent organic carbon, depending on the content of mineral materials, and is 16 or more inches thick.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

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

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Ridge. A long, narrow elevation of the land surface. Commonly, a ridge has a crest and steep sides and forms an extended upland between valleys.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral

fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy. General term for the soil textural classes loamy very fine sand, loamy fine sand, loamy sand, loamy coarse sand, very fine sand, fine sand, sand, and coarse sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder slope. A geomorphic component of a side slope of a hill, mound, or ridge. It makes up the transitional, generally convex surface between a back slope and the top of a hill, mound, or ridge.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Silty. General term for the soil textural classes silt, silt loam, and silty clay loam.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 6 percent
Sloping	6 to 12 percent
Moderately steep	12 to 20 percent
Steep	20 to 30 percent
Very steep	30 percent and higher

Classes for complex slopes are as follows:

Nearly level	0 to 2 percent
Undulating	2 to 6 percent
Rolling	6 to 12 percent
Hilly	12 to 20 percent
Steep	20 to 30 percent
Very steep	30 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Strip cut. A method of tree harvest in which the timber is clear cut in strips, commonly 50 to 100 feet wide.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Succession. The naturally occurring replacement of one plant community by another. Shade-tolerant plant species commonly replace shade-intolerant species.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tiers. Layers used to define the control section in the classification of organic soils. The organic material is divided into three tiers. The surface tier is the upper 12 inches, the subsurface tier is the next 24 inches, and the bottom tier is the lower 16 inches.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Valley floor. A general term for the nearly level and gently sloping bottom surface of a valley. Component landforms include stream channels, the flood plain, and, in some areas, low terrace

surfaces that may be subject to flooding from tributary streams.

Valley slope. The sloping to very steep surface between the valley bottom and ridge.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1951-81 at Blair, Wisconsin)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	22.7	1.1	11.9	47	-33	0	0.85	0.28	1.30	3	9.3
February----	29.2	6.1	17.7	52	-27	6	.84	.20	1.34	3	7.6
March-------	40.1	18.4	29.3	70	-17	43	1.91	.89	2.78	5	11.3
April-------	57.4	33.4	45.4	85	13	199	2.89	1.81	3.85	7	2.3
May---------	70.4	44.0	57.2	90	24	533	4.21	2.74	5.55	8	.0
June--------	78.8	53.7	66.3	95	35	789	4.32	2.68	5.79	8	.0
July--------	83.2	58.0	70.6	97	42	949	4.45	2.22	6.38	7	.0
August------	81.0	56.0	68.5	94	38	884	4.64	2.13	6.79	7	.0
September---	71.8	46.6	59.2	90	27	576	3.63	1.42	5.47	7	.0
October-----	60.6	36.6	48.6	84	15	305	2.36	.62	3.74	5	.1
November----	43.5	24.5	34.0	68	-5	41	1.64	.53	2.53	4	4.2
December----	28.6	10.4	19.5	54	-24	8	1.02	.48	1.47	4	9.1
Yearly:											
Average---	55.6	32.4	44.0	---	---	---	---	---	---	---	---
Extreme---	---	---	---	97	-35	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,333	32.76	26.88	38.51	68	43.9

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1951-81 at Blair, Wisconsin)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 6	May 25	June 1
2 years in 10 later than--	May 1	May 18	May 27
5 years in 10 later than--	Apr. 22	May 6	May 19
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 6	Sept. 22	Sept. 11
2 years in 10 earlier than--	Oct. 10	Sept. 26	Sept. 14
5 years in 10 earlier than--	Oct. 18	Oct. 5	Sept. 21

Table 3.--Growing Season

(Recorded in the period 1951-81 at Blair, Wisconsin)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	158	129	111
8 years in 10	165	137	116
5 years in 10	178	151	124
2 years in 10	191	165	133
1 year in 10	197	173	138

Table 4.—Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
AbA	Absco loamy sand, 0 to 3 percent slopes	2,485	0.4
AcA	Absco-Northbend complex, 0 to 3 percent slopes	5,120	0.8
Ad	Adder muck, 0 to 1 percent slopes	4,166	0.7
ArA	Arenzville silt loam, 0 to 3 percent slopes	1,543	0.2
BeB	Bertrand silt loam, 1 to 6 percent slopes	1,417	0.2
BkA	Bilmod sandy loam, 0 to 3 percent slopes	4,851	0.8
BlB	Bilson sandy loam, 0 to 6 percent slopes	13,665	2.1
BnB	Bilson-Silverhill sandy loams, 1 to 6 percent slopes	4,110	0.6
BnC2	Bilson-Elevasil sandy loams, 6 to 12 percent slopes, eroded	7,744	1.2
BnD2	Bilson-Elevasil sandy loams, 12 to 20 percent slopes, eroded	1,308	0.2
BoB	Boone sand, 2 to 6 percent slopes	1,168	0.2
BoC	Boone sand, 6 to 15 percent slopes	15,589	2.4
BoF	Boone sand, 15 to 50 percent slopes	4,548	0.7
BpF	Boone-Elevasil complex, 15 to 50 percent slopes	31,060	4.9
Cd	Citypoint mucky peat, 0 to 1 percent slopes	4,187	0.7
CfA	Coffton silt loam, 0 to 3 percent slopes	2,509	0.4
CoC2	Council loam, 6 to 12 percent slopes, eroded	1,691	0.3
CpC2	Council-Bilson fine sandy loams, 6 to 12 percent slopes, eroded	2,009	0.3
CpD2	Council-Bilson fine sandy loams, 12 to 20 percent slopes, eroded	4,718	0.7
CsD2	Council and Seaton soils, 12 to 20 percent slopes, eroded	23,757	3.7
CsE	Council and Seaton soils, 20 to 30 percent slopes	4,644	0.7
Da	Dawsil mucky peat, 0 to 1 percent slopes	28,211	4.4
DuA	Dunnville sandy loam, 0 to 3 percent slopes	809	0.1
ElB	Elevasil sandy loam, 2 to 6 percent slopes	3,553	0.6
ElC2	Elevasil sandy loam, 6 to 12 percent slopes, eroded	3,804	0.6
ElD2	Elevasil sandy loam, 12 to 20 percent slopes, eroded	3,360	0.5
Eo	Elm Lake mucky sand, 0 to 2 percent slopes	4,505	0.7
Et	Ettrick silt loam, 0 to 2 percent slopes	3,797	0.6
FaA	Fairchild sand, 0 to 3 percent slopes	1,678	0.3
FeA	Fairchild-Elm Lake complex, 0 to 3 percent slopes	19,008	3.0
GaC2	Gale silt loam, 6 to 12 percent slopes, eroded	1,607	0.3
GaD2	Gale silt loam, 12 to 25 percent slopes, eroded	1,123	0.2
GoB	Gosil loamy sand, 0 to 6 percent slopes	8,765	1.4
GoC	Gosil loamy sand, 6 to 12 percent slopes	4,832	0.8
HkB	Hiles-Kert silt loams, 0 to 6 percent slopes	1,354	0.2
HnB	Hixton loam, 2 to 6 percent slopes	927	0.1
HnC2	Hixton loam, 6 to 12 percent slopes, eroded	1,727	0.3
HnD2	Hixton loam, 12 to 20 percent slopes, eroded	737	0.1
HpA	Hoop sandy loam, 0 to 3 percent slopes	994	0.2
Ht	Houghton muck, 0 to 1 percent slopes	2,877	0.4
HuB	Humbird fine sandy loam, 1 to 6 percent slopes	2,570	0.4
HxB	Humbird-Merrillan fine sandy loams, 0 to 6 percent slopes	7,000	1.1
ImA	Impact sand, 0 to 3 percent slopes	5,113	0.8
IrA	Ironrun sand, 0 to 3 percent slopes	9,861	1.5
IxA	Ironrun-Ponycreek complex, 0 to 3 percent slopes	45,967	7.2
IzB	Ironrun-Ponycreek-Arbutus complex, 0 to 6 percent slopes	586	0.1
JaA	Jackson silt loam, 0 to 2 percent slopes	538	0.1
JaB	Jackson silt loam, 2 to 6 percent slopes	1,156	0.2
Ka	Kalmarville silt loam, 0 to 1 percent slopes	5,064	0.8
KeA	Kert silt loam, 0 to 3 percent slopes	1,374	0.2
LfC2	La Farge silt loam, 4 to 12 percent slopes, eroded	3,840	0.6
LfD2	La Farge silt loam, 12 to 25 percent slopes, eroded	3,113	0.5
LsD2	La Farge-Seaton silt loams, 12 to 25 percent slopes, eroded	8,061	1.3
Lt	Loxley peat, 0 to 1 percent slopes	23,211	3.6
LuB	Ludington sand, 1 to 6 percent slopes	4,504	0.7
LxB	Ludington-Fairchild sands, 0 to 6 percent slopes	2,972	0.5
MaB	Mahtomedi loamy sand, 0 to 6 percent slopes	4,940	0.8
MbA	Majik loamy fine sand, 0 to 3 percent slopes	3,147	0.5
MmA	Merimod silt loam, 0 to 3 percent slopes	3,128	0.5
MnB	Merit silt loam, 0 to 6 percent slopes	3,078	0.5
MoB	Merit-Gardenvale silt loams, 1 to 6 percent slopes	5,350	0.8
MpA	Merrillan fine sandy loam, 0 to 3 percent slopes	9,213	1.4
MrA	Merrillan-Veedum complex, 0 to 3 percent slopes	11,265	1.8
MxA	Moppet-Fordum complex, 0 to 3 percent slopes	1,666	0.3

Table 4.—Acreage and Proportionate Extent of the Soils—Continued

Map symbol	Soil name	Acres	Percent
Ne	Newlang muck, 0 to 2 percent slopes	4,166	0.7
OrA	Orion silt loam, 0 to 3 percent slopes	1,504	0.2
Pa	Palms muck, 0 to 1 percent slopes	1,377	0.2
Pt	Pits	1,993	0.3
Pu	Ponycreek muck, 0 to 2 percent slopes	2,911	0.5
Pv	Ponycreek-Dawsil complex, 0 to 2 percent slopes	15,984	2.5
Pw	Psammaquents, nearly level	2,867	0.4
RkA	Rockdam sand, 0 to 3 percent slopes	27,394	4.3
RoA	Rowley silt loam, 0 to 3 percent slopes	437	0.1
SeB	Seaton silt loam, 2 to 6 percent slopes	6,406	1.0
SeC2	Seaton silt loam, 6 to 12 percent slopes, eroded	24,068	3.8
SmB	Sebbo loam, 1 to 6 percent slopes	4,999	0.8
SnA	Sechler loam, 0 to 3 percent slopes	1,124	0.2
SoA	Sooner silt loam, 0 to 3 percent slopes	1,904	0.3
SpA	Sparta sand, 0 to 3 percent slopes	902	0.1
TrB	Tarr sand, 0 to 6 percent slopes	65,707	10.3
TrC	Tarr sand, 6 to 15 percent slopes	13,466	2.1
TrF	Tarr sand, 15 to 45 percent slopes	4,237	0.7
TtA	Tint sand, 0 to 3 percent slopes	6,482	1.0
TuB	Tintson sand, 0 to 6 percent slopes	1,362	0.2
TwA	Toddville silt loam, 0 to 3 percent slopes	2,149	0.3
UdF	Udorthents, loamy, very steep	3,559	0.6
UfC2	Urne fine sandy loam, 6 to 12 percent slopes, eroded	1,734	0.3
UfD2	Urne fine sandy loam, 12 to 25 percent slopes, eroded	1,304	0.2
UrF	Urne-Council complex, 25 to 50 percent slopes	24,261	3.8
Vs	Veedum-Elm Lake mucks, 0 to 2 percent slopes	5,198	0.8
WmA	Whitehall silt loam, 0 to 3 percent slopes	1,198	0.2
w	Water	8,512	1.3
	Total	639,879	100.0

Table 5.--Land Capability and Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Corn silage	Soybeans	Oats	Bromegrass-alfalfa hay	Timothy-red clover hay	Kentucky bluegrass
		Bu	Tons	Bu	Bu	Tons	Tons	AUM*
AbA---- Absco	IVs	---	---	---	---	2.8	2.8	2.0
AcA---- Absco-Northbend	IVw	---	---	---	---	2.8	2.8	2.5
Ad---- Adder	Vw	---	---	---	---	---	---	1.6
ArA---- Arenzville	IIw	135	22	45	80	5.0	---	4.8
BeB---- Bertrand	IIe	140	23	46	75	5.3	---	4.6
BkA---- Bilmod	IIIs	90	15	30	60	3.5	3.5	2.9
BlB---- Bilson	IIIs	90	15	30	60	3.5	3.3	2.9
BnB---- Bilson-Silverhill	IIIs	90	15	30	60	3.7	---	3.0
BnC2---- Bilson-Elevasil	IIIe	80	13	26	50	3.3	---	2.6
BnD2---- Bilson-Elevasil	IVe	70	11	22	40	2.9	---	2.2
BoB---- Boone	IVs	45	7	15	35	2.0	---	1.1
BoC---- Boone	VIs	40	6	13	30	1.8	---	0.9
BoF---- Boone	VIIs	---	---	---	---	---	---	0.2
BpF---- Boone-Elevasil	VIIe	---	---	---	---	---	---	0.8
Cd---- Citypoint	VIIw	---	---	---	---	---	---	1.2
CfA---- Coffton	IIw	130	21	43	75	4.9	4.0	4.1
CoC2---- Council	IIIe	120	20	39	65	4.5	---	3.7
CpC2---- Council-Bilson	IIIe	105	17	33	60	3.7	---	3.2
CpD2---- Council-Bilson	IVe	95	15	29	50	3.3	---	2.8

See footnote at end of table.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Soybeans	Oats	Bromegrass-alfalfa hay	Timothy-red clover hay	Kentucky bluegrass
		Bu	Tons	Bu	Bu	Tons	Tons	AUM*
CsD2---------- Council and Seaton	IVe	115	19	37	60	4.4	---	3.6
CsE---------- Council and Seaton	VIe	---	---	---	---	---	---	3.2
Da---------- Dawsil	VIIw	---	---	---	---	---	---	1.8
DuA---------- Dunnville	IIIs	75	12	25	55	3.8	---	2.9
ElB---------- Elevasil	IIIs	85	14	28	65	4.0	---	3.2
ElC2---------- Elevasil	IIIe	75	12	25	55	3.6	---	2.8
ElD2---------- Elevasil	IVe	65	10	21	45	3.2	---	2.4
Eo---------- Elm Lake	VIw	---	---	---	---	---	---	0.7
Et---------- Ettrick	VIw	---	---	---	---	---	4.0	3.0
FaA---------- Fairchild	IIIw	55	9	18	40	2.1	2.2	2.5
FeA---------- Fairchild-Elm Lake	VIw	---	---	---	---	---	---	1.6
GaC2---------- Gale	IIIe	95	15	31	65	4.1	---	2.8
GaD2---------- Gale	IVe	85	14	28	55	3.8	---	2.4
GoB---------- Gosil	IVs	60	10	20	50	2.8	---	2.0
GoC---------- Gosil	IVs	55	9	18	45	2.6	---	1.8
HkB---------- Hiles-Kert	IIw	80	13	27	70	3.8	3.0	2.7
HnB---------- Hixton	IIe	90	15	30	65	3.9	---	3.1
HnC2---------- Hixton	IIIe	80	13	26	55	3.5	---	2.7
HnD2---------- Hixton	IVe	70	11	23	45	3.1	---	2.3

See footnote at end of table.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Soybeans	Oats	Bromegrass-alfalfa hay	Timothy-red clover hay	Kentucky bluegrass
		Bu	Tons	Bu	Bu	Tons	Tons	AUM*
HpA--Hoop	IIIw	105	17	35	65	4.2	3.3	3.4
Ht--Houghton	VIIIw	135	23	---	---	---	---	5.0
HuB--Humbird	IIe	55	9	18	65	2.5	---	1.9
HxB--Humbird-Merrillan	IIw	60	10	19	60	2.7	---	1.9
ImA--Impact	IVs	60	10	20	50	2.6	---	1.9
IrA--Ironrun	IVw	50	8	---	45	1.8	2.0	1.2
IxA--Ironrun-Ponycreek	VIw	---	---	---	---	---	---	1.2
IzB--Ironrun-Ponycreek-Arbutus	VIw	---	---	---	---	---	---	1.2
JaA--Jackson	I	145	24	48	80	5.5	---	4.7
JaB--Jackson	IIe	140	23	46	75	5.3	---	5.0
Ka--Kalmarville	Vw	---	---	---	---	---	---	3.0
KeA--Kert	IIw	75	12	25	65	3.5	3.0	2.7
LfC2--La Farge	IIIe	100	16	33	65	3.8	---	3.2
LfD2--La Farge	IVe	95	15	29	55	3.4	---	2.8
LsD2--La Farge-Seaton	IVe	105	17	34	60	4.0	---	3.3
Lt--Loxley	VIIw	---	---	---	---	---	---	3.3
LuB--Ludington	IVs	55	9	18	45	2.1	---	1.3
LxB--Ludington-Fairchild	IVs	55	9	18	45	2.1	---	1.8
MaB--Mahtomedi	IVs	40	6	13	40	2.2	---	1.5

See footnote at end of table.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Soybeans	Oats	Bromegrass-alfalfa hay	Timothy-red clover hay	Kentucky bluegrass
		Bu	Tons	Bu	Bu	Tons	Tons	AUM*
MbA---------- Majik	IVw	55	9	18	50	2.5	2.5	2.0
MmA---------- Merimod	IIe	105	17	35	65	4.4	---	3.1
MnB---------- Merit	IIe	100	16	33	65	4.0	3.0	3.1
MoB---------- Merit-Gardenvale	IIe	105	17	32	70	4.0	---	3.1
MpA---------- Merrillan	IIw	65	10	21	60	3.0	2.4	1.9
MrA---------- Merrillan-Veedum	VIw	---	---	---	---	---	---	1.2
MxA---------- Moppet-Fordum	VIw	---	---	---	---	---	---	2.8
Ne---------- Newlang	VIw	---	---	---	---	---	---	1.0
OrA---------- Orion	IIw	125	20	41	75	4.5	3.5	4.0
Pa---------- Palms	Vw	---	---	---	---	---	---	3.5
Pt---------- Pits	VIIIs	---	---	---	---	---	---	---
Pu---------- Ponycreek	VIw	---	---	---	---	---	---	1.0
Pv---------- Ponycreek-Dawsil	VIIw	---	---	---	---	---	---	1.3
Pw---------- Psammaquents	VIw	---	---	---	---	---	---	---
RkA---------- Rockdam	IVs	55	9	---	55	2.5	---	1.3
RoA---------- Rowley	IIw	145	24	48	80	5.5	4.0	5.0
SeB---------- Seaton	IIe	145	24	48	85	5.5	---	4.8
SeC2---------- Seaton	IIIe	135	22	45	75	5.1	---	4.4
SmB---------- Sebbo	IIe	150	25	50	90	5.6	4.0	5.0

See footnote at end of table.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Soybeans	Oats	Bromegrass-alfalfa hay	Timothy-red clover hay	Kentucky bluegrass
		Bu	Tons	Bu	Bu	Tons	Tons	AUM*
SnA--Sechler	IIw	95	15	32	65	3.8	3.1	3.2
SoA--Sooner	IIw	105	17	35	60	3.7	3.2	3.1
SpA--Sparta	IVs	65	10	21	55	2.8	---	2.0
TrB--Tarr	IVs	50	8	16	45	2.3	---	1.3
TrC--Tarr	VIs	45	7	15	40	2.1	---	1.1
TrF--Tarr	VIIs	---	---	---	---	---	---	0.3
TtA--Tint	IVs	65	11	21	55	3.0	---	1.6
TuB--Tintson	IIIs	70	11	22	60	3.5	---	2.0
TwA--Toddville	I	150	25	50	85	5.6	---	5.0
UdF--Udorthents	VIIe	---	---	---	---	---	---	---
UfC2--Urne	IIIe	80	13	26	60	3.8	---	2.9
UfD2--Urne	IVe	70	12	23	50	3.4	---	2.5
UrF--Urne-Council	VIIe	---	---	---	---	---	---	2.2
Vs--Veedum-Elm Lake	VIw	---	---	---	---	---	---	1.6
WmA--Whitehall	IIs	115	19	38	70	4.5	---	3.6

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

Table 6.--Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
ArA	Arenzville silt loam, 0 to 3 percent slopes
BeB	Bertrand silt loam, 1 to 6 percent slopes
BkA	Bilmod sandy loam, 0 to 3 percent slopes
BlB	Bilson sandy loam, 0 to 6 percent slopes
BnB	Bilson-Silverhill sandy loams, 1 to 6 percent slopes
CfA	Coffton silt loam, 0 to 3 percent slopes (where drained)
DuA	Dunnville sandy loam, 0 to 3 percent slopes
Et	Ettrick silt loam, 0 to 2 percent slopes (where drained and either protected from flooding or not frequently flooded during the growing season)
HkB	Hiles-Kert silt loams, 0 to 6 percent slopes (where drained)
HnB	Hixton loam, 2 to 6 percent slopes
HpA	Hoop sandy loam, 0 to 3 percent slopes (where drained)
JaA	Jackson silt loam, 0 to 2 percent slopes
JaB	Jackson silt loam, 2 to 6 percent slopes
KeA	Kert silt loam, 0 to 3 percent slopes (where drained)
MmA	Merimod silt loam, 0 to 3 percent slopes
MnB	Merit silt loam, 0 to 6 percent slopes
MoB	Merit-Gardenvale silt loams, 1 to 6 percent slopes
OrA	Orion silt loam, 0 to 3 percent slopes (where drained)
RoA	Rowley silt loam, 0 to 3 percent slopes (where drained)
SeB	Seaton silt loam, 2 to 6 percent slopes
SmB	Sebbo loam, 1 to 6 percent slopes
SnA	Sechler loam, 0 to 3 percent slopes (where drained)
SoA	Sooner silt loam, 0 to 3 percent slopes (where drained)
TwA	Toddville silt loam, 0 to 3 percent slopes
WmA	Whitehall silt loam, 0 to 3 percent slopes

Table 7.--Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
AbA---------- Absco	3S	Slight	Moderate	Slight	Slight	Black oak----------	54	38	Red pine, jack pine.
						Northern pin oak----	---	---	
						Eastern white pine--	---	---	
						Red maple----------	---	---	
						Eastern cottonwood--	---	---	
AcA:									
Absco----------	3S	Slight	Moderate	Slight	Slight	Black oak----------	54	38	Red pine, jack pine.
						Northern pin oak----	---	---	
						Eastern white pine--	---	---	
						Red maple----------	---	---	
						Eastern cottonwood--	---	---	
Northbend------	2W	Slight	Slight	Slight	Severe	Silver maple--------	80	34	Silver maple, eastern white pine, white spruce.
						Red maple----------	---	---	
						American elm--------	---	---	
						White ash----------	---	---	
						Swamp white oak-----	---	---	
						Cottonwood----------	---	---	
ArA---------- Arenzville	4A	Slight	Slight	Slight	Severe	Northern red oak----	65	59	Red pine, eastern white pine, white spruce, northern red oak, black walnut.
						White oak----------	---	---	
						Red maple----------	---	---	
						Eastern white pine--	---	---	
						Basswood----------	---	---	
						White ash----------	---	---	
BeB---------- Bertrand	5A	Slight	Slight	Slight	Severe	Northern red oak----	70	66	Red pine, eastern white pine, white spruce, black walnut.
						White ash----------	---	---	
						White oak----------	---	---	
						Red maple----------	---	---	
						Black walnut--------	---	---	
						Basswood----------	---	---	
BkA---------- Bilmod	4A	Slight	Slight	Slight	Moderate	Northern red oak----	60	51	Red pine, eastern white pine, white spruce, Norway spruce.
						White oak----------	---	---	
						Black oak----------	---	---	
						Northern pin oak----	---	---	
						Shagbark hickory----	---	---	
BlB---------- Bilson	4A	Slight	Slight	Slight	Moderate	Northern red oak----	60	51	Red pine, eastern white pine, white spruce, Norway spruce.
						White oak----------	---	---	
						Black oak----------	---	---	
						Northern pin oak----	---	---	
						Shagbark hickory----	---	---	
						Red maple----------	---	---	
						White pine----------	---	---	
BnB:									
Bilson---------	4A	Slight	Slight	Slight	Moderate	Northern red oak----	60	51	Red pine, eastern white pine, white spruce, Norway spruce.
						White oak----------	---	---	
						Black oak----------	---	---	
						Northern pin oak----	---	---	
						Shagbark hickory----	---	---	

See footnote at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
BnB:									
Silverhill	4A	Slight	Slight	Slight	Moderate	Northern red oak	63	56	Red pine, eastern white pine, white spruce, northern red oak.
						Northern pin oak	---	---	
						White oak	---	---	
						Black oak	---	---	
BnC2:									
Bilson	4A	Slight	Slight	Slight	Moderate	Northern red oak	60	51	Red pine, eastern white pine, white spruce, Norway spruce.
						White oak	---	---	
						Black oak	---	---	
						Northern pin oak	---	---	
						Shagbark hickory	---	---	
Elevasil	2A	Slight	Slight	Slight	Moderate	Black oak	45	30	Jack pine, red pine.
						Jack pine	---	---	
						Northern pin oak	---	---	
						Northern red oak	---	---	
BnD2:									
Bilson	4R	Moderate	Slight	Slight	Moderate	Northern red oak	60	51	Red pine, eastern white pine, white spruce, Norway spruce.
						White oak	---	---	
						Black oak	---	---	
						Northern pin oak	---	---	
						Shagbark hickory	---	---	
Elevasil	2R	Moderate	Slight	Slight	Moderate	Black oak	45	30	Jack pine, red pine.
						Jack pine	---	---	
						Northern pin oak	---	---	
						Northern red oak	---	---	
BoB, BoC	2A	Slight	Moderate	Slight	Slight	Black oak	44	29	Red pine, jack pine.
Boone						White oak	---	---	
						Jack pine	49	65	
						Eastern white pine	---	---	
						Northern pin oak	---	---	
						Red pine	---	---	
BoF	2R	Moderate	Moderate	Slight	Slight	Black oak	44	29	Red pine, jack pine.
Boone						White oak	---	---	
						Jack pine	49	65	
						Eastern white pine	---	---	
						Northern pin oak	---	---	
						Red pine	---	---	
BpF:									
Boone	2R	Moderate	Moderate	Slight	Slight	Black oak	44	29	Red pine, jack pine.
						White oak	---	---	
						Jack pine	49	65	
						Eastern white pine	---	---	
						Northern pin oak	---	---	
						Red pine	---	---	
Elevasil	2R	Moderate	Slight	Slight	Moderate	Black oak	45	30	Jack pine, red pine.
						Jack pine	---	---	
						Northern pin oak	---	---	
						Northern red oak	---	---	

See footnote at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
Cd---------- Citypoint	2W	Slight	Severe	Severe	Severe	Black spruce--------	15	23	---
						Tamarack----------	---	---	
CfA---------- Coffton	2W	Slight	Slight	Slight	Severe	Silver maple--------	90	42	White spruce, white ash, silver maple, red maple.
						Red maple----------	---	---	
						White ash----------	---	---	
						American elm--------	---	---	
CoC2---------- Council	4A	Slight	Slight	Slight	Severe	Northern red oak----	66	60	Red pine, eastern white pine, white spruce, Norway spruce.
						Sugar maple---------	---	---	
						Red maple----------	---	---	
						American basswood---	---	---	
						Paper birch---------	---	---	
						Quaking aspen-------	---	---	
						Black oak----------	---	---	
						White oak----------	---	---	
CpC2: Council--------	4A	Slight	Slight	Slight	Severe	Northern red oak----	66	60	Red pine, eastern white pine, white spruce, Norway spruce.
						Sugar maple---------	---	---	
						Red maple----------	---	---	
						American basswood---	---	---	
						Paper birch---------	---	---	
						Quaking aspen-------	---	---	
						Black oak----------	---	---	
						White oak----------	---	---	
Bilson---------	4A	Slight	Slight	Slight	Moderate	Northern red oak----	60	51	Red pine, eastern white pine, white spruce, Norway spruce.
						White oak----------	---	---	
						Black oak----------	---	---	
						Northern pin oak----	---	---	
						Shagbark hickory----	---	---	
CpD2: Council--------	4R	Moderate	Slight	Slight	Severe	Northern red oak----	66	60	Red pine, eastern white pine, white spruce, Norway spruce.
						Sugar maple---------	---	---	
						Red maple----------	---	---	
						American basswood---	---	---	
						Paper birch---------	---	---	
						Quaking aspen-------	---	---	
						Black oak----------	---	---	
						White oak----------	---	---	
Bilson---------	4R	Moderate	Slight	Slight	Moderate	Northern red oak----	60	51	Red pine, eastern white pine, white spruce, Norway spruce.
						White oak----------	---	---	
						Black oak----------	---	---	
						Northern pin oak----	---	---	
						Shagbark hickory----	---	---	
CsD2, CsE: Council--------	4R	Moderate	Slight	Slight	Severe	Northern red oak----	66	60	Red pine, eastern white pine, white spruce, Norway spruce.
						Sugar maple---------	---	---	
						Red maple----------	---	---	
						American basswood---	---	---	
						Paper birch---------	---	---	
						Quaking aspen-------	---	---	
						Black oak----------	---	---	
						White oak----------	---	---	

See footnote at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
CsD2, CsE:									
Seaton	5R	Moderate	Slight	Slight	Severe	Northern red oak	70	66	Black walnut, red pine, white spruce, northern whitecedar.
						Sugar maple	---	---	
						American basswood	---	---	
Da Dawsil	2W	Slight	Severe	Severe	Severe	Black spruce	15	23	---
						Tamarack	---	---	
DuA Dunnville	3A	Slight	Slight	Slight	Moderate	Northern red oak	55	42	Eastern white pine, red pine, white spruce.
						Sugar maple	---	---	
						American basswood	---	---	
ElB, ElC2 Elevasil	2A	Slight	Slight	Slight	Moderate	Black oak	45	30	Jack pine, red pine.
						Jack pine	---	---	
						Northern pin oak	---	---	
						Northern red oak	---	---	
ElD2 Elevasil	2R	Moderate	Slight	Slight	Moderate	Black oak	45	30	Jack pine, red pine.
						Jack pine	---	---	
						Northern pin oak	---	---	
						Northern red oak	---	---	
Eo Elm Lake	3W	Slight	Severe	Severe	Severe	Red maple	60	38	White spruce, red maple, white ash.
						White ash	---	---	
						Quaking aspen	---	---	
FaA Fairchild	5W	Slight	Moderate	Moderate	Moderate	Jack pine	55	77	Jack pine, red pine, eastern white pine, Norway spruce.
						Northern pin oak	---	---	
						Red maple	---	---	
						Paper birch	---	---	
FeA:									
Fairchild	5W	Slight	Moderate	Moderate	Moderate	Jack pine	55	77	Jack pine, red pine, eastern white pine, Norway spruce.
						Northern pin oak	---	---	
						Red maple	---	---	
						Paper birch	---	---	
Elm Lake	3W	Slight	Severe	Severe	Severe	Red maple	60	38	White spruce, red maple, white ash.
						White ash	---	---	
						Quaking aspen	---	---	
GaC2 Gale	5A	Slight	Slight	Slight	Severe	Northern red oak	74	66	Red pine, eastern white pine, white spruce.
						Sugar maple	---	---	
						White oak	---	---	
GaD2 Gale	5R	Moderate	Slight	Slight	Severe	Northern red oak	74	66	Red pine, eastern white pine, white spruce.
						Sugar maple	---	---	
						White oak	---	---	

See footnote at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
GoB, GoC-------- Gosil	3A	Slight	Slight	Slight	Moderate	Northern red oak---- Northern pin oak---- Jack pine---------- Red pine---------- Eastern white pine-- Bur oak---------- White oak----------	55 54 60 54 56 40 ---	42 38 85 85 109 26 ---	Jack pine, red pine.
HkB: Hiles----------	4L	Slight	Slight	Slight	Severe	Northern red oak---- Black oak---------- White oak---------- Sugar maple--------- American basswood--- Quaking aspen-------	65 --- --- --- --- ---	59 --- --- --- --- ---	Red pine, eastern white pine, white spruce.
Kert----------	4W	Slight	Slight	Moderate	Severe	Northern red oak---- Sugar maple--------- Swamp white oak----- Red maple----------	65 --- --- ---	59 --- --- ---	White spruce, eastern white pine, red pine.
HnB, HnC2------- Hixton	4A	Slight	Slight	Slight	Severe	Northern red oak---- White oak---------- Black oak---------- Red maple---------- Eastern white pine--	65 --- --- --- ---	59 --- --- --- ---	Northern whitecedar, red pine, white spruce.
HnD2------------ Hixton	4R	Moderate	Slight	Slight	Severe	Northern red oak---- White oak---------- Black oak---------- Red maple---------- Eastern white pine--	65 --- --- --- ---	59 --- --- --- ---	Northern whitecedar, red pine, white spruce.
HuB------------- Humbird	4L	Slight	Slight	Slight	Moderate	Northern red oak---- Northern pin oak---- Red maple---------- Black oak---------- Jack pine---------- Eastern white pine--	65 55 --- --- 63 ---	59 38 --- --- 91 ---	Red pine, eastern white pine, white spruce, red maple.
HxB: Humbird--------	4L	Slight	Slight	Slight	Moderate	Northern red oak---- Northern pin oak---- Red maple---------- Black oak---------- Jack pine---------- Eastern white pine--	65 55 --- --- 63 ---	59 38 --- --- 91 ---	Red pine, eastern white pine, white spruce, red maple.
Merrillan------	4W	Slight	Slight	Moderate	Moderate	Northern red oak---- Northern pin oak---- Red maple---------- Eastern white pine-- Eastern hemlock-----	60 --- --- --- ---	51 --- --- --- ---	Red pine, eastern white pine, white spruce, red maple.
ImA------------- Impact	5S	Slight	Moderate	Slight	Moderate	Jack pine---------- Northern pin oak---- Red pine---------- White oak----------	53 --- --- ---	71 --- --- ---	Red pine, jack pine, Norway spruce.

See footnote at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
IrA---------- Ironrun	6W	Slight	Moderate	Moderate	Moderate	Quaking aspen-------	70	81	Eastern white pine, white spruce, red pine, Norway spruce.
						Bigtooth aspen------	---	---	
						Paper birch---------	---	---	
						Red maple-----------	---	---	
						Eastern white pine--	---	---	
						Northern pin oak----	---	---	
						Jack pine-----------	---	---	
						Swamp white oak-----	---	---	
IxA:									
Ironrun--------	6W	Slight	Moderate	Moderate	Moderate	Quaking aspen-------	70	81	Eastern white pine, white spruce, red pine, Norway spruce.
						Bigtooth aspen------	---	---	
						Paper birch---------	---	---	
						Red maple-----------	---	---	
						Eastern white pine--	---	---	
						Northern pin oak----	---	---	
						Jack pine-----------	---	---	
						Swamp white oak-----	---	---	
Ponycreek------	6W	Slight	Severe	Severe	Severe	Jack pine-----------	59	84	Eastern white pine, white spruce.
						Quaking aspen-------	50	43	
						Paper birch---------	---	---	
						Eastern white pine--	---	---	
						Black ash-----------	---	---	
						Red maple-----------	---	---	
						Tamarack------------	---	---	
IzB:									
Ironrun--------	6W	Slight	Moderate	Moderate	Severe	Quaking aspen-------	70	81	Eastern white pine, white spruce, red pine, Norway spruce.
						Bigtooth aspen------	---	---	
						Paper birch---------	---	---	
						Red maple-----------	---	---	
						Eastern white pine--	---	---	
						Northern pin oak----	---	---	
						Jack pine-----------	---	---	
						Swamp white oak-----	---	---	
Ponycreek------	6W	Slight	Severe	Severe	Severe	Jack pine-----------	59	84	Eastern white pine, white spruce.
						Quaking aspen-------	50	43	
						Paper birch---------	---	---	
						Eastern white pine--	---	---	
						Black ash-----------	---	---	
						Red maple-----------	---	---	
						Tamarack------------	---	---	
Arbutus--------	2S	Slight	Moderate	Slight	Slight	Red maple-----------	56	36	Jack pine, red pine, eastern white pine.
						Quaking aspen-------	---	---	
						Paper birch---------	---	---	
						Bigtooth aspen------	---	---	
						Jack pine-----------	---	---	
						Northern pin oak----	---	---	
						Eastern white pine--	---	---	
						Black cherry--------	---	---	
JaA, JaB-------- Jackson	5A	Slight	Slight	Slight	Severe	Northern red oak----	70	66	Red pine, eastern white pine, white spruce, black walnut.
						White ash-----------	---	---	
						White oak-----------	---	---	
						Bur oak-------------	---	---	
						Black walnut--------	---	---	

See footnote at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
KeA---------- Kert	4W	Slight	Slight	Moderate	Severe	Northern red oak----	65	59	White spruce, eastern white pine, red pine.
						White ash----------	---	---	
						Swamp white oak-----	---	---	
						Red maple----------	---	---	
						Eastern white pine--	---	---	
LfC2---------- La Farge	4A	Slight	Slight	Slight	Severe	Northern red oak----	66	60	Eastern white pine, red pine.
						Red maple----------	---	---	
						White oak----------	---	---	
						Shagbark hickory----	---	---	
						American basswood---	---	---	
						Eastern white pine--	---	---	
LfD2---------- La Farge	4R	Moderate	Slight	Slight	Severe	Northern red oak----	66	60	Eastern white pine, red pine.
						Red maple----------	---	---	
						White oak----------	---	---	
						Shagbark hickory----	---	---	
						American basswood---	---	---	
						Eastern white pine--	---	---	
LsD2:									
La Farge-------	4R	Moderate	Slight	Slight	Severe	Northern red oak----	66	60	Eastern white pine, red pine.
						Red maple----------	---	---	
						White oak----------	---	---	
						Shagbark hickory----	---	---	
						American basswood---	---	---	
						Eastern white pine--	---	---	
Seaton---------	5R	Moderate	Slight	Slight	Severe	Northern red oak----	70	66	Black walnut, red pine, white spruce, northern whitecedar.
						Sugar maple---------	---	---	
						American basswood---	---	---	
						Eastern white pine--	---	---	
						White ash----------	---	---	
Lt---------- Loxley	2W	Slight	Severe	Severe	Severe	Black spruce--------	15	23	---
						Tamarack----------	---	---	
						Balsam fir----------	---	---	
LuB---------- Ludington	5A	Slight	Moderate	Slight	Moderate	Jack pine----------	55	77	Jack pine, red pine.
						Northern pin oak----	---	---	
						Red maple----------	---	---	
						Paper birch---------	---	---	
LxB:									
Ludington------	5A	Slight	Moderate	Slight	Moderate	Jack pine----------	55	77	Jack pine, red pine.
						Northern pin oak----	---	---	
						Red maple----------	---	---	
						Paper birch---------	---	---	
						Eastern white pine--	---	---	
Fairchild------	5W	Slight	Moderate	Moderate	Moderate	Jack pine----------	55	77	Jack pine, red pine, eastern white pine, Norway spruce.
						Northern pin oak----	---	---	
						Red maple----------	---	---	
						Paper birch---------	---	---	
						Eastern white pine--	---	---	

See footnote at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
MaB---------- Mahtomedi	8S	Slight	Moderate	Slight	Slight	Red pine----------	64	112	Red pine, jack pine, eastern white pine, white spruce.
						Black oak----------	---	---	
						Jack pine----------	69	102	
						Eastern white pine--	59	118	
						Northern pin oak----	---	---	
MbA---------- Majik	5W	Slight	Slight	Slight	Moderate	Jack pine----------	55	77	Jack pine, eastern white pine, red pine, balsam fir, white spruce, red maple.
						Eastern white pine--	62	127	
						Northern pin oak----	60	43	
						Red pine----------	50	75	
						Paper birch---------	---	---	
						Quaking aspen-------	---	---	
MmA---------- Merimod	4A	Slight	Slight	Slight	Severe	Northern red oak----	68	63	Red pine, eastern white pine, white spruce.
						Red maple----------	---	---	
						American basswood---	---	---	
						Eastern white pine--	---	---	
						White oak----------	---	---	
MnB---------- Merit	4A	Slight	Slight	Slight	Severe	Northern red oak----	68	63	Red pine, eastern white pine, white spruce.
						Red maple----------	---	---	
						American basswood---	---	---	
						Eastern white pine--	---	---	
						White oak----------	---	---	
MoB:									
Merit----------	4A	Slight	Slight	Slight	Severe	Northern red oak----	68	63	Red pine, eastern white pine, white spruce.
						Red maple----------	---	---	
						American basswood---	---	---	
						Eastern white pine--	---	---	
						White oak----------	---	---	
Gardenvale-----	4A	Slight	Slight	Slight	Severe	Northern red oak----	68	63	Red pine, white spruce, northern red oak.
						White oak----------	---	---	
						Shagbark hickory----	---	---	
						American basswood---	---	---	
						Eastern white pine--	---	---	
MpA---------- Merrillan	4W	Slight	Slight	Moderate	Moderate	Northern red oak----	60	51	Red pine, eastern white pine, white spruce, red maple.
						Northern pin oak----	---	---	
						Red maple----------	---	---	
						Eastern white pine--	---	---	
						Eastern hemlock-----	---	---	
MrA:									
Merrillan------	4W	Slight	Slight	Moderate	Moderate	Northern red oak----	60	51	Red pine, eastern white pine, white spruce, red maple.
						Northern pin oak----	---	---	
						Red maple----------	---	---	
						Eastern white pine--	---	---	
						Eastern hemlock-----	---	---	
Veedum---------	1W	Slight	Severe	Severe	Severe	Black ash----------	39	20	---
						Red maple----------	---	---	
						Quaking aspen-------	---	---	

See footnote at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
MxA:									
Moppet	3L	Slight	Slight	Slight	Severe	Red maple	60	38	White spruce, eastern white pine, red pine.
						Northern red oak	---	---	
						American basswood	---	---	
						Eastern white pine	---	---	
Fordum	2W	Slight	Severe	Severe	Severe	Silver maple	80	34	Silver maple, red maple, green ash.
						Black ash	---	---	
						White spruce	---	---	
Ne Newlang	6W	Slight	Severe	Severe	Severe	Eastern white pine	50	90	Eastern white pine, white spruce.
						Quaking aspen	50	43	
						Paper birch	---	---	
OrA Orion	2W	Slight	Slight	Slight	Severe	Silver maple	80	34	White spruce, silver maple, white ash, eastern cottonwood.
						Red maple	---	---	
						White ash	---	---	
						Eastern white pine	---	---	
						Eastern cottonwood	---	---	
Pu Ponycreek	6W	Slight	Severe	Severe	Severe	Jack pine	59	84	Eastern white pine, white spruce.
						Quaking aspen	50	43	
						Paper birch	---	---	
						Eastern white pine	---	---	
						Black ash	---	---	
						Red maple	---	---	
						Tamarack	---	---	
Pv:									
Ponycreek	6W	Slight	Severe	Severe	Severe	Jack pine	59	84	Eastern white pine, white spruce.
						Quaking aspen	50	43	
						Paper birch	---	---	
						Eastern white pine	---	---	
						Black ash	---	---	
						Red maple	---	---	
						Tamarack	---	---	
Dawsil	2W	Slight	Severe	Severe	Severe	Black spruce	15	23	---
						Tamarack	---	---	
RkA Rockdam	6S	Slight	Moderate	Slight	Slight	Jack pine	56	78	Jack pine, red pine, eastern white pine.
						Red pine	52	80	
						Eastern white pine	---	---	
						Northern pin oak	---	---	
						White oak	---	---	
RoA Rowley	2A	Slight	Slight	Slight	Severe	Silver maple	70	25	Silver maple, white ash, white spruce.
						Red maple	---	---	
						White ash	---	---	
						American elm	---	---	
SeB, SeC2 Seaton	5A	Slight	Slight	Slight	Severe	Northern red oak	70	66	Black walnut, red pine, white spruce, northern whitecedar.
						Sugar maple	---	---	
						American basswood	---	---	
						Eastern white pine	---	---	

See footnote at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
SmB---------- Sebbo	4A	Slight	Slight	Slight	Severe	Northern red oak----	66	60	Red pine, eastern white pine, white spruce, Norway spruce.
						Red maple----------	---	---	
						American basswood---	---	---	
						Paper birch---------	---	---	
						White oak----------	---	---	
						Black oak----------	---	---	
SoA---------- Sooner	2A	Slight	Slight	Slight	Moderate	Silver maple--------	80	34	Silver maple, red maple, white ash, green ash, white spruce.
						White ash----------	---	---	
						Red maple----------	---	---	
						Eastern white pine--	---	---	
SpA---------- Sparta	6S	Slight	Moderate	Slight	Slight	Jack pine----------	56	78	Red pine, eastern white pine, jack pine.
						Northern pin oak----	---	---	
						Red pine----------	---	---	
						Eastern white pine--	---	---	
TrB, TrC-------- Tarr	6S	Slight	Moderate	Slight	Slight	Red pine----------	52	80	Red pine, eastern white pine, jack pine.
						Jack pine----------	56	78	
						Northern pin oak----	---	---	
TrF---------- Tarr	6R	Severe	Severe	Slight	Slight	Red pine----------	52	80	Red pine, eastern white pine, jack pine.
						Jack pine----------	56	78	
						Northern pin oak----	---	---	
TtA---------- Tint	6S	Slight	Moderate	Slight	Slight	Red pine----------	52	80	Eastern white pine, red pine, jack pine.
						Jack pine----------	56	78	
						Northern pin oak----	---	---	
TuB---------- Tintson	6S	Slight	Moderate	Slight	Slight	Red pine----------	52	80	Eastern white pine, red pine, jack pine.
						Jack pine----------	56	78	
						Northern pin oak----	---	---	
UfC2---------- Urne	4A	Slight	Slight	Slight	Moderate	Northern red oak----	62	54	Red pine, eastern white pine, white spruce.
						White oak----------	---	---	
						Black oak----------	---	---	
						Shagbark hickory----	---	---	
						White ash----------	---	---	
UfD2---------- Urne	4R	Moderate	Slight	Slight	Moderate	Northern red oak----	62	54	Red pine, eastern white pine, white spruce.
						White oak----------	---	---	
						Black oak----------	---	---	
						Shagbark hickory----	---	---	
						White ash----------	---	---	
UrF: Urne----------	4R	Severe	Slight	Slight	Moderate	Northern red oak----	62	54	Red pine, eastern white pine, white spruce.
						White oak----------	---	---	
						Black oak----------	---	---	
						Shagbark hickory----	---	---	
						White ash----------	---	---	

See footnote at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
UrF:									
Council	4R	Severe	Slight	Slight	Severe	Northern red oak	66	60	Red pine, eastern white pine, white spruce, Norway spruce.
						Sugar maple	---	---	
						Red maple	---	---	
						American basswood	---	---	
						Paper birch	---	---	
						Quaking aspen	---	---	
						Black oak	---	---	
						White oak	---	---	
Vs:									
Veedum	1W	Slight	Severe	Severe	Severe	Black ash	39	20	---
						Red maple	---	---	
						Quaking aspen	---	---	
Elm Lake	3W	Slight	Severe	Severe	Severe	Red maple	60	38	White spruce, red maple, black ash.
						Black ash	---	---	
						Quaking aspen	---	---	

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

Table 8.--Woodland Equipment Use

(Only the soils suitable for production of commercial trees are listed. Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe")

Soil name and map symbol	Ratings for the most limiting season				Preferred operating season(s)
	Logging areas and skid trails	Log landings	Haul roads	Site preparation and planting	
AbA--Absco	Moderate: too sandy, flooding.	Moderate: too sandy, flooding.	Moderate: too sandy, flooding.	Moderate: too sandy.	Summer, fall, winter.
AcA:					
Absco	Moderate: too sandy, flooding.	Moderate: too sandy, flooding.	Moderate: too sandy, flooding.	Moderate: too sandy.	Summer, fall, winter.
Northbend	Moderate: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Summer, fall, winter.
ArA--Arenzville	Slight	Moderate: flooding, low strength.	Moderate: flooding, low strength.	Slight	Summer, fall, winter.
BeB--Bertrand	Slight	Moderate: low strength.	Moderate: low strength.	Slight	Summer, fall, winter.
BkA--Bilmod	Slight	Slight	Slight	Slight	Year round.
BlB--Bilson	Slight	Slight	Slight	Slight	Year round.
BnB:					
Bilson	Slight	Slight	Slight	Slight	Year round.
Silverhill	Slight	Slight	Slight	Slight	Year round.
BnC2:					
Bilson	Slight	Moderate: slope.	Slight	Slight	Year round.
Elevasil	Slight	Moderate: slope.	Slight	Slight	Year round.
BnD2:					
Bilson	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Year round.
Elevasil	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Year round.
BoB--Boone	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Year round.
BoC--Boone	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: too sandy.	Year round.
BoF--Boone	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Year round.

Table 8.--Woodland Equipment Use--Continued

Soil name and map symbol	Ratings for the most limiting season				Preferred operating season(s)
	Logging areas and skid trails	Log landings	Haul roads	Site preparation and planting	
BpF:					
Boone	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Year round.
Elevasil	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Year round.
Cd Citypoint	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter.
CfA Coffton	Moderate: wetness.	Moderate: wetness, flooding, low strength.	Moderate: wetness, flooding, low strength.	Moderate: wetness.	Summer, fall, winter.
CoC2 Council	Slight	Moderate: slope.	Slight	Slight	Year round.
CpC2:					
Council	Slight	Moderate: slope.	Slight	Slight	Year round.
Bilson	Slight	Moderate: slope.	Slight	Slight	Year round.
CpD2:					
Council	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Year round.
Bilson	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Year round.
CsD2, CsE:					
Council	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Summer, fall, winter.
Seaton	Moderate: slope.	Severe: slope, low strength.	Moderate: slope, low strength.	Moderate: slope.	Summer, fall, winter.
DuA Dunnville	Slight	Slight	Slight	Slight	Year round.
ElB Elevasil	Slight	Slight	Slight	Slight	Year round.
ElC2 Elevasil	Slight	Moderate: slope.	Slight	Slight	Year round.
ElD2 Elevasil	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Year round.
Eo Elm Lake	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.
FaA Fairchild	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Summer, winter.

Table 8.--Woodland Equipment Use--Continued

Soil name and map symbol	Ratings for the most limiting season				Preferred operating season(s)
	Logging areas and skid trails	Log landings	Haul roads	Site preparation and planting	
FeA:					
Fairchild	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Summer, winter.
Elm Lake	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.
GaC2 Gale	Slight	Moderate: slope, low strength.	Moderate: low strength.	Slight	Summer, fall, winter.
GaD2 Gale	Moderate: slope.	Severe: slope, low strength.	Moderate: slope, low strength.	Moderate: slope.	Summer, fall, winter.
GoB Gosil	Slight	Slight	Slight	Slight	Year round.
GoC Gosil	Slight	Moderate: slope.	Slight	Slight	Year round.
HkB:					
Hiles	Severe: low strength.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Summer, winter.
Kert	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.
HnB Hixton	Slight	Moderate: low strength.	Moderate: low strength.	Slight	Summer, fall, winter.
HnC2 Hixton	Slight	Moderate: slope, low strength.	Moderate: low strength.	Slight	Summer, fall, winter.
HnD2 Hixton	Moderate: slope.	Severe: slope, low strength.	Moderate: slope, low strength.	Moderate: slope.	Summer, fall, winter.
HuB Humbird	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.
HxB:					
Humbird	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.
Merrillan	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.
ImA Impact	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Year round.
IrA Ironrun	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Summer, winter.

Table 8.--Woodland Equipment Use--Continued

Soil name and map symbol	Ratings for the most limiting season				Preferred operating season(s)
	Logging areas and skid trails	Log landings	Haul roads	Site preparation and planting	
IxA:					
Ironrun	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Summer, winter.
Ponycreek	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.
IzB:					
Ironrun	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Summer, winter.
Ponycreek	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.
Arbutus	Moderate: too sandy.	Moderate: too sandy, depth to rock.	Moderate: too sandy, depth to rock.	Moderate: too sandy.	Year round.
JaA, JaB Jackson	Slight	Moderate: low strength.	Moderate: low strength.	Slight	Summer, fall, winter.
KeA Kert	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.
LfC2 La Farge	Slight	Moderate: slope, low strength.	Moderate: low strength.	Slight	Summer, fall, winter.
LfD2 La Farge	Moderate: slope.	Severe: slope, low strength.	Moderate: slope, low strength.	Moderate: slope.	Summer, fall, winter.
LsD2:					
La Farge	Moderate: slope.	Severe: slope, low strength.	Moderate: slope, low strength.	Moderate: slope.	Summer, fall, winter.
Seaton	Moderate: slope.	Severe: slope, low strength.	Moderate: slope, low strength.	Moderate: slope.	Summer, fall, winter.
Lt Loxley	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter.
LuB Ludington	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Year round.
LxB:					
Ludington	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Year round.
Fairchild	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Moderate: wetness, too sandy, low strength.	Summer, winter.

Table 8.--Woodland Equipment Use--Continued

Soil name and map symbol	Ratings for the most limiting season				Preferred operating season(s)
	Logging areas and skid trails	Log landings	Haul roads	Site preparation and planting	
MaB---------- Mahtomedi	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Year round.
MbA---------- Majik	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Summer, fall, winter.
MmA---------- Merimod	Slight---------	Moderate: low strength.	Moderate: low strength.	Slight---------	Year round.
MnB---------- Merit	Slight---------	Moderate: low strength.	Moderate: low strength.	Slight---------	Year round.
MoB:					
Merit----------	Slight---------	Moderate: low strength.	Moderate: low strength.	Slight---------	Year round.
Gardenvale-------	Slight---------	Moderate: low strength.	Moderate: low strength.	Slight---------	Year round.
MpA---------- Merrillan	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.
MrA:					
Merrillan--------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.
Veedum----------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter.
MxA:					
Moppet----------	Moderate: low strength.	Moderate: flooding, low strength.	Moderate: flooding, low strength.	Moderate: low strength.	Summer, fall, winter.
Pordum----------	Severe: wetness, low strength.	Severe: wetness, flooding, low strength.	Severe: wetness, flooding, low strength.	Severe: wetness, low strength.	Winter.
Ne---------- Newlang	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness.	Winter.
OrA---------- Orion	Moderate: wetness.	Moderate: wetness, flooding, low strength.	Moderate: wetness, low strength.	Moderate: wetness.	Summer, winter.
Pu---------- Ponycreek	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter.
Pv:					
Ponycreek--------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter.

Table 8.--Woodland Equipment Use--Continued

Soil name and map symbol	Ratings for the most limiting season				Preferred operating season(s)
	Logging areas and skid trails	Log landings	Haul roads	Site preparation and planting	
Pv:					
Dawsil	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter.
RkA--- Rockdam	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Year round.
SeB--- Seaton	Slight---	Moderate: low strength.	Moderate: low strength.	Slight---	Summer, fall, winter.
SeC2--- Seaton	Slight---	Moderate: slope, low strength.	Moderate: low strength.	Slight---	Summer, fall, winter.
SmB--- Sebbo	Slight---	Moderate: low strength.	Moderate: low strength.	Slight---	Summer, fall, winter.
SoA--- Sooner	Moderate: wetness.	Moderate: wetness, low strength.	Moderate: wetness, low strength.	Moderate: wetness.	Summer, winter.
SpA--- Sparta	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Year round.
TrB--- Tarr	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Year round.
TrC--- Tarr	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: too sandy.	Year round.
TrF--- Tarr	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Year round.
TtA--- Tint	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Year round.
TuB--- Tintson	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Year round.
UdF--- Udorthents	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Year round.
UfC2--- Urne	Slight---	Moderate: slope.	Slight---	Slight---	Year round.
UfD2--- Urne	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Year round.
UrF:					
Urne---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Year round.
Council---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Year round.
Vs:					
Veedum---	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter.

Table 8.--Woodland Equipment Use--Continued

Soil name and map symbol	Ratings for the most limiting season				Preferred operating season(s)
	Logging areas and skid trails	Log landings	Haul roads	Site preparation and planting	
Vs: Elm Lake	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter.

Table 9.--Forest Habitat Types

(Only the soils that are assigned to a habitat type are listed. See text for a description of the various habitat types)

Soil name and map symbol	Habitat type symbol	Dominance	Short scientific name	Nutrient regime*	Moisture regime**
AbA	PVRh	Primary	Pinus/Vaccinium-Rubus	P	DM
Absco	PVGy	Secondary	Pinus/Vaccinium-Gaylussacia	P	D
AcA:					
Absco	PVRh	Primary	Pinus/Vaccinium-Rubus	P	DM
Northbend	ArCi	Primary	Acer rubrum/Circaea	M-R	M
ArA	ArCi	Primary	Acer rubrum/Circaea	M-R	M
Arenzville					
BeB	ArCi	Primary	Acer rubrum/Circaea	M-R	M
Bertrand					
BkA	ArDe-V	Primary	Acer rubrum/Desmodium (Vaccinium)	M	D-DM
Bilmod	PVCr	Secondary	Pinus/Vaccinium-Cornus	M	D
BlB	ArDe-V	Primary	Acer rubrum/Desmodium (Vaccinium)	M	D-DM
Bilson	PVCr	Secondary	Pinus/Vaccinium-Cornus	M	D
BnB	ArDe-V	Primary	Acer rubrum/Desmodium (Vaccinium)	M	D-DM
Bilson-Silverhill					
BnC2, BnD2:					
Bilson	ArDe-V	Primary	Acer rubrum/Desmodium (Vaccinium)	M	D-DM
Elevasil	PVCr	Primary	Pinus/Vaccinium-Cornus	M	D
BoB, BoC	PVGy	Primary	Pinus/Vaccinium-Gaylussacia	P	D
Boone	PVCr	Secondary	Pinus/Vaccinium-Cornus	M	D
BoF	PVGy	Primary	Pinus/Vaccinium-Gaylussacia	P	D
Boone					
BpF:					
Boone	PVGy	Primary	Pinus/Vaccinium-Gaylussacia	P	D
Elevasil	PVCr	Primary	Pinus/Vaccinium-Cornus	M	D
CfA	ArCi	Primary	Acer rubrum/Circaea	M-R	M
Coffton					
CoC2	ArCi	Primary	Acer rubrum/Circaea	M-R	M
Council	ArDe-V	Secondary	Acer rubrum/Desmodium (Vaccinium)	M	D-DM
CpC2, CpD2:					
Council	ArCi	Primary	Acer rubrum/Circaea	M-R	M
Bilson	ArDe-V	Primary	Acer rubrum/Desmodium (Vaccinium)	M	D-DM
CsD2, CsE	ArCi	Primary	Acer rubrum/Circaea	M-R	M
Council and Seaton					
DuA	ArDe-V	Primary	Acer rubrum/Desmodium (Vaccinium)	M	D-DM
Dunnville	PVCr	Secondary	Pinus/Vaccinium-Cornus	M	D
ElB, ElC2, ElD2	PVCr	Primary	Pinus/Vaccinium-Cornus	M	D
Elevasil	ArDe-V	Secondary	Acer rubrum/Desmodium (Vaccinium)	M	D-DM

See footnotes at end of table.

Table 9.--Forest Habitat Types--Continued

Soil name and map symbol	Habitat type symbol	Dominance	Short scientific name	Nutrient regime*	Moisture regime**
FaA----------	PVHa	Primary	Pinus/Vaccinium-Hamamelis----------	P-M	D
Fairchild	PVRh	Secondary	Pinus/Vaccinium-Rubus----------	P	DM
FeA:					
Fairchild----------	PVHa	Primary	Pinus/Vaccinium-Hamamelis----------	P-M	D
	PVRh	Secondary	Pinus/Vaccinium-Rubus----------	P	DM
Elm Lake.					
GaC2, GaD2----------	ArCi	Primary	Acer rubrum/Circaea----------	M-R	M
Gale	ArDe-V	Secondary	Acer rubrum/Desmodium (Vaccinium)-----	M	D-DM
GoB, GoC----------	PVHa	Primary	Pinus/Vaccinium-Hamamelis----------	P-M	D
Gosil	PVCr	Secondary	Pinus/Vaccinium-Cornus----------	M	D
HkB:					
Hiles----------	ArCi	Primary	Acer rubrum/Circaea----------	M-R	M
Kert----------	PVHa	Primary	Pinus/Vaccinium-Hamamelis----------	P-M	D
HnB, HnC2, HnD2------	ArDe-V	Primary	Acer rubrum/Desmodium (Vaccinium)-----	M	D-DM
Hixton					
HuB----------	ArDe-V	Primary	Acer rubrum/Desmodium (Vaccinium)-----	M	D-DM
Humbird	PVHa	Secondary	Pinus/Vaccinium-Hamamelis----------	P-M	D
HxB:					
Humbird----------	ArDe-V	Primary	Acer rubrum/Desmodium (Vaccinium)-----	M	D-DM
Merrillan----------	PVHa	Primary	Pinus/Vaccinium-Hamamelis----------	P-M	D
ImA----------	PVGy	Primary	Pinus/Vaccinium-Gaylussacia----------	P	D
Impact	PVCr	Secondary	Pinus/Vaccinium-Cornus----------	M	D
IrA----------	PVHa	Primary	Pinus/Vaccinium-Hamamelis----------	P-M	D
Ironrun	PVRh	Secondary	Pinus/Vaccinium-Rubus----------	P	DM
IxA:					
Ironrun----------	PVHa	Primary	Pinus/Vaccinium-Hamamelis----------	P-M	D
	PVRh	Secondary	Pinus/Vaccinium-Rubus----------	P	DM
Ponycreek.					
IzB:					
Ironrun----------	PVRh	Primary	Pinus/Vaccinium-Rubus----------	P	DM
Ponycreek.					
Arbutus----------	PVGy	Primary	Pinus/Vaccinium-Gaylussacia----------	P	D
JaA, JaB----------	ArCi	Primary	Acer rubrum/Circaea----------	M-R	M
Jackson					
KeA----------	ArCi	Primary	Acer rubrum/Circaea----------	M-R	M
Kert	PVHa	Secondary	Pinus/Vaccinium-Hamamelis----------	P-M	D
LfC2, LfD2----------	ArCi	Primary	Acer rubrum/Circaea----------	M-R	M
La Farge	ArDe-V	Secondary	Acer rubrum/Desmodium (Vaccinium)-----	M	D-DM
LsD2:					
La Farge----------	ArDe-V	Primary	Acer rubrum/Desmodium (Vaccinium)-----	M	D-DM

See footnotes at end of table.

Table 9.--Forest Habitat Types--Continued

Soil name and map symbol	Habitat type symbol	Dominance	Short scientific name	Nutrient regime*	Moisture regime**
LsD2:					
Seaton	ArCi	Primary	Acer rubrum/Circaea	M-R	M
LuB	PVHa	Primary	Pinus/Vaccinium-Hamamelis	P-M	D
Ludington	PVCr	Secondary	Pinus/Vaccinium-Cornus	M	D
LxB:					
Ludington	PVHa	Primary	Pinus/Vaccinium-Hamamelis	P-M	D
Fairchild	PVRh	Primary	Pinus/Vaccinium-Rubus	P	DM
MaB	PVGy	Primary	Pinus/Vaccinium-Gaylussacia	P	D
Mahtomedi	PVCr	Secondary	Pinus/Vaccinium-Cornus	M	D
MbA	PVRh	Primary	Pinus/Vaccinium-Rubus	P	DM
Majik					
MmA	ArDe-V	Primary	Acer rubrum/Desmodium (Vaccinium)	M	D-DM
Merimod					
MnB	ArDe-V	Primary	Acer rubrum/Desmodium (Vaccinium)	M	D-DM
Merit					
MoB	ArDe-V	Primary	Acer rubrum/Desmodium (Vaccinium)	M	D-DM
Merit-Gardenvale					
MpA	PVHa	Primary	Pinus/Vaccinium-Hamamelis	P-M	D
Merrillan	PVRh	Secondary	Pinus/Vaccinium-Rubus	P	DM
MrA:					
Merrillan	PVHa	Primary	Pinus/Vaccinium-Hamamelis	P-M	D
	PVRh	Secondary	Pinus/Vaccinium-Rubus	P	DM
Veedum.					
MxA:					
Moppet	ArDe-V	Primary	Acer rubrum/Desmodium (Vaccinium)	M	D-DM
	PVCr	Secondary	Pinus/Vaccinium-Cornus	M	D
Fordum.					
OrA	ArCi	Primary	Acer rubrum/Circaea	M-R	M
Orion					
RkA	PVGy	Primary	Pinus/Vaccinium-Gaylussacia	P	D
Rockdam	PVCr	Secondary	Pinus/Vaccinium-Cornus	M	D
SeB, SeC2	ArCi	Primary	Acer rubrum/Circaea	M-R	M
Seaton					
SmB	ArCi	Primary	Acer rubrum/Circaea	M-R	M
Sebbo					
SoA	ArDe-V	Primary	Acer rubrum/Desmodium (Vaccinium)	M	D-DM
Sooner					
SpA	PVGy	Primary	Pinus/Vaccinium-Gaylussacia	P	D
Sparta	PVCr	Secondary	Pinus/Vaccinium-Cornus	M	D
TrB, TrC, TrF	PVGy	Primary	Pinus/Vaccinium-Gaylussacia	P	D
Tarr	PVCr	Secondary	Pinus/Vaccinium-Cornus	M	D

See footnotes at end of table.

Table 9.--Forest Habitat Types--Continued

Soil name and map symbol	Habitat type symbol	Dominance	Short scientific name	Nutrient regime*	Moisture regime**
TtA	PVGy	Primary	Pinus/Vaccinium-Gaylussacia	P	D
Tint	PVCr	Secondary	Pinus/Vaccinium-Cornus	M	D
TuB	PVCr	Primary	Pinus/Vaccinium-Cornus	M	D
Tintson	ArDe-V	Secondary	Acer rubrum/Desmodium (Vaccinium)	M	D-DM
UfC2, UfD2	ArDe-V	Primary	Acer rubrum/Desmodium (Vaccinium)	M	D-DM
Urne					
UrF:					
Urne	ArDe-V	Primary	Acer rubrum/Desmodium (Vaccinium)	M	D-DM
Council	ArCi	Primary	Acer rubrum/Circaea	M-R	M

* VP indicates very poor; P, poor; M, medium; R, rich; and VR, very rich.

** VD indicates very dry; D, dry; DM, dry-mesic; M, mesic; WM, wet-mesic; and VW, very wet.

Table 10.--Windbreaks and Environmental Plantings

(Only the soils suitable for windbreaks and environmental plantings are listed. The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
AbA---------- Absco	---	Silky dogwood, eastern redcedar, nannyberry viburnum, American cranberrybush.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
AcA: Absco----------	---	Silky dogwood, eastern redcedar, nannyberry viburnum, American cranberrybush.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
Northbend--------	---	Northern whitecedar, nannyberry viburnum, lilac, silky dogwood, American cranberrybush, redosier dogwood.	White spruce------	Eastern white pine, red maple, red pine, white ash.	Silver maple.
Ad---------- Adder	---	Silky dogwood, common ninebark, Amur privet, American cranberrybush, late lilac, Siberian peashrub, nannyberry viburnum.	Northern whitecedar, Siberian crabapple.	Eastern white pine, green ash.	Imperial Carolina poplar.
ArA---------- Arenzville	---	Northern whitecedar, lilac, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood.	White spruce------	Eastern white pine, red pine, white ash, red maple.	Silver maple.
BeB---------- Bertrand	---	Lilac, northern whitecedar, Amur maple, American cranberrybush, gray dogwood.	White spruce, Norway spruce, Black Hills spruce.	Eastern white pine, red pine, white ash, red maple.	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
BkA---------- Bilmod	Manyflower cotoneaster.	Gray dogwood, silky dogwood, Siberian peashrub, Amur maple, lilac, eastern redcedar, American cranberrybush.	Norway spruce-----	Jack pine, red pine, eastern white pine.	---
BlB---------- Bilson	Manyflower cotoneaster.	Gray dogwood, silky dogwood, Siberian peashrub, American cranberrybush, Amur maple, lilac, eastern redcedar.	Norway spruce-----	Jack pine, red pine, eastern white pine.	---
BnB:					
Bilson----------	Manyflower cotoneaster.	Gray dogwood, silky dogwood, Siberian peashrub, American cranberrybush, Amur maple, lilac, eastern redcedar.	Norway spruce-----	Jack pine, red pine, eastern white pine.	---
Silverhill-------	Manyflower cotoneaster.	American cranberrybush, Siberian peashrub, Amur maple, lilac, silky dogwood.	Norway spruce, jack pine.	Eastern white pine, red pine.	---
BnC2, BnD2:					
Bilson----------	Manyflower cotoneaster.	Gray dogwood, silky dogwood, Siberian peashrub, American cranberrybush, Amur maple, lilac, eastern redcedar.	Norway spruce-----	Jack pine, red pine, eastern white pine.	---
Elevasil---------	---	Siberian peashrub, eastern redcedar, lilac, Amur maple, gray dogwood, silky dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
BoB, BoC, BoF----- Boone	Manyflower cotoneaster.	Siberian peashrub, eastern redcedar, lilac, silky dogwood, gray dogwood, Amur maple, American cranberrybush.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
BpF:					
Boone----------	Manyflower cotoneaster.	Siberian peashrub, eastern redcedar, lilac, silky dogwood, gray dogwood, Amur maple, American cranberrybush.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
Elevasil---------	---	Siberian peashrub, eastern redcedar, lilac, Amur maple, gray dogwood, silky dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
CfA---------- Coffton	---	Redosier dogwood, silky dogwood, nannyberry viburnum, American cranberrybush, lilac, northern whitecedar.	White spruce------	Silver maple, eastern white pine, red pine, white ash, red maple.	---
CoC2---------- Council	---	Northern whitecedar, lilac, American cranberrybush, Amur maple, gray dogwood.	White spruce, Norway spruce, Black Hills spruce.	Eastern white pine, red pine, white ash, red maple.	---
CpC2, CpD2:					
Council----------	---	Northern whitecedar, lilac, American cranberrybush, Amur maple, gray dogwood.	White spruce, Norway spruce, Black Hills spruce.	Eastern white pine, red pine, white ash, red maple.	---
Bilson----------	Manyflower cotoneaster.	Gray dogwood, silky dogwood, Siberian peashrub, American cranberrybush, Amur maple, lilac, eastern redcedar.	Norway spruce-----	Jack pine, red pine, eastern white pine.	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
CsD2, CsE:					
Council	---	Northern whitecedar, lilac, American cranberrybush, Amur maple, gray dogwood.	White spruce, Norway spruce, Black Hills spruce.	Eastern white pine, red pine, white ash, red maple.	---
Seaton	---	Gray dogwood, redosier dogwood, lilac, Siberian peashrub.	Hackberry, northern whitecedar, Russian-olive, eastern redcedar, Amur maple, blue spruce.	Eastern white pine, green ash.	---
ElB, ElC2, ElD2--- Elevasil	---	Siberian peashrub, eastern redcedar, lilac, Amur maple, gray dogwood, silky dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
Eo Elm Lake	---	Northern whitecedar, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood, common ninebark.	White spruce, balsam fir.	Silver maple, white ash, green ash, red maple.	---
FaA Fairchild	---	Northern whitecedar, lilac, silky dogwood, American cranberrybush, nannyberry viburnum, redosier dogwood.	White spruce------	Eastern white pine, red pine, white ash, red maple, silver maple.	---
FeA:					
Fairchild	---	Northern whitecedar, lilac, silky dogwood, American cranberrybush, nannyberry viburnum, redosier dogwood.	White spruce------	Eastern white pine, red pine, white ash, red maple, silver maple.	---
Elm Lake	---	Northern whitecedar, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood, common ninebark.	White spruce, balsam fir.	Silver maple, white ash, green ash, red maple.	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
GaC2, GaD2-------- Gale	Manyflower cotoneaster.	Siberian peashrub, silky dogwood, eastern redcedar, American cranberrybush, Amur maple, lilac, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
GoB, GoC---------- Gosil	Manyflower cotoneaster.	Siberian peashrub, lilac, silky dogwood, eastern redcedar, Amur maple, American cranberrybush, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
HkB: Hiles------------	Manyflower cotoneaster.	Eastern redcedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	Siberian peashrub, Norway spruce.	Eastern white pine, red pine, jack pine.	---
Kert-------------	---	Northern whitecedar, lilac, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood.	White spruce------	Eastern white pine, red pine, white ash, red maple, silver maple.	---
HnB, HnC2, HnD2--- Hixton	Manyflower cotoneaster.	Gray dogwood, silky dogwood, Siberian peashrub, American cranberrybush, Amur maple, lilac, eastern redcedar.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
HpA--------------- Hoop	---	Northern whitecedar, nannyberry viburnum, redosier dogwood, lilac.	Amur maple, white spruce.	Eastern white pine, hackberry, red maple, white ash, green ash.	Silver maple.
HuB--------------- Humbird	Manyflower cotoneaster.	Eastern redcedar, Siberian peashrub, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
HxB:					
Humbird----------	Manyflower cotoneaster.	Eastern redcedar, Siberian peashrub, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
Merrillan--------	---	Nannyberry viburnum, northern whitecedar, lilac, American cranberrybush, silky dogwood, redosier dogwood.	White spruce------	Eastern white pine, red pine, white ash, red maple, silver maple.	---
ImA---------- Impact	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
IrA---------- Ironrun	-	Common ninebark, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
IxA:					
Ironrun----------	---	Common ninebark, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
Ponycreek.					
IzB:					
Ironrun----------	---	Common ninebark, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
Ponycreek.					
Arbutus----------	---	Autumn-olive, lilac, white spruce, Amur privet.	Hawthorn----------	Red pine, eastern white pine, jack pine.	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
JaA, JaB---------- Jackson	---	Northern whitecedar, lilac, Amur maple, American cranberrybush, gray dogwood.	White spruce, Black Hills spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
Ka---------- Kalmarville	---	American plum, redosier dogwood.	Tall purple willow, hackberry, northern whitecedar, white spruce, Amur maple.	Golden willow, green ash.	Eastern cottonwood, silver maple.
KeA---------- Kert	---	Northern whitecedar, lilac, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood.	White spruce------	Eastern white pine, red pine, white ash, red maple, silver maple.	---
LfC2, LfD2-------- La Farge	Manyflower cotoneaster.	Siberian peashrub, eastern redcedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
LsD2: La Farge----------	Manyflower cotoneaster.	Siberian peashrub, eastern redcedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
Seaton----------	---	Gray dogwood, redosier dogwood, lilac, Siberian peashrub.	Hackberry, northern whitecedar, Russian-olive, eastern redcedar, Amur maple, blue spruce.	Eastern white pine, green ash.	---
Lt---------- Loxley	---	Common ninebark, nannyberry viburnum, silky dogwood, lilac, American cranberrybush, gray dogwood.	Siberian crabapple, northern whitecedar.	Eastern white pine, green ash, Norway spruce.	Imperial Carolina poplar.

Table 10.--Windbreaks and Environmental Plantings--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
LuB---------- Ludington	Manyflower cotoneaster.	Eastern redcedar, Amur maple, American cranberrybush, lilac, silky dogwood, gray dogwood, Siberian peashrub.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
LxB:					
Ludington--------	Manyflower cotoneaster.	Eastern redcedar, Amur maple, American cranberrybush, lilac, silky dogwood, gray dogwood, Siberian peashrub.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
Fairchild--------	---	Northern whitecedar, lilac, silky dogwood, American cranberrybush, nannyberry viburnum, redosier dogwood.	White spruce------	Eastern white pine, red pine, white ash, red maple, silver maple.	---
MaB---------- Mahtomedi	Manyflower cotoneaster.	Gray dogwood, silky dogwood, Siberian peashrub, American cranberrybush, Amur maple, lilac, eastern redcedar.	Norway spruce-----	Jack pine, red pine, eastern white pine.	---
MbA---------- Majik	---	Silky dogwood, American cranberrybush, lilac, redosier dogwood, nannyberry viburnum, northern whitecedar.	White spruce------	White ash, red pine, red maple, silver maple, eastern white pine.	---
MmA---------- Merimod	Siberian peashrub, lilac.	Eastern redcedar, Manchurian crabapple, hackberry.	Eastern white pine, jack pine, green ash, bur oak, honeylocust, Russian-olive.	-	---
MnB---------- Merit	Siberian peashrub, lilac.	Manchurian crabapple, hackberry.	Eastern white pine, jack pine, green ash, bur oak, honeylocust, Russian-olive.	Red maple---------	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
MoB:					
Merit	Siberian peashrub, lilac.	Manchurian crabapple, hackberry.	Eastern white pine, jack pine, green ash, bur oak, honeylocust, Russian-olive.	Red maple	---
Gardenvale	Manyflower cotoneaster.	American cranberrybush, Siberian peashrub, Amur maple, lilac, silky dogwood.	Norway spruce, jack pine.	Eastern white pine, red pine.	---
MpA Merrillan	---	Nannyberry viburnum, northern whitecedar, lilac, American cranberrybush, silky dogwood, redosier dogwood.	White spruce	Eastern white pine, red pine, white ash, red maple, silver maple.	---
MrA:					
Merrillan	---	Nannyberry viburnum, northern whitecedar, lilac, American cranberrybush, silky dogwood, redosier dogwood.	White spruce	Eastern white pine, red pine, white ash, red maple, silver maple.	---
Veedum.					
MxA:					
Moppet	---	Northern whitecedar, lilac, redosier dogwood, silky dogwood, American cranberrybush, nannyberry viburnum.	White spruce	Eastern white pine, red pine, white ash, red maple, silver maple.	---
Fordum.					
OrA Orion	---	Common ninebark, nannyberry viburnum, northern whitecedar, lilac, American cranberrybush, silky dogwood, redosier dogwood.	White spruce	Eastern white pine, white ash, red maple, silver maple.	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
RkA---------- Rockdam	Manyflower cotoneaster.	Eastern redcedar, Amur maple, Siberian peashrub, gray dogwood, lilac, American cranberrybush, silky dogwood.	Red pine, Norway spruce.	Eastern white pine, jack pine.	---
RoA---------- Rowley	---	Northern whitecedar, redosier dogwood, American cranberrybush, nannyberry viburnum, lilac, silky dogwood.	White spruce------	Eastern white pine, red pine, white ash, silver maple, red maple.	---
SeB, SeC2--------- Seaton	---	Gray dogwood, redosier dogwood, lilac, Siberian peashrub.	Hackberry, northern whitecedar, Russian-olive, eastern redcedar, Amur maple, blue spruce.	Eastern white pine, green ash.	---
SmB---------- Sebbo	---	Northern whitecedar, lilac, Amur maple, gray dogwood.	White spruce, Norway spruce, Black Hills spruce.	Eastern white pine, red pine, white ash, red maple.	---
SnA---------- Sechler	---	Northern whitecedar, American cranberrybush, lilac, redosier dogwood, silky dogwood, nannyberry viburnum.	White spruce------	Eastern white pine, red pine, white ash, silver maple, red maple.	---
SoA---------- Sooner	---	Northern whitecedar, lilac, nannyberry viburnum, silky dogwood, gray dogwood, American cranberrybush.	White spruce------	Eastern white pine, red pine, white ash, red maple, silver maple.	---
SpA---------- Sparta	Manyflower cotoneaster.	Siberian peashrub, Amur maple, lilac, eastern redcedar, American cranberrybush, gray dogwood, silky dogwood.	Norway spruce-----	Red pine, eastern white pine, jack pine.	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
TrB, TrC, TrF----- Tarr	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
TtA---------- Tint	Manyflower cotoneaster.	Eastern redcedar, Amur maple, Siberian peashrub, gray dogwood, lilac, American cranberrybush, silky dogwood.	Norway spruce-----	Eastern white pine, jack pine, red pine.	---
TuB---------- Tintson	---	Eastern redcedar, lilac, Amur maple, Siberian peashrub, silky dogwood, gray dogwood.	---	Eastern white pine, red pine, jack pine.	---
TwA---------- Toddville	---	Gray dogwood, Amur maple, American cranberrybush, lilac, northern whitecedar.	Black Hills spruce, white spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
UfC2, UfD2-------- Urne	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, silky dogwood, gray dogwood, Siberian peashrub.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
UrF:					
Urne----------	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, silky dogwood, gray dogwood, Siberian peashrub.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
Council----------	---	Northern whitecedar, lilac, American cranberrybush, Amur maple, gray dogwood.	White spruce, Norway spruce, Black Hills spruce.	Eastern white pine, red pine, white ash, red maple.	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Vs: Veedum. Elm Lake---------	---	Northern whitecedar, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood, common ninebark.	White spruce, balsam fir.	Silver maple, white ash, green ash, red maple.	---
WmA---------- Whitehall	Manyflower cotoneaster.	Eastern redcedar, lilac, gray dogwood, silky dogwood, Siberian peashrub, Amur maple, American cranberrybush.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---

Table 11.--Recreational Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AbA Absco	Severe: flooding.	Slight	Moderate: small stones, flooding.	Slight	Moderate: droughty, flooding.
AcA: Absco	Severe: flooding.	Slight	Moderate: small stones, flooding.	Slight	Moderate: droughty, flooding.
Northbend	Severe: flooding, wetness, too acid.	Severe: too acid.	Severe: wetness, flooding, too acid.	Moderate: wetness, flooding.	Severe: too acid, flooding.
Ad Adder	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: ponding, flooding, excess humus.
ArA Arenzville	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
BeB Bertrand	Slight	Slight	Moderate: slope.	Slight	Slight.
BkA Bilmod	Slight	Slight	Slight	Slight	Moderate: droughty.
BlB Bilson	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: droughty.
BnB: Bilson	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: droughty.
Silverhill	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
BnC2: Bilson	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
Elevasil	Severe: too acid.	Severe: too acid.	Severe: slope, too acid.	Slight	Severe: too acid.
BnD2: Bilson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Elevasil	Severe: slope, too acid.	Severe: slope, too acid.	Severe: slope, too acid.	Moderate: slope.	Severe: too acid, slope.

Table 11.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BoB---------- Boone	Severe: too sandy, too acid.	Severe: too sandy, too acid.	Severe: too sandy, too acid.	Severe: too sandy.	Severe: too acid, droughty.
BoC---------- Boone	Severe: too sandy, too acid.	Severe: too sandy, too acid.	Severe: slope, too sandy, too acid.	Severe: too sandy.	Severe: too acid, droughty.
BoF---------- Boone	Severe: slope, too sandy, too acid.	Severe: slope, too sandy, too acid.	Severe: slope, too sandy, too acid.	Severe: too sandy, slope.	Severe: too acid, droughty, slope.
BpF: Boone----------	Severe: slope, too sandy, too acid.	Severe: slope, too sandy, too acid.	Severe: slope, too sandy, too acid.	Severe: too sandy, slope.	Severe: too acid, droughty, slope.
Elevasil----------	Severe: slope, too acid.	Severe: slope, too acid.	Severe: slope, too acid.	Severe: slope.	Severe: too acid, slope.
Cd---------- Citypoint	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
CfA---------- Coffton	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
CoC2---------- Council	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
CpC2: Council----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
Bilson----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: droughty, slope.
CpD2: Council----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Bilson----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
CsD2: Council----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Seaton----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
CsE: Council----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.

Table 11.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CsE:					
Seaton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Da Dawsil	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
DuA Dunnville	Slight	Slight	Slight	Slight	Moderate: droughty.
ElB Elevasil	Severe: too acid.	Severe: too acid.	Severe: too acid.	Slight	Severe: too acid.
ElC2 Elevasil	Severe: too acid.	Severe: too acid.	Severe: slope, too acid.	Slight	Severe: too acid.
ElD2 Elevasil	Severe: slope, too acid.	Severe: slope, too acid.	Severe: slope, too acid.	Moderate: slope.	Severe: too acid, slope.
Eo Elm Lake	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Et Ettrick	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
FaA Fairchild	Severe: wetness, too sandy, too acid.	Severe: wetness, too sandy, too acid.	Severe: too sandy, wetness, too acid.	Severe: wetness, too sandy.	Severe: too acid, wetness.
FeA:					
Fairchild	Severe: wetness, too sandy, too acid.	Severe: wetness, too sandy, too acid.	Severe: too sandy, wetness, too acid.	Severe: wetness, too sandy.	Severe: too acid, wetness.
Elm Lake	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
GaC2 Gale	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer, area reclaim.
GaD2 Gale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
GoB Gosil	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, small stones, too sandy.	Moderate: too sandy.	Moderate: droughty.
GoC Gosil	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: droughty, slope.

Table 11.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
HkB:					
Hiles	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness, depth to rock.	Severe: erodes easily.	Moderate: wetness, depth to rock.
Kert	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, depth to rock.
HnB Hixton	Slight	Slight	Moderate: slope, depth to rock.	Slight	Moderate: depth to rock.
HnC2 Hixton	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, depth to rock.
HnD2 Hixton	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
HpA Hoop	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
Ht Houghton	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness, flooding.	Severe: wetness, excess humus.	Severe: wetness, flooding, excess humus.
HuB Humbird	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, depth to rock.	Moderate: wetness.	Moderate: wetness, droughty.
HxB:					
Humbird	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, depth to rock.	Moderate: wetness.	Moderate: wetness, droughty.
Merrillan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
ImA Impact	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
IrA Ironrun	Severe: wetness, too sandy, too acid.	Severe: wetness, too sandy, too acid.	Severe: too sandy, wetness, too acid.	Severe: wetness, too sandy.	Severe: too acid, wetness, droughty.
IxA:					
Ironrun	Severe: wetness, too sandy, too acid.	Severe: wetness, too sandy, too acid.	Severe: too sandy, wetness, too acid.	Severe: wetness, too sandy.	Severe: too acid, wetness, droughty.

Table 11.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
IxA:					
Ponycreek	Severe: ponding, excess humus, too acid.	Severe: ponding, excess humus, too acid.	Severe: excess humus, ponding, too acid.	Severe: ponding, excess humus.	Severe: too acid, ponding, excess humus.
IzB:					
Ironrun	Severe: wetness, too sandy, too acid.	Severe: wetness, too sandy, too acid.	Severe: too sandy, wetness, too acid.	Severe: wetness, too sandy.	Severe: too acid, wetness, droughty.
Ponycreek	Severe: ponding, excess humus, too acid.	Severe: ponding, excess humus, too acid.	Severe: excess humus, ponding, too acid.	Severe: ponding, excess humus.	Severe: too acid, ponding, excess humus.
Arbutus	Severe: too acid.	Severe: too acid.	Severe: too acid.	Moderate: too sandy.	Severe: too acid.
JaA Jackson	Slight	Slight	Slight	Slight	Slight.
JaB Jackson	Slight	Slight	Moderate: slope.	Slight	Slight.
Ka Kalmarville	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
KeA Kert	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, depth to rock.
LfC2 La Farge	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer, area reclaim.
LfD2 La Farge	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
LsD2:					
La Farge	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Seaton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Lt Loxley	Severe: ponding, excess humus, too acid.	Severe: ponding, excess humus, too acid.	Severe: excess humus, ponding, too acid.	Severe: ponding, excess humus.	Severe: too acid, ponding, excess humus.
LuB Ludington	Severe: too sandy, too acid.	Severe: too sandy, too acid.	Severe: too sandy, too acid.	Severe: too sandy.	Severe: too acid.
LxB:					
Ludington	Severe: too sandy, too acid.	Severe: too sandy, too acid.	Severe: too sandy, too acid.	Severe: too sandy.	Severe: too acid.

Table 11.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
LxB:					
Fairchild	Severe: wetness, too sandy, too acid.	Severe: wetness, too sandy, too acid.	Severe: too sandy, wetness, too acid.	Severe: wetness, too sandy.	Severe: too acid, wetness.
MaB Mahtomedi	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope.	Moderate: too sandy.	Moderate: droughty.
MbA Majik	Severe: wetness.	Moderate: wetness, too sandy.	Severe: wetness.	Moderate: wetness, too sandy.	Moderate: wetness, droughty.
MmA Merimod	Slight	Slight	Moderate: small stones.	Slight	Slight.
MnB Merit	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
MoB:					
Merit	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
Gardenvale	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
MpA Merrillan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
MrA:					
Merrillan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Veedum	Severe: ponding, too acid.	Severe: ponding, too acid.	Severe: ponding, too acid.	Severe: ponding.	Severe: too acid, ponding.
MxA:					
Moppet	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Fordum	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
Ne Newlang	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus, too acid.	Severe: excess humus, ponding, too acid.	Severe: ponding, excess humus.	Severe: too acid, ponding, excess humus.
OrA Orion	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
Pa Palms	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: ponding, flooding, excess humus.

Table 11.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Pt. Pits					
Pu---------- Ponycreek	Severe: ponding, excess humus, too acid.	Severe: ponding, excess humus, too acid.	Severe: excess humus, ponding, too acid.	Severe: ponding, excess humus.	Severe: too acid, ponding, excess humus.
Pv:					
Ponycreek---------- 	Severe: ponding, excess humus, too acid.	Severe: ponding, excess humus, too acid.	Severe: excess humus, ponding, too acid.	Severe: ponding, excess humus.	Severe: too acid, ponding, excess humus.
Dawsil---------- 	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Pw---------- Psammaquents	Severe: flooding, wetness.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
RkA---------- Rockdam	Severe: too sandy, too acid.	Severe: too sandy, too acid.	Severe: too sandy, too acid.	Severe: too sandy.	Severe: too acid, droughty.
RoA---------- Rowley	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
SeB---------- Seaton	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
SeC2---------- Seaton	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
SmB---------- Sebbo	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
SnA---------- Sechler	Severe: flooding, wetness, too acid.	Severe: too acid.	Severe: wetness, too acid.	Moderate: wetness.	Severe: too acid.
SoA---------- Sooner	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
SpA---------- Sparta	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
TrB---------- Tarr	Severe: too sandy, too acid.	Severe: too sandy, too acid.	Severe: too sandy, too acid.	Severe: too sandy.	Severe: too acid.
TrC---------- Tarr	Severe: too sandy, too acid.	Severe: too sandy, too acid.	Severe: slope, too sandy, too acid.	Severe: too sandy.	Severe: too acid.

Table 11.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
TrF---------- Tarr	Severe: slope, too sandy, too acid.	Severe: slope, too sandy, too acid.	Severe: slope, too sandy, too acid.	Severe: too sandy, slope.	Severe: too acid, slope.
TtA---------- Tint	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
TuB---------- Tintson	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
TwA---------- Toddville	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
UdF---------- Udorthents	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
UfC2---------- Urne	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, thin layer, area reclaim.
UfD2---------- Urne	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
UrF:					
Urne----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Council----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Vs:					
Veedum----------	Severe: ponding, excess humus, too acid.	Severe: ponding, excess humus, too acid.	Severe: excess humus, ponding, too acid.	Severe: ponding, excess humus.	Severe: too acid, ponding, excess humus.
Elm Lake----------	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
WmA---------- Whitehall	Severe: flooding.	Slight----------	Slight----------	Slight----------	Slight.

Table 12.--Wildlife Habitat

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AbA---- Absco	Poor	Fair	Fair	Poor	Fair	Poor	Very poor.	Fair	Fair	Very poor.
AcA:										
Absco----	Poor	Fair	Fair	Poor	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Northbend----	Fair	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair.
Ad---- Adder	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
ArA---- Arenzville	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
BeB---- Bertrand	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BkA---- Bilmod	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
BlB---- Bilson	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BnB:										
Bilson----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Silverhill----	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BnC2:										
Bilson----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Elevasil----	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
BnD2:										
Bilson----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Elevasil----	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
BoB, BoC---- Boone	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
BoF---- Boone	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
BpF:										
Boone----	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Elevasil----	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

Table 12.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Cd---- Citypoint	Very poor.	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Fair.
CfA---- Coffton	Good	Good	Good	Good	Good	Good	Fair	Good	Good	Fair.
CoC2---- Council	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CpC2:										
Council----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Bilson----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CpD2:										
Council----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Bilson----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CsD2:										
Council----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Seaton----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CsE:										
Council----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Seaton----	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Da---- Dawsil	Very poor.	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Fair.
DuA---- Dunnville	Fair	Fair	Good	Good	Good	Poor	Poor	Fair	Fair	Poor.
ElB, ElC2---- Elevasil	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
ElD2---- Elevasil	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Eo---- Elm Lake	Poor	Poor	Fair	Fair	Fair	Poor	Good	Poor	Fair	Fair.
Et---- Ettrick	Good	Good	Fair	Good	Fair	Good	Good	Good	Good	Good.
FaA---- Fairchild	Poor	Fair	Good	Fair	Fair	Fair	Fair	Poor	Fair	Fair.
FeA:										
Fairchild----	Poor	Fair	Good	Fair	Fair	Fair	Fair	Poor	Fair	Fair.

Table 12.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
FeA:										
Elm Lake	Poor	Poor	Fair	Fair	Fair	Poor	Good	Poor	Fair	Fair.
GaC2---------- Gale	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GaD2---------- Gale	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GoB, GoC---------- Gosil	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
HkB:										
Hiles----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Kert----------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
HnB---------- Hixton	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HnC2---------- Hixton	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HnD2---------- Hixton	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
HpA---------- Hoop	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
Ht---------- Houghton	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
HuB---------- Humbird	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Poor.
HxB:										
Humbird----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Poor.
Merrillan----------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
ImA---------- Impact	Poor	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
IrA---------- Ironrun	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
IxA:										
Ironrun----------	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
Ponycreek----------	Fair	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
IzB:										
Ironrun----------	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
Ponycreek----------	Fair	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
Arbutus----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.

Table 12.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
JaA, JaB---------- Jackson	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ka---------- Kalmarville	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
KeA---------- Kert	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
LfC2---------- La Farge	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LfD2---------- La Farge	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
LsD2:										
La Farge----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Seaton----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lt---------- Loxley	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
LuB---------- Ludington	Very poor.	Fair	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
LxB:										
Ludington----------	Very poor.	Fair	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Fairchild----------	Poor	Fair	Good	Fair	Fair	Fair	Fair	Poor	Fair	Fair.
MaB---------- Mahtomedi	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
MbA---------- Majik	Poor	Fair	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
MmA---------- Merimod	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
MnB---------- Merit	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MoB:										
Merit----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Gardenvale--------	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MpA---------- Merrillan	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
MrA:										
Merrillan----------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Veedum----------	Fair	Good	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.

Table 12.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
MxA:										
Moppet	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
Fordum	Very poor.	Very poor.	Poor	Fair	Fair	Good	Good	Very poor.	Fair	Good.
Ne Newlang	Poor	Poor	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
OrA Orion	Good	Good	Good	Good	Good	Good	Fair	Good	Good	Good.
Pa Palms	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Pt. Pits										
Pu Ponycreek	Fair	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
Pv:										
Ponycreek	Fair	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
Dawsil	Very poor.	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Fair.
Pw Psammaquents	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
RkA Rockdam	Poor	Fair	Good	Fair	Good	Poor	Very poor.	Fair	Good	Very poor.
RoA Rowley	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
SeB, SeC2 Seaton	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SmB Sebbo	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SnA Sechler	Fair	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair.
SoA Sooner	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
SpA Sparta	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
TrB, TrC, TrF Tarr	Poor	Poor	Good	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
TtA Tint	Poor	Poor	Good	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
TuB Tintson	Poor	Poor	Good	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
TwA Toddville	Good	Good	Good	Poor	Poor	Poor	Very poor.	Good	Poor	Very poor.

Table 12.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
UdF. Udorthents										
UfC2---------- Urne	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
UfD2---------- Urne	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
UrF:										
Urne----------	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Council----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Vs:										
Veedum----------	Fair	Good	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
Elm Lake----------	Poor	Poor	Fair	Fair	Fair	Poor	Good	Poor	Fair	Fair.
WmA---------- Whitehall	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

Table 13.--Building Site Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AbA Absco	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
AcA: Absco	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
Northbend	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: too acid, flooding.
Ad Adder	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, ponding, flooding.	Severe: ponding, flooding, excess humus.
ArA Arenzville	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.	Moderate: flooding.
BeB Bertrand	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
BkA Bilmod	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Moderate: frost action.	Moderate: droughty.
BlB Bilson	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: droughty.
BnB: Bilson	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: droughty.
Silverhill	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: droughty.
BnC2: Bilson	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope.
Elevasil	Severe: cutbanks cave.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, frost action.	Severe: too acid.
BnD2: Bilson	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Elevasil	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: too acid, slope.

Table 13.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
BoB---------- Boone	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: too acid, droughty.
BoC---------- Boone	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: too acid, droughty.
BoF---------- Boone	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: too acid, droughty, slope.
BpF: Boone----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: too acid, droughty, slope.
Elevasil---------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: too acid, slope.
Cd---------- Citypoint	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding, frost action.	Severe: ponding, excess humus.
CfA---------- Coffton	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Moderate: wetness, flooding.
CoC2---------- Council	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
CpC2: Council----------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Bilson----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope.
CpD2: Council----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bilson----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CsD2, CsE: Council----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Seaton----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.

Table 13.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Da---------- Dawsil	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
DuA---------- Dunnville	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty.
ElB---------- Elevasil	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Severe: too acid.
ElC2---------- Elevasil	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Severe: too acid.
ElD2---------- Elevasil	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: too acid, slope.
Eo---------- Elm Lake	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Et---------- Ettrick	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
FaA---------- Fairchild	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Severe: too acid, wetness.
FeA: Fairchild--------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Severe: too acid, wetness.
Elm Lake---------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.
GaC2---------- Gale	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope, thin layer, area reclaim.
GaD2---------- Gale	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
GoB---------- Gosil	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty.
GoC---------- Gosil	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
HkB: Hiles----------	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, wetness.	Moderate: wetness, depth to rock.

Table 13.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HkB:						
Kert	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness, depth to rock.
HnB	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: depth to rock.
HnC2	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, depth to rock.
HnD2	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
HpA	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
Ht	Severe: excess humus, wetness.	Severe: subsides, flooding, wetness.	Severe: subsides, flooding, wetness.	Severe: subsides, flooding, wetness.	Severe: subsides, wetness, flooding.	Severe: wetness, flooding, excess humus.
HuB	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
HxB:						
Humbird	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
Merrillan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
ImA	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty, too sandy.
IrA	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: too acid, wetness, droughty.
IxA:						
Ironrun	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: too acid, wetness, droughty.
Ponycreek	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: too acid, ponding, excess humus.

Table 13.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
IzB:						
Ironrun	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: too acid, wetness, droughty.
Ponycreek	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: too acid, ponding, excess humus.
Arbutus	Severe: depth to rock, cutbanks cave.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Severe: too acid.
JaA Jackson	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: wetness.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
JaB Jackson	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: wetness.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
Ka Kalmarville	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.	Severe: wetness, flooding.
KeA Kert	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness, depth to rock.
LfC2 La Farge	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope, thin layer, area reclaim.
LfD2 La Farge	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
LsD2:						
La Farge	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
Seaton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
Lt Loxley	Severe: excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: too acid, ponding, excess humus.
LuB Ludington	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: too acid.

Table 13.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
LxB:						
Ludington	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: too acid.
Fairchild	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: too acid, wetness.
MaB---Mahtomedi	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
MbA---Majik	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
MmA---Merimod	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: wetness.	Moderate: shrink-swell.	Moderate: shrink-swell, frost action.	Slight.
MnB---Merit	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Moderate: shrink-swell, frost action.	Slight.
MoB:						
Merit	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Moderate: shrink-swell, frost action.	Slight.
Gardenvale	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: low strength, frost action.	Slight.
MpA---Merrillan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
MrA:						
Merrillan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
Veedum	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: too acid, ponding.
MxA:						
Moppet	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Fordum	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding, frost action.	Severe: ponding, flooding.
Ne---Newlang	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding.	Severe: too acid, ponding, excess humus.

Table 13.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
OrA---------- Orion	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding, frost action.	Moderate: wetness, flooding.
Pa---------- Palms	Severe: excess humus, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, ponding, flooding.	Severe: ponding, flooding, excess humus.
Pt. Pits						
Pu---------- Ponycreek	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: too acid, ponding, excess humus.
Pv: Ponycreek--------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: too acid, ponding, excess humus.
Dawsil----------	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
Pw---------- Psammaquents	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
RkA---------- Rockdam	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Severe: too acid, droughty.
RoA---------- Rowley	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
SeB---------- Seaton	Slight---------	Slight---------	Slight---------	Moderate: slope.	Severe: low strength, frost action.	Slight.
SeC2---------- Seaton	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
SmB---------- Sebbo	Moderate: wetness.	Slight---------	Moderate: wetness.	Slight---------	Moderate: low strength, frost action.	Slight.
SnA---------- Sechler	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: too acid.
SoA---------- Sooner	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.

Table 13.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
SpA---------- Sparta	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty, too sandy.
TrB---------- Tarr	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: too acid.
TrC---------- Tarr	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: too acid.
TrF---------- Tarr	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: too acid, slope.
TtA---------- Tint	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Severe: droughty.
TuB---------- Tintson	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Moderate: droughty, too sandy.
TwA---------- Toddville	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
UdF---------- Udorthents	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
UfC2---------- Urne	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer, area reclaim.
UfD2---------- Urne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
UrF:						
Urne----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Council----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Vs:						
Veedum----------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: too acid, ponding, excess humus.
Elm Lake----------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.
WmA---------- Whitehall	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, frost action.	Slight.

Table 14.--Sanitary Facilities

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AbA					
Absco	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy.
AcA:					
Absco	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy.
Northbend	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, too acid.
Ad					
Adder	Severe: subsides, flooding, ponding.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: seepage, too sandy, ponding.
ArA					
Arenzville	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
BeB					
Bertrand	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: too clayey, thin layer.
BkA					
Bilmod	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
BlB					
Bilson	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
BnB:					
Bilson	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Silverhill	Severe: poor filter.	Severe: seepage.	Severe: depth to rock, seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
BnC2:					
Bilson	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

Table 14.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BnC2:					
Elevasil	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
BnD2:					
Bilson	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
Elevasil	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
BoB Boone	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, seepage, too sandy.
BoC Boone	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, seepage, too sandy.
BoF Boone	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, seepage, too sandy.
BpF:					
Boone	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, seepage, too sandy.
Elevasil	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Cd Citypoint	Severe: depth to rock, ponding, percs slowly.	Severe: seepage, depth to rock, excess humus.	Severe: depth to rock, seepage, ponding.	Severe: depth to rock, seepage, ponding.	Poor: depth to rock, ponding, excess humus.
CfA Coffton	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness, thin layer.
CoC2 Council	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
CpC2:					
Council	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Bilson	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

Table 14.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CpD2:					
Council	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Bilson	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
CsD2, CsE:					
Council	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Seaton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Da Dawsil	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
DuA Dunnville	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
ElB Elevasil	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
ElC2 Elevasil	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
ElD2 Elevasil	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Eo Elm Lake	Severe: depth to rock, ponding, percs slowly.	Severe: seepage, depth to rock.	Severe: depth to rock, ponding, too sandy.	Severe: depth to rock, seepage, ponding.	Poor: depth to rock, seepage, too sandy.
Et Ettrick	Severe: flooding, ponding, percs slowly.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, ponding.	Poor: ponding.
FaA Fairchild	Severe: depth to rock, wetness, percs slowly.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, wetness, too sandy.	Severe: depth to rock, seepage, wetness.	Poor: depth to rock, seepage, too sandy.
FeA:					
Fairchild	Severe: depth to rock, wetness, percs slowly.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, wetness, too sandy.	Severe: depth to rock, seepage, wetness.	Poor: depth to rock, seepage, too sandy.

Table 14.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
FeA:					
Elm Lake	Severe: depth to rock, ponding, percs slowly.	Severe: seepage, depth to rock, excess humus.	Severe: depth to rock, ponding, too sandy.	Severe: depth to rock, seepage, ponding.	Poor: depth to rock, seepage, too sandy.
GaC2	Severe:	Severe:	Severe:	Severe:	Poor:
Gale	thin layer, seepage, poor filter.	seepage, slope.	seepage.	seepage.	area reclaim, thin layer.
GaD2	Severe:	Severe:	Severe:	Severe:	Poor:
Gale	thin layer, seepage, poor filter.	seepage, slope.	seepage, slope.	seepage, slope.	area reclaim, slope, thin layer.
GoB	Severe:	Severe:	Severe:	Severe:	Poor:
Gosil	poor filter.	seepage.	seepage, too sandy.	seepage.	seepage, too sandy.
GoC	Severe:	Severe:	Severe:	Severe:	Poor:
Gosil	poor filter.	seepage, slope.	seepage, too sandy.	seepage.	seepage, too sandy.
HkB:					
Hiles	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, too acid.	Severe: depth to rock.	Poor: depth to rock, too acid.
Kert	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, too acid.	Severe: depth to rock, wetness.	Poor: depth to rock, wetness.
HnB	Severe:	Severe:	Severe:	Severe:	Poor:
Hixton	depth to rock, poor filter.	seepage, depth to rock.	depth to rock, seepage.	depth to rock, seepage.	depth to rock.
HnC2	Severe:	Severe:	Severe:	Severe:	Poor:
Hixton	depth to rock, poor filter.	seepage, depth to rock, slope.	depth to rock, seepage.	depth to rock, seepage.	depth to rock.
HnD2	Severe:	Severe:	Severe:	Severe:	Poor:
Hixton	depth to rock, poor filter, slope.	seepage, depth to rock, slope.	depth to rock, seepage, slope.	depth to rock, seepage, slope.	depth to rock, slope.
HpA	Severe:	Severe:	Severe:	Severe:	Poor:
Hoop	wetness, poor filter.	seepage, wetness.	seepage, wetness, too sandy.	seepage, wetness.	seepage, too sandy, wetness.
Ht	Severe:	Severe:	Severe:	Severe:	Poor:
Houghton	subsides, flooding, wetness.	seepage, flooding, excess humus.	flooding, seepage, wetness.	flooding, seepage, wetness.	wetness, excess humus.
HuB	Severe:	Severe:	Severe:	Severe:	Poor:
Humbird	depth to rock, wetness, percs slowly.	depth to rock, wetness.	depth to rock, wetness.	depth to rock.	depth to rock.

Table 14.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HxB:					
Humbird	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock.	Poor: depth to rock.
Merrillan	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, too clayey.	Severe: depth to rock, wetness.	Poor: depth to rock, too clayey, hard to pack.
ImA	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
IrA	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
IxA:					
Ironrun	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Ponycreek	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
IzB:					
Ironrun	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Ponycreek	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Arbutus	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage, too sandy.	Severe: depth to rock, seepage.	Poor: depth to rock, seepage, too sandy.
JaA, JaB	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Fair: too clayey, wetness.
Ka	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness, seepage.	Poor: wetness.
KeA	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, too acid.	Severe: depth to rock, wetness.	Poor: depth to rock, wetness.

Table 14.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
LfC2---------- La Farge	Severe: thin layer, seepage.	Severe: seepage, slope.	Severe: seepage.	Moderate: seepage.	Poor: area reclaim, thin layer.
LfD2---------- La Farge	Severe: thin layer, seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: area reclaim, slope, thin layer.
LsD2: La Farge----------	Severe: thin layer, seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: area reclaim, slope, thin layer.
Seaton----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Lt---------- Loxley	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus, too acid.
LuB---------- Ludington	Severe: depth to rock, wetness, percs slowly.	Severe: seepage, depth to rock.	Severe: depth to rock, wetness.	Severe: depth to rock, seepage.	Poor: depth to rock, seepage, too sandy.
LxB: Ludington----------	Severe: depth to rock, wetness, percs slowly.	Severe: seepage, depth to rock.	Severe: depth to rock, wetness.	Severe: depth to rock, seepage.	Poor: depth to rock, seepage, too sandy.
Fairchild----------	Severe: depth to rock, wetness, percs slowly.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, wetness, too sandy.	Severe: depth to rock, seepage, wetness.	Poor: depth to rock, seepage, too sandy.
MaB---------- Mahtomedi	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
MbA---------- Majik	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
MmA---------- Merimod	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
MnB---------- Merit	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
MoB: Merit----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

Table 14.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MoB:					
Gardenvale	Severe: poor filter.	Severe: seepage.	Severe: depth to rock, seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
MpA					
Merrillan	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, too clayey.	Severe: depth to rock, wetness.	Poor: depth to rock, too clayey, hard to pack.
MrA:					
Merrillan	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, too clayey.	Severe: depth to rock, wetness.	Poor: depth to rock, too clayey, hard to pack.
Veedum	Severe: depth to rock, ponding, percs slowly.	Severe: depth to rock, ponding.	Severe: depth to rock, ponding, too acid.	Severe: depth to rock, ponding.	Poor: depth to rock, ponding, too acid.
MxA:					
Moppet	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: thin layer.
Fordum	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: seepage, too sandy, small stones.
Ne					
Newlang	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: seepage, too sandy, ponding.
OrA					
Orion	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Pa					
Palms	Severe: subsides, flooding, ponding.	Severe: seepage, flooding, excess humus.	Severe: flooding, ponding, excess humus.	Severe: flooding, seepage, ponding.	Poor: ponding, excess humus.
Pt.					
Pits					
Pu					
Ponycreek	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Pv:					
Ponycreek	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.

Table 14.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Pv: Dawsil	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Pw Psammaquents	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: too sandy, wetness.
RkA Rockdam	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
RoA Rowley	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
SeB Seaton	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
SeC2 Seaton	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
SmB Sebbo	Severe: wetness.	Moderate: seepage, slope, wetness.	Moderate: wetness.	Slight	Good.
SnA Sechler	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
SoA Sooner	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
SpA Sparta	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
TrB Tarr	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
TrC Tarr	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
TrF Tarr	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
TtA Tint	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.

Table 14.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
TuB---------- Tintson	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
TwA---------- Toddville	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Fair: too clayey, wetness, thin layer.
UdF---------- Udorthents	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
UfC2---------- Urne	Severe: thin layer, seepage.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: area reclaim, thin layer.
UfD2---------- Urne	Severe: thin layer, seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: area reclaim, slope, thin layer.
UrF:					
Urne----------	Severe: thin layer, seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: area reclaim, slope, thin layer.
Council----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Vs:					
Veedum----------	Severe: depth to rock, ponding, percs slowly.	Severe: depth to rock, excess humus, ponding.	Severe: depth to rock, ponding, too acid.	Severe: depth to rock, ponding.	Poor: depth to rock, ponding, too acid.
Elm Lake----------	Severe: depth to rock, ponding, percs slowly.	Severe: seepage, depth to rock, excess humus.	Severe: depth to rock, ponding, too sandy.	Severe: depth to rock, seepage, ponding.	Poor: depth to rock, seepage, too sandy.
WmA---------- Whitehall	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.

Table 15.--Construction Materials

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AbA Absco	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
AcA: Absco	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
Northbend	Fair: wetness.	Probable	Improbable: too sandy.	Poor: area reclaim, too acid.
Ad Adder	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
ArA Arenzville	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
BeB Bertrand	Good	Probable	Improbable: too sandy.	Good.
BkA Bilmod	Fair: wetness.	Probable	Improbable: too sandy.	Fair: small stones, area reclaim, thin layer.
BlB Bilson	Good	Probable	Improbable: too sandy.	Fair: small stones, thin layer.
BnB: Bilson	Good	Probable	Improbable: too sandy.	Fair: small stones, thin layer.
Silverhill	Fair: depth to rock, thin layer.	Improbable: thin layer.	Improbable: too sandy.	Fair: thin layer.
BnC2: Bilson	Good	Probable	Improbable: too sandy.	Fair: small stones, thin layer, slope.
Elevasil	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
BnD2: Bilson	Fair: slope.	Probable	Improbable: too sandy.	Poor: slope.
Elevasil	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

Table 15.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
BoB, BoC---------- Boone	Poor: depth to rock.	Improbable: thin layer.	Improbable: thin layer.	Poor: too sandy, small stones.
BoF---------- Boone	Poor: depth to rock, slope.	Improbable: thin layer.	Improbable: thin layer.	Poor: too sandy, small stones, slope.
BpF: Boone----------	Poor: depth to rock, slope.	Improbable: thin layer.	Improbable: thin layer.	Poor: too sandy, small stones, slope.
Elevasil----------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Cd---------- Citypoint	Poor: depth to rock, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
CfA---------- Coffton	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
CoC2---------- Council	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
CpC2: Council----------	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Bilson----------	Good----------	Probable----------	Improbable: too sandy.	Fair: small stones, thin layer, slope.
CpD2: Council----------	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Bilson----------	Fair: slope.	Probable----------	Improbable: too sandy.	Poor: slope.
CsD2: Council----------	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Seaton----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
CsE: Council----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Seaton----------	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

Table 15.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Da---------- Dawsil	Poor: wetness.	Probable----------	Improbable: too sandy.	Poor: excess humus, area reclaim, wetness.
DuA---------- Dunnville	Good----------	Probable----------	Probable----------	Poor: small stones.
ElB, ElC2---------- Elevasil	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
ElD2---------- Elevasil	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Eo---------- Elm Lake	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
Et---------- Ettrick	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
FaA---------- Fairchild	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness, too acid.
FeA:				
Fairchild----------	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness, too acid.
Elm Lake----------	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
GaC2---------- Gale	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer, slope.
GaD2---------- Gale	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
GoB, GoC---------- Gosil	Good----------	Probable----------	Improbable: too sandy.	Fair: too sandy, small stones, thin layer.
HkB:				
Hiles----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too acid.
Kert----------	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, thin layer.
HnB---------- Hixton	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey.

Table 15.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
HnC2---------- Hixton	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, slope.
HnD2---------- Hixton	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
HpA---------- Hoop	Fair: wetness.	Probable----------	Improbable: too sandy.	Fair: small stones, thin layer.
Ht---------- Houghton	Poor: wetness, low strength.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
HuB---------- Humbird	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
HxB:				
Humbird----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
Merrillan----------	Poor: depth to rock, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness, too acid.
ImA---------- Impact	Good----------	Probable----------	Improbable: too sandy.	Poor: too sandy.
IrA---------- Ironrun	Poor: wetness.	Probable----------	Improbable: too sandy.	Poor: too sandy, wetness, too acid.
IxA:				
Ironrun----------	Poor: wetness.	Probable----------	Improbable: too sandy.	Poor: too sandy, wetness, too acid.
Ponycreek----------	Poor: wetness.	Probable----------	Improbable: too sandy.	Poor: too sandy, wetness, too acid.
IzB:				
Ironrun----------	Poor: wetness.	Probable----------	Improbable: too sandy.	Poor: too sandy, wetness, too acid.
Ponycreek----------	Poor: wetness.	Probable----------	Improbable: too sandy.	Poor: too sandy, wetness, too acid.

Table 15.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
IzB:				
Arbutus	Poor: depth to rock.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, small stones, too acid.
JaA, JaB	Fair: wetness.	Probable	Improbable: too sandy.	Fair: too clayey.
Ka	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
KeA	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones, thin layer.
LfC2	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer, slope.
LfD2	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
LsD2:				
La Farge	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Seaton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Lt	Poor: wetness, low strength.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness, too acid.
LuB	Poor: depth to rock.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, too acid.
LxB:				
Ludington	Poor: depth to rock.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, too acid.
Fairchild	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness, too acid.
MaB	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
MbA	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.

Table 15.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
MmA---------- Merimod	Fair: wetness.	Probable----------	Improbable: too sandy.	Fair: area reclaim, too clayey, small stones.
MnB---------- Merit	Good----------	Probable----------	Improbable: too sandy.	Fair: area reclaim, too clayey, small stones.
MoB: Merit----------	Good----------	Probable----------	Improbable: too sandy.	Fair: area reclaim, too clayey, small stones.
Gardenvale----------	Fair: depth to rock, thin layer.	Improbable: thin layer.	Improbable: too sandy.	Fair: small stones, thin layer.
MpA---------- Merrillan	Poor: depth to rock, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness, too acid.
MrA: Merrillan----------	Poor: depth to rock, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness, too acid.
Veedum----------	Poor: depth to rock, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too acid.
MxA: Moppet----------	Fair: wetness.	Probable----------	Probable----------	Poor: area reclaim.
Fordum----------	Poor: wetness.	Probable----------	Probable----------	Poor: small stones, area reclaim, wetness.
Ne---------- Newlang	Poor: wetness.	Probable----------	Improbable: too sandy.	Poor: too sandy, wetness.
OrA---------- Orion	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Pa---------- Palms	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
Pt. Pits				
Pu---------- Ponycreek	Poor: wetness.	Probable----------	Improbable: too sandy.	Poor: too sandy, wetness, too acid.

Table 15.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Pv: Ponycreek	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness, too acid.
Dawsil	Poor: wetness.	Probable	Probable	Poor: excess humus, area reclaim, wetness.
Pw: Psammaquents	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
RkA: Rockdam	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, too acid.
RoA: Rowley	Fair: wetness.	Probable	Improbable: too sandy.	Fair: too clayey.
SeB: Seaton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
SeC2: Seaton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
SmB: Sebbo	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
SnA: Sechler	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, small stones.
SoA: Sooner	Fair: wetness.	Probable	Improbable: too sandy.	Fair: area reclaim, too clayey, small stones.
SpA: Sparta	Good	Probable	Improbable: too sandy.	Poor: too sandy.
TrB, TrC: Tarr	Good	Probable	Improbable: too sandy.	Poor: too sandy, too acid.
TrF: Tarr	Poor: slope.	Probable	Improbable: too sandy.	Poor: too sandy, too acid, slope.
TtA: Tint	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
TuB: Tintson	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
TwA: Toddville	Fair: wetness.	Probable	Improbable: too sandy.	Good.

Table 15.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
UdF---------- Udorthents	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
UfC2---------- Urne	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
UfD2---------- Urne	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
UrF:				
Urne----------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Council----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Vs:				
Veedum----------	Poor: depth to rock, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too acid.
Elm Lake----------	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
WmA---------- Whitehall	Good----------	Probable----------	Improbable: too sandy.	Fair: thin layer.

Table 16.--Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
AbA Absco	Severe: seepage.	Severe: seepage, piping.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
AcA:						
Absco	Severe: seepage.	Severe: seepage, piping.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
Northbend	Severe: seepage.	Severe: piping, wetness.	Flooding, frost action, too acid.	Wetness, rooting depth, flooding.	Erodes easily, wetness.	Wetness, erodes easily, rooting depth.
Ad Adder	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, flooding, subsides.	Ponding, soil blowing, rooting depth.	Ponding, too sandy, soil blowing.	Wetness, rooting depth.
ArA Arenzville	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily, flooding.	Erodes easily	Erodes easily.
BeB Bertrand	Severe: seepage.	Moderate: thin layer, piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
BkA Bilmod	Severe: seepage.	Severe: seepage, piping.	Cutbanks cave	Wetness, droughty, soil blowing.	Wetness, too sandy, soil blowing.	Droughty.
BlB Bilson	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
BnB:						
Bilson	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
Silverhill	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
BnC2, BnD2:						
Bilson	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
Elevasil	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, droughty, soil blowing.	Slope, depth to rock, soil blowing.	Slope, droughty, depth to rock.
BoB Boone	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Depth to rock, too sandy.	Droughty, depth to rock.

Table 16.--Water Management--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
BoC, BoF---------- Boone	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
BpF:						
Boone----------	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
Elevasil---------	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, droughty, soil blowing.	Slope, depth to rock, soil blowing.	Slope, droughty, depth to rock.
Cd---------- Citypoint	Severe: seepage.	Severe: excess humus, ponding.	Ponding, percs slowly, depth to rock.	Ponding, percs slowly, depth to rock.	Depth to rock, ponding.	Wetness, depth to rock, rooting depth.
CfA---------- Coffton	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
CoC2---------- Council	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope, erodes easily.	Slope, erodes easily.
CpC2, CpD2:						
Council----------	Severe: slope.	Severe: piping.	Deep to water	Slope, soil blowing.	Slope----------	Slope.
Bilson----------	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
CsD2, CsE:						
Council----------	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope, erodes easily.	Slope, erodes easily.
Seaton----------	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Da---------- Dawsil	Severe: seepage.	Severe: excess humus, ponding.	Ponding, subsides, frost action.	Ponding--------	Ponding--------	Wetness.
DuA---------- Dunnville	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
ElB---------- Elevasil	Severe: seepage.	Severe: piping.	Deep to water	Slope, droughty, soil blowing.	Depth to rock, soil blowing.	Droughty, depth to rock.
ElC2, ElD2-------- Elevasil	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, droughty, soil blowing.	Slope, depth to rock, soil blowing.	Slope, droughty, depth to rock.
Eo---------- Elm Lake	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, depth to rock, cutbanks cave.	Ponding, droughty, fast intake.	Depth to rock, erodes easily, ponding.	Wetness, erodes easily, droughty.
Et---------- Ettrick	Moderate: seepage.	Severe: ponding.	Flooding, frost action, ponding.	Flooding, ponding.	Ponding--------	Wetness.

Table 16.--Water Management--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
FaA---------- Fairchild	Severe: seepage.	Severe: seepage, piping, wetness.	Depth to rock, cutbanks cave, too acid.	Wetness, droughty, fast intake.	Depth to rock, wetness, too sandy.	Wetness, droughty, depth to rock.
FeA:						
Fairchild--------	Severe: seepage.	Severe: seepage, piping, wetness.	Depth to rock, cutbanks cave, too acid.	Wetness, droughty, fast intake.	Depth to rock, wetness, too sandy.	Wetness, droughty, depth to rock.
Elm Lake---------	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, depth to rock, cutbanks cave.	Ponding--------	Depth to rock, erodes easily, ponding.	Wetness, erodes easily.
GaC2, GaD2-------- Gale	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope, thin layer, erodes easily.	Slope, area reclaim, erodes easily.	Slope, erodes easily, area reclaim.
GoB---------- Gosil	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
GoC---------- Gosil	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Slope, droughty.
HkB:						
Hiles----------	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Depth to rock, slope, too acid.	Slope, wetness, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Kert----------	Moderate: seepage, depth to rock.	Severe: thin layer.	Depth to rock, frost action.	Wetness, depth to rock.	Depth to rock, erodes easily, wetness.	Wetness, erodes easily, depth to rock.
HnB---------- Hixton	Severe: seepage.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Depth to rock	Depth to rock.
HnC2, HnD2-------- Hixton	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
HpA---------- Hoop	Severe: seepage.	Severe: seepage, piping, wetness.	Cutbanks cave	Wetness, droughty, soil blowing.	Wetness, too sandy, soil blowing.	Wetness, droughty, rooting depth.
Ht---------- Houghton	Severe: seepage.	Severe: excess humus, wetness.	Flooding, subsides, frost action.	Wetness, soil blowing, flooding.	Wetness, soil blowing.	Wetness.
HuB---------- Humbird	Moderate: depth to rock, slope.	Severe: piping.	Percs slowly, depth to rock, slope.	Slope, wetness, droughty.	Depth to rock, wetness.	Droughty, depth to rock.
HxB:						
Humbird----------	Moderate: depth to rock, slope.	Severe: piping.	Percs slowly, depth to rock, slope.	Slope, wetness, droughty.	Depth to rock, wetness.	Droughty, depth to rock.

Table 16.--Water Management--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
HxB:						
Merrillan	Moderate: seepage, depth to rock.	Severe: thin layer, wetness.	Percs slowly, depth to rock, frost action.	Wetness, soil blowing.	Depth to rock, wetness, soil blowing.	Wetness, depth to rock, percs slowly.
ImA	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake.	Too sandy, soil blowing.	Droughty.
Impact						
IrA	Severe: seepage.	Severe: seepage, piping, wetness.	Cutbanks cave, too acid.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Ironrun						
IxA:						
Ironrun	Severe: seepage.	Severe: seepage, piping, wetness.	Cutbanks cave, too acid.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Ponycreek	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, cutbanks cave, too acid.	Ponding, droughty, soil blowing.	Ponding, too sandy, soil blowing.	Wetness, droughty.
IzB:						
Ironrun	Severe: seepage.	Severe: seepage, piping, wetness.	Cutbanks cave, too acid.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Ponycreek	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, cutbanks cave, too acid.	Ponding, droughty, soil blowing.	Ponding, too sandy, soil blowing.	Wetness, droughty.
Arbutus	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Depth to rock, too sandy, soil blowing.	Droughty, depth to rock.
JaA	Severe: seepage.	Moderate: thin layer, piping, wetness.	Frost action---	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
Jackson						
JaB	Severe: seepage.	Moderate: thin layer, piping, wetness.	Frost action, slope.	Slope, wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
Jackson						
Ka	Severe: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, flooding.	Wetness---	Wetness.
Kalmarville						
KeA	Moderate: seepage, depth to rock.	Severe: thin layer.	Depth to rock, frost action.	Wetness, depth to rock.	Depth to rock, erodes easily, wetness.	Wetness, erodes easily, depth to rock.
Kert						
LfC2, LfD2	Severe: slope.	Severe: thin layer.	Deep to water	Slope, thin layer, rooting depth.	Slope, area reclaim, erodes easily.	Slope, erodes easily, area reclaim.
La Farge						

Table 16.--Water Management--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
LsD2:						
La Farge	Severe: slope.	Severe: thin layer.	Deep to water	Slope, thin layer, rooting depth.	Slope, area reclaim, erodes easily.	Slope, erodes easily, area reclaim.
Seaton	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Lt Loxley	Severe: seepage.	Severe: excess humus, ponding.	Ponding, subsides, frost action.	Ponding, too acid.	Ponding	Wetness.
LuB Ludington	Severe: seepage.	Severe: seepage, piping.	Depth to rock, slope, cutbanks cave.	Slope, wetness, droughty.	Depth to rock, wetness.	Droughty, depth to rock.
LxB:						
Ludington	Severe: seepage.	Severe: seepage, piping.	Depth to rock, slope, cutbanks cave.	Slope, wetness, droughty.	Depth to rock, wetness.	Droughty, depth to rock.
Fairchild	Severe: seepage.	Severe: seepage, piping, wetness.	Depth to rock, cutbanks cave, too acid.	Wetness, droughty, fast intake.	Depth to rock, wetness, too sandy.	Wetness, droughty, depth to rock.
MaB Mahtomedi	Severe: seepage.	Severe: seepage.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty, rooting depth.
MbA Majik	Severe: seepage.	Severe: seepage, piping, wetness.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
MmA Merimod	Severe: seepage.	Severe: seepage, piping.	Cutbanks cave	Wetness, rooting depth.	Erodes easily, wetness, too sandy.	Erodes easily, rooting depth.
MnB Merit	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, rooting depth.	Erodes easily, too sandy.	Erodes easily, rooting depth.
MoB:						
Merit	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, rooting depth.	Erodes easily, too sandy.	Erodes easily, rooting depth.
Gardenvale	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, erodes easily.	Erodes easily, too sandy.	Erodes easily.
MpA Merrillan	Moderate: seepage, depth to rock.	Severe: thin layer, wetness.	Percs slowly, depth to rock, frost action.	Wetness, soil blowing.	Depth to rock, wetness, soil blowing.	Wetness, depth to rock, percs slowly.
MrA:						
Merrillan	Moderate: seepage, depth to rock.	Severe: thin layer, wetness.	Percs slowly, depth to rock, frost action.	Wetness, soil blowing.	Depth to rock, wetness, soil blowing.	Wetness, depth to rock, percs slowly.

Table 16.--Water Management--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
MrA:						
Veedum	Moderate: seepage, depth to rock.	Severe: thin layer, ponding.	Ponding, depth to rock, frost action.	Ponding, depth to rock.	Depth to rock, erodes easily, ponding.	Wetness, erodes easily, depth to rock.
MxA:						
Moppet	Severe: seepage.	Severe: piping.	Flooding	Wetness, soil blowing, rooting depth.	Wetness, soil blowing.	Rooting depth.
Fordum	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, flooding, frost action.	Ponding, droughty, flooding.	Erodes easily, ponding, too sandy.	Wetness, erodes easily, droughty.
Ne	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, flooding, cutbanks cave.	Ponding, droughty, soil blowing.	Ponding, too sandy, soil blowing.	Wetness, droughty.
OrA	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness	Erodes easily, wetness.	Wetness, erodes easily.
Pa	Severe: seepage.	Severe: excess humus, ponding.	Ponding, flooding, subsides.	Ponding, soil blowing.	Erodes easily, ponding, soil blowing.	Wetness, erodes easily, rooting depth.
Pt.						
Pits						
Pu	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, cutbanks cave, too acid.	Ponding, droughty, soil blowing.	Ponding, too sandy, soil blowing.	Wetness, droughty.
Pv:						
Ponycreek	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, cutbanks cave, too acid.	Ponding, droughty, soil blowing.	Ponding, too sandy, soil blowing.	Wetness, droughty.
Dawsil	Severe: seepage.	Severe: excess humus, ponding.	Ponding, subsides, frost action.	Ponding	Ponding	Wetness.
Pw	Severe: seepage.	Severe: wetness.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy.	Wetness, droughty.
RkA	Severe: seepage.	Severe: seepage, piping.	Cutbanks cave, too acid.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
RoA	Severe: seepage.	Severe: wetness.	Frost action	Wetness	Erodes easily, wetness.	Wetness, erodes easily.
SeB	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.

Table 16.--Water Management--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
SeC2--Seaton	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
SmB--Sebbo	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.
SnA--Sechler	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, frost action, cutbanks cave.	Wetness, droughty, flooding.	Wetness, too sandy.	Wetness, droughty.
SoA--Sooner	Severe: seepage.	Severe: seepage, piping, wetness.	Cutbanks cave	Wetness, rooting depth.	Erodes easily, wetness, too sandy.	Wetness, erodes easily, rooting depth.
SpA--Sparta	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake.	Too sandy, soil blowing.	Droughty.
TrB--Tarr	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
TrC, TrF--Tarr	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Slope, droughty.
TtA--Tint	Severe: seepage.	Severe: seepage, piping.	Cutbanks cave	Wetness, droughty.	Wetness, too sandy, soil blowing.	Droughty.
TuB--Tintson	Severe: seepage.	Severe: seepage, piping.	Slope, cutbanks cave.	Slope, wetness, droughty.	Wetness, too sandy, soil blowing.	Droughty.
TwA--Toddville	Severe: seepage.	Moderate: thin layer, wetness.	Frost action	Wetness	Erodes easily, wetness.	Erodes easily.
UdF--Udorthents	Severe: slope.	Slight	Deep to water	Slope	Slope	Slope.
UfC2, UfD2--Urne	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, thin layer.	Slope, area reclaim, erodes easily.	Slope, erodes easily.
UrF:						
Urne	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, thin layer.	Slope, area reclaim, erodes easily.	Slope, erodes easily.
Council	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
Vs:						
Veedum	Moderate: seepage, depth to rock.	Severe: thin layer, ponding.	Ponding, depth to rock, frost action.	Ponding, soil blowing, depth to rock.	Depth to rock, erodes easily, ponding.	Wetness, erodes easily, depth to rock.

Table 16.--Water Management--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Vs:						
Elm Lake	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, depth to rock, cutbanks cave.	Ponding	Depth to rock, erodes easily, ponding.	Wetness, erodes easily.
WmA Whitehall	Severe: seepage.	Severe: seepage, piping.	Deep to water	Favorable	Erodes easily, too sandy.	Erodes easily.

Table 17.--Engineering Index Properties

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
AbA---------- Absco	0-4	Loamy sand----	SM	A-2-4	0	0	90-100	85-100	50-75	15-30	---	NP
	4-14	Sand, loamy sand.	SM, SP-SM	A-2-4, A-1, A-3	0	0	90-100	85-100	45-65	5-30	---	NP
	14-42	Stratified sand to loam.	SP-SM, SM	A-2-4, A-3	0	0	90-100	85-100	55-70	5-25	---	NP
	42-60	Sand, coarse sand, loamy sand.	SP-SM, SP, SM	A-1, A-3, A-2-4	0	0	90-100	85-100	45-65	0-15	---	NP
AcA:												
Absco--------	0-4	Loamy sand----	SM	A-2-4	0	0	90-100	85-100	50-75	15-30	---	NP
	4-14	Sand, loamy sand.	SM, SP-SM	A-2-4, A-1, A-3	0	0	90-100	85-100	45-65	5-30	---	NP
	14-42	Stratified sand to loam.	SP-SM, SM	A-2-4, A-3	0	0	90-100	85-100	55-70	5-25	---	NP
	42-60	Sand, coarse sand, loamy sand.	SP-SM, SP, SM	A-1, A-3, A-2-4	0	0	90-100	85-100	45-65	0-15	---	NP
Northbend----	0-7	Silt loam-----	ML, CL-ML	A-4	0	0	95-100	90-100	55-100	40-80	<25	NP-7
	7-34	Silt loam, loam, sandy loam.	ML, CL, SM, SC	A-4	0	0	95-100	90-100	45-100	30-75	<28	NP-9
	34-36	Loamy fine sand, loamy sand.	SM	A-1	0	0	95-100	90-100	35-95	15-50	---	NP
	36-60	Sand, fine sand.	SP, SP-SM, SM	A-1, A-3	0	0	95-100	90-100	25-85	4-35	---	NP
Ad---------- Adder	0-22	Muck----------	PT	A-8	---	---	---	---	---	---	---	---
	22-60	Sand, coarse sand, fine sand.	SP, SM	A-2, A-3, A-1	0	0	100	95-100	40-80	0-35	---	NP
ArA---------- Arenzville	0-32	Silt loam-----	ML, CL-ML, CL	A-4	0	0	100	100	95-100	80-95	20-30	4-10
	32-42	Silt loam-----	CL	A-6, A-7	0	0	100	100	90-100	85-95	30-45	10-20
	42-60	Silt loam-----	CL, CL-ML	A-4	0	0	75-100	75-100	75-100	70-95	20-30	5-10
BeB---------- Bertrand	0-9	Silt loam-----	CL-ML, CL	A-4, A-6	0	0	100	100	90-100	85-90	25-35	6-15
	9-43	Silt loam, silty clay loam.	CL	A-6, A-4	0	0	100	100	90-100	85-95	25-40	7-20
	43-48	Sandy loam, fine sandy loam, loam.	CL-ML, SC-SM, CL, SC	A-4	0	0	100	100	80-95	35-75	<30	4-10
	48-60	Sand, fine sand, loamy sand.	SP-SM, SM	A-2, A-3	0	0	95-100	95-100	50-80	5-35	---	NP
BkA---------- Bilmod	0-9	Sandy loam----	SM, SC-SM	A-4, A-2-4	0	0	95-100	90-100	55-80	25-50	15-25	NP-7
	9-24	Sandy loam, loam, fine sandy loam.	SM, SC, CL, ML	A-4, A-2-4	0	0-2	95-100	90-100	55-90	25-65	<28	NP-9
	24-32	Loamy sand, sand.	SM, SP-SM	A-2-4, A-3, A-1-b	0	0-2	80-100	75-100	20-75	5-30	<21	NP-4
	32-60	Sand----------	SM, SP-SM	A-1-b, A-3	0	0-2	80-100	75-100	20-70	5-25	---	NP

Table 17.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
BlB----------	0-8	Sandy loam----	SM, SC-SM	A-4, A-2-4	0	0	80-100	75-100	45-90	20-50	15-25	NP-7
Bilson	8-32	Sandy loam, fine sandy loam, loam.	SM, SC, CL, ML	A-4, A-2-4	0	0	80-100	75-100	45-95	20-65	<28	NP-9
	32-60	Sand----------	SM, SP-SM	A-1-b, A-3	0	0	80-100	75-100	20-70	5-25	---	NP
BnB:												
Bilson-------	0-8	Sandy loam----	SM, SC-SM	A-4, A-2-4	0	0	80-100	75-100	45-90	20-50	15-25	NP-7
	8-32	Sandy loam, fine sandy loam, loam.	SM, SC, CL, ML	A-4, A-2-4	0	0	80-100	75-100	45-95	20-65	<28	NP-9
	32-60	Sand----------	SM, SP-SM	A-1-b, A-3	0	0	80-100	75-100	20-70	5-25	---	NP
Silverhill---	0-8	Sandy loam----	SM, SC	A-2-4, A-4	0	0	100	100	60-80	30-50	<26	NP-8
	8-26	Sandy loam, fine sandy loam.	SC-SM, SC, CL, CL-ML	A-2-4, A-4	0	0	100	100	60-95	30-80	21-28	4-9
	26-32	Loamy sand, sand.	SM, SP-SM	A-1-b, A-2-4, A-3	0	0	100	100	30-75	5-35	<21	NP-4
	32-50	Sand----------	SM, SP-SM	A-1-b, A-3, A-2-4	0	0	80-100	75-100	30-75	5-35	<21	NP-4
	50-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
BnC2, BnD2:												
Bilson-------	0-8	Sandy loam----	SM, SC-SM	A-4, A-2-4	0	0	80-100	75-100	45-90	20-50	15-25	NP-7
	8-32	Sandy loam, fine sandy loam, loam.	SM, SC, CL, ML	A-4, A-2-4	0	0	80-100	75-100	45-95	20-65	<28	NP-9
	32-60	Sand----------	SM, SP-SM	A-1-b, A-3	0	0	80-100	75-100	20-70	5-25	---	NP
Elevasil-----	0-3	Sandy loam----	SM, SC-SM	A-4, A-2-4	0	0-9	80-100	75-100	45-80	20-45	18-25	3-7
	3-27	Sandy loam, loam, fine sandy loam.	SC, SC-SM, CL, CL-ML	A-4, A-2-4, A-1-b	0	0-9	80-100	75-100	45-80	20-55	21-28	4-9
	27-31	Loamy sand, loamy fine sand, channery sand.	SP, SM, SP-SM	A-2-4, A-3, A-1-b	0	0-9	80-100	50-100	15-70	4-35	<21	NP-4
	31-39	Sand, fine sand, channery sand.	SP, SM, SP-SM	A-2-4, A-3, A-1-b	0	0-9	80-100	50-100	10-60	2-20	<18	NP-3
	39-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
BoB, BoC, BoF-Boone	0-3	Sand----------	SM, SP-SM	A-2, A-3, A-1	0	0-9	80-100	75-100	40-80	5-35	---	NP
	3-8	Sand, fine sand, loamy fine sand.	SM, SP-SM, SP	A-2, A-3, A-1	0	0-9	80-100	75-100	35-75	2-35	---	NP
	8-35	Fine sand, channery sand.	SM, SP-SM, SP	A-2, A-3, A-1	0	0-9	55-100	50-100	20-75	1-35	---	NP
	35-61	Weathered bedrock.	---	---	---	---	---	---	20-75	1-35	---	---
BpF:												
Boone--------	0-3	Sand----------	SM, SP-SM	A-2, A-3, A-1	0	0-9	80-100	75-100	40-80	5-35	---	NP
	3-8	Sand, fine sand, loamy fine sand.	SM, SP-SM, SP	A-2, A-3, A-1	0	0-9	80-100	75-100	35-75	2-35	---	NP
	8-35	Fine sand, channery sand.	SM, SP-SM, SP	A-2, A-3, A-1	0	0-9	55-100	50-100	20-75	1-35	---	NP
	35-61	Weathered bedrock.	---	---	---	---	---	---	20-75	1-35	---	---
Elevasil-----	0-3	Sandy loam----	SM, SC-SM	A-4, A-2-4	0	0-9	80-100	75-100	45-80	20-45	18-25	3-7
	3-27	Sandy loam, loam, fine sandy loam.	SC, SC-SM, CL, CL-ML	A-4, A-2-4, A-1-b	0	0-9	80-100	75-100	45-80	20-55	21-28	4-9
	27-31	Loamy sand, loamy fine sand, channery sand.	SP, SM, SP-SM	A-2-4, A-3, A-1-b	0	0-9	80-100	50-100	15-70	4-35	<21	NP-4
	31-39	Sand, fine sand, channery sand.	SP, SM, SP-SM	A-2-4, A-3, A-1-b	0	0-9	80-100	50-100	10-60	2-20	<18	NP-3
	39-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
Cd----------	0-12	Mucky peat----	PT	A-8	0	0	---	---	---	---	---	---
Citypoint	12-26	Muck----------	PT	A-8	0	0	---	---	---	---	---	---
	26-34	Sand, sandy loam, silty clay.	SP, SM, SC-SM, CL	A-1, A-2-4, A-6	0	0	80-100	75-100	20-100	4-80	0-55	NP-30
	34-60	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
CfA----------	0-11	Silt loam-----	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	85-100	25-40	5-20
Coffton	11-38	Silt loam-----	ML, CL-ML, CL	A-4	0	0	100	100	90-100	85-95	20-35	3-10
	38-60	Stratified silt loam to fine sand.	ML, SM, SC, CL	A-4, A-2	0	0	100	90-100	85-100	30-85	15-30	NP-10

Table 17.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 10 inches	Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
CoC2----------	0-7	Loam----------	ML, SM	A-4	0	0	80-100	75-100	55-100	45-85	<20	NP-4
Council	7-45	Loam, silt loam, sandy loam.	CL, CL-ML, SC, SC-SM	A-4	0	0	80-100	75-100	50-100	35-85	20-28	4-9
	45-60	Sandy loam, loam, silt loam.	ML, CL, SM, SC	A-4, A-2	0	0	80-100	75-100	50-100	30-85	<28	NP-9
CpC2, CpD2:												
Council------	0-9	Fine sandy loam.	ML, SM	A-4, A-2, A-1	0	0	80-100	75-100	45-90	20-55	<20	NP-4
	9-41	Loam, silt loam, sandy loam.	CL, CL-ML, SC, SC-SM	A-4	0	0	80-100	75-100	50-100	35-85	20-28	4-9
	41-60	Sandy loam, loam, silt loam.	ML, CL, SM, SC	A-4, A-2	0	0	80-100	75-100	50-100	30-85	<28	NP-9
Bilson-------	0-8	Fine sandy loam.	SM, SC-SM	A-4, A-2-4	0	0	80-100	75-100	45-90	20-50	15-25	NP-7
	8-27	Sandy loam, fine sandy loam, loam.	SM, SC, CL, ML	A-4, A-2-4	0	0	80-100	75-100	45-95	20-65	<28	NP-9
	27-60	Sand----------	SM, SP-SM	A-1-b, A-3	0	0	80-100	75-100	20-70	5-25	---	NP
CsD2:												
Council------	0-7	Loam----------	ML, SM	A-4	0	0	80-100	75-100	55-100	45-85	<20	NP-4
	7-45	Loam, silt loam, sandy loam.	CL, CL-ML, SC, SC-SM	A-4	0	0	80-100	75-100	50-100	35-85	20-28	4-9
	45-60	Sandy loam, loam, silt loam.	ML, CL, SM, SC	A-4, A-2	0	0	80-100	75-100	50-100	30-85	<28	NP-9
Seaton-------	0-9	Silt loam-----	CL, CL-ML	A-4, A-6	0	0	100	100	100	95-100	20-35	5-15
	9-46	Silt loam-----	CL, CL-ML	A-6, A-4, A-7	0	0	100	100	100	90-100	25-45	5-25
	46-60	Silt loam-----	CL, CL-ML	A-4, A-6	0	0	100	100	100	90-100	25-40	5-20
CsE:												
Council------	0-7	Loam----------	ML, SM	A-4	0	0	80-100	75-100	55-100	45-85	<20	NP-4
	7-45	Loam, silt loam, sandy loam.	CL, CL-ML, SC, SC-SM	A-4	0	0	80-100	75-100	50-100	35-85	20-28	4-9
	45-60	Sandy loam, loam, silt loam.	ML, CL, SM, SC	A-4, A-2	0	0	80-100	75-100	50-100	30-85	<28	NP-9
Seaton-------	0-9	Silt loam-----	CL, CL-ML, ML	A-4, A-6, A-7	0	0	100	100	100	95-100	20-45	5-20
	9-38	Silt loam-----	CL, CL-ML	A-6, A-4, A-7	0	0	100	100	100	90-100	25-45	5-25
	38-60	Silt loam-----	CL, CL-ML	A-4, A-6	0	0	100	100	100	90-100	25-40	5-20
Da----------	0-20	Mucky peat----	PT	A-8	0	0	---	---	---	---	---	---
Dawsil	20-40	Muck----------	PT	A-8	0	0	---	---	---	---	---	---
	40-60	Sand, coarse sand, loamy sand.	SC-SM, SM, SC, SP-SM	A-2, A-3, A-1, A-4	0	0	85-100	75-100	25-75	5-35	<20	NP-10

Table 17.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
DuA----------	0-16	Sandy loam----	SM, ML	A-2, A-4	0	0	95-100	90-100	55-95	30-65	<20	NP-4
Dunnville	16-24	Loam, sandy loam, fine sandy loam.	CL, CL-ML, SC, SC-SM	A-2, A-4	0	0	95-100	90-100	55-95	30-75	20-28	4-9
	24-27	Loamy sand, loamy coarse sand.	ML	A-2, A-4	0	0	95-100	90-100	45-85	20-55	<20	NP-4
	27-60	Sand, gravelly coarse sand, fine sand.	SP, SM, GP, GM	A-2, A-3, A-1	0	0	50-100	50-100	25-80	1-20	---	NP
ElB, ElC2, ElD2----------	0-3	Sandy loam----	SM, SC-SM	A-4, A-2-4	0	0-9	80-100	75-100	45-80	20-45	18-25	3-7
Elevasil	3-27	Sandy loam, loam, fine sandy loam.	SC, SC-SM, CL, CL-ML	A-4, A-2-4, A-1-b	0	0-9	80-100	75-100	45-80	20-55	21-28	4-9
	27-31	Loamy sand, loamy fine sand, channery sand.	SP, SM, SP-SM	A-2-4, A-3, A-1-b	0	0-9	80-100	50-100	15-70	4-35	<21	NP-4
	31-39	Sand, fine sand, channery sand.	SP, SM, SP-SM	A-2-4, A-3, A-1-b	0	0-9	80-100	50-100	10-60	2-20	<18	NP-3
	39-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
Eo----------	0-4	Mucky sand----	SM	A-2, A-1	0	0	80-100	75-100	40-75	15-35	---	NP
Elm Lake	4-28	Sand, loamy sand, fine sand.	SP-SM, SM	A-2, A-3, A-1	0	0	80-100	75-100	30-90	5-25	---	NP
	28-38	Silty clay loam, loam, sandy clay loam.	CL, CL-ML, SC, SC-SM	A-6, A-2, A-4, A-7	0	0	80-100	75-100	45-100	25-85	20-45	4-22
	38-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
Et----------	0-15	Silt loam-----	CL	A-6, A-7	0	0	100	100	90-100	70-90	30-50	10-25
Ettrick	15-40	Silt loam, silty clay loam.	CL, CH	A-7	0	0	100	100	90-100	85-100	40-55	15-30
	40-60	Stratified silt loam to fine sand.	CL, CL-ML, SC, SC-SM	A-2, A-4, A-6, A-7	0	0	100	100	60-100	30-100	20-45	4-25
FaA----------	0-4	Sand----------	SM, SP-SM	A-2, A-3, A-1	0	0	100	100	20-75	5-35	---	NP
Fairchild	4-13	Sand, loamy sand.	SP-SM, SM	A-2, A-3, A-1, A-4	0	0	100	100	20-95	5-50	---	NP
	13-21	Sand, loamy sand.	SM, SP-SM	A-2, A-3, A-1, A-4	0	0	100	100	20-95	5-50	---	NP
	21-32	Sand, loamy sand.	SP-SM, SM	A-3, A-2, A-4, A-1	0	0	100	100	20-95	5-50	---	NP
	32-39	Clay loam, loam, sandy clay loam.	CL-ML, CL, SC-SM, SC	A-4, A-6, A-7, A-2	0	0	80-100	75-95	45-90	20-80	20-45	4-21
	39-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 10 inches	Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
FeA:												
Fairchild----	0-4	Sand----------	SM, SP-SM	A-2, A-3, A-1	0	0	100	100	20-75	5-35	---	NP
	4-13	Sand, loamy sand.	SP-SM, SM	A-2, A-3, A-1, A-4	0	0	100	100	20-95	5-50	---	NP
	13-21	Sand, loamy sand.	SM, SP-SM	A-2, A-3, A-1, A-4	0	0	100	100	20-95	5-50	---	NP
	21-32	Sand, loamy sand.	SP-SM, SM	A-3, A-2, A-4, A-1	0	0	100	100	20-95	5-50	---	NP
	32-39	Clay loam, loam, sandy clay loam.	CL-ML, CL, SC-SM, SC	A-4, A-6, A-7, A-2	0	0	80-100	75-95	45-90	20-80	20-45	4-21
	39-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
Elm Lake-----	0-4	Muck----------	PT	A-8	0	0	---	---	---	---	---	---
	4-28	Sand, loamy sand, fine sand.	SP-SM, SM	A-2, A-3, A-1	0	0	80-100	75-100	30-90	5-25	---	NP
	28-38	Silty clay loam, loam, sandy clay loam.	CL, CL-ML, SC, SC-SM	A-6, A-2, A-4, A-7	0	0	80-100	75-100	45-100	25-85	20-45	4-22
	38-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
GaC2, GaD2----	0-8	Silt loam-----	CL-ML, CL	A-4, A-6	0	0	100	100	90-100	85-95	20-30	5-11
Gale	8-27	Silt loam, silty clay loam.	CL	A-6, A-4, A-7	0	0	100	100	90-100	85-95	25-45	9-20
	27-31	Loam, channery sandy loam.	CL	A-4, A-6	0	0	100	100	65-100	50-95	25-40	9-20
	31-39	Sand, loamy sand.	SM, SP-SM, SC-SM	A-3, A-2, A-1, A-4	0	0-2	85-100	85-100	45-75	5-40	<25	NP-7
	39-60	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
GoB, GoC------	0-9	Loamy sand----	SM, SP-SM	A-1, A-2-4	0	0	85-100	75-100	30-75	10-35	---	NP
Gosil	9-27	Loamy sand, loamy fine sand, sand.	SM, SP-SM	A-1, A-2-4, A-4	0	0	85-100	75-100	25-95	8-50	<21	NP-4
	27-36	Sand, fine sand.	SM, SP	A-1, A-2-4, A-3	0	0	85-100	75-100	20-85	4-35	---	NP
	36-60	Sand, fine sand.	SM, SP	A-1, A-2-4, A-3	0	0	85-100	75-100	20-85	4-35	---	NP
HkB:												
Hiles--------	0-8	Silt loam-----	CL, CL-ML	A-4	0	0	95-100	95-100	75-100	65-85	20-30	4-10
	8-12	Silt loam-----	CL, CL-ML	A-4	0	0	95-100	95-100	75-100	65-85	20-30	4-10
	12-20	Silt loam-----	CL	A-6	0	0	95-100	95-100	75-100	65-85	25-35	10-15
	20-28	Loam, sandy clay loam, clay loam.	CL, SC	A-6, A-2-6	0	0	90-100	85-95	50-95	25-75	25-40	10-20
	28-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
HkB:												
Kert	0-3	Silt loam	CL, CL-ML	A-4	0	0	95-100	95-100	70-100	65-85	20-30	4-10
	3-8	Silt loam, silt.	CL, ML, CL-ML	A-4	0	0	95-100	95-100	70-100	65-85	<30	NP-9
	8-19	Silt loam	CL	A-6	0	0	95-100	95-100	70-100	65-85	30-40	10-20
	19-31	Loam, silty clay loam, sandy clay loam.	CL, SC	A-7, A-6, A-2-6	0	0	80-100	75-100	45-100	20-85	30-45	10-20
	31-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
HnB, HnC2, HnD2	0-9	Loam	CL, CL-ML	A-4	0	0	100	100	85-95	60-75	20-30	5-10
Hixton	9-32	Loam, sandy loam, sandy clay loam.	CL, SC	A-4, A-6, A-2	0	0	70-100	65-100	50-95	25-75	25-35	9-15
	32-39	Sand, fine sand.	SM, SP-SM, SP	A-1, A-3, A-2	0	0	55-100	50-100	35-80	4-30	---	NP
	39-60	Weathered bedrock, unweathered bedrock.	---	---	0	0	---	---	---	---	---	---
HpA	0-11	Sandy loam	SM, SC-SM	A-4, A-2-4	0	0	80-100	75-100	45-80	20-50	18-25	3-7
Hoop	11-24	Sandy loam, fine sandy loam.	SC, SC-SM, CL, CL-ML	A-4, A-2-4	0	0	80-100	75-100	45-90	20-55	21-27	4-9
	24-34	Sand, coarse sand, loamy sand.	SM, SP-SM	A-2-4, A-3, A-1-b	0	0	80-100	75-100	20-75	5-35	<21	NP-4
	34-60	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-70	5-25	---	NP
Ht	0-60	Muck	PT	A-8	0	0	---	---	---	---	---	---
Houghton												
HuB	0-3	Fine sandy loam.	SM, SC-SM	A-4, A-2-4	0	0	95-100	95-100	55-90	30-50	15-25	2-7
Humbird	3-6	Fine sandy loam, sandy loam.	SM	A-4, A-2-4	0	0	95-100	95-100	55-90	30-50	---	NP
	6-18	Sandy loam, fine sandy loam.	SM, SC, SC-SM	A-4, A-2-4	0	0	80-100	75-100	55-90	30-50	20-28	3-9
	18-30	Clay loam, silty clay, clay.	CL, CH	A-7	0	0	80-100	75-100	60-100	50-95	43-66	21-39
	30-60	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
HxB:												
Humbird------	0-3	Fine sandy loam.	SM, SC-SM	A-4, A-2-4	0	0	95-100	95-100	55-90	30-50	15-25	2-7
	3-6	Fine sandy loam, sandy loam.	SM	A-4, A-2-4	0	0	95-100	95-100	55-90	30-50	---	NP
	6-18	Sandy loam, fine sandy loam.	SM, SC, SC-SM	A-4, A-2-4	0	0	95-100	95-100	55-90	30-50	20-28	3-9
	18-30	Clay loam, silty clay, clay.	CL, CH	A-7	0	0	80-100	75-100	60-100	50-95	43-66	21-39
	30-60	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Merrillan----	0-4	Fine sandy loam.	SM, SC-SM	A-4, A-2-4	0	0	80-100	75-100	45-90	20-50	15-23	2-6
	4-6	Fine sandy loam, sandy loam.	SM, SC-SM	A-4, A-2-4	0	0	80-100	75-100	45-90	20-50	18-25	3-7
	6-15	Sandy loam, fine sandy loam.	SM, SC-SM	A-4, A-2-4	0	0	80-100	75-100	45-90	20-50	18-25	3-7
	15-21	Sandy loam, fine sandy loam.	SC, SC-SM	A-4, A-2-4	0	0	90-100	85-100	45-90	20-50	21-28	4-9
	21-31	Clay loam, silty clay loam, clay.	CL, CH	A-7-6	0	0	90-100	85-100	65-95	50-85	43-65	21-40
	31-60	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
ImA---------- Impact	0-14	Sand----------	SM, SP-SM	A-2, A-3, A-1	0	0	95-100	75-100	45-80	5-25	---	NP
	14-30	Sand, loamy sand, loamy fine sand.	SM, SP-SM	A-1, A-2, A-3, A-4	0	0	95-100	75-100	45-90	5-40	---	NP
	30-60	Sand, fine sand.	SP, SP-SM	A-1, A-2, A-3	0	0	95-100	75-100	45-80	1-10	---	NP
IrA---------- Ironrun	0-4	Sand----------	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-70	5-25	---	NP
	4-12	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-70	5-25	---	NP
	12-16	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-75	5-35	---	NP
	16-30	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-75	5-35	---	NP
	30-62	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-70	5-25	---	NP

Table 17.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 10 inches	Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
IxA:												
Ironrun------	0-4	Sand----------	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-70	5-25	---	NP
	4-12	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-70	5-25	---	NP
	12-16	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-75	5-35	---	NP
	16-30	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-75	5-35	---	NP
	30-62	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-70	5-25	---	NP
Ponycreek----	0-4	Muck----------	PT	A-8	0	0	---	---	---	---	---	---
	4-6	Mucky sand----	SM, SP-SM	A-1-b, A-3	0	0	80-100	75-100	20-70	5-25	---	NP
	6-29	Sand, coarse sand.	SM, SP-SM	A-1-b, A-3	0	0	80-100	75-100	20-70	5-25	---	NP
	29-64	Sand, coarse sand.	SM, SP-SM	A-1-b, A-3	0	0	80-100	75-100	20-70	5-25	---	NP
IzB:												
Ironrun------	0-4	Sand----------	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-70	5-25	---	NP
	4-12	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-70	5-25	---	NP
	12-16	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-75	5-35	---	NP
	16-30	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-75	5-35	---	NP
	30-62	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-70	5-25	---	NP
Ponycreek----	0-4	Muck----------	PT	A-8	0	0	---	---	---	---	---	---
	4-6	Mucky sand----	SM, SP-SM	A-1-b, A-3	0	0	80-100	75-100	20-70	5-25	---	NP
	6-29	Sand, coarse sand.	SM, SP-SM	A-1-b, A-3	0	0	80-100	75-100	20-70	5-25	---	NP
	29-64	Sand, coarse sand.	SM, SP-SM	A-1-b, A-3	0	0	80-100	75-100	20-70	5-25	---	NP
Arbutus------	0-3	Loamy sand----	SM	A-2-4, A-1	0	0-5	90-100	85-100	35-75	15-35	0-20	NP-4
	3-6	Loamy sand, sand.	SM, SP	A-2-4, A-1, A-3	0	0-5	90-100	85-100	25-75	4-35	0-20	NP-4
	6-17	Loamy sand, sand.	SM, SP	A-2-4, A-1, A-3	0	0-5	90-100	85-100	25-75	4-35	0-20	NP-5
	17-32	Sand, loamy sand.	SM, SP	A-2-4, A-1, A-3	0	0-5	90-100	85-100	25-75	4-35	0-20	NP-4
	32-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
JaA, JaB------ Jackson	0-9	Silt loam-----	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	85-95	25-35	5-15
	9-50	Silt loam, silty clay loam.	CL	A-6, A-4	0	0	100	100	90-100	85-100	25-40	7-20
	50-60	Sand, fine sand, loamy sand.	SP-SM, SM	A-2, A-3	0	0	95-100	95-100	50-85	5-35	---	NP

Table 17.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 10 inches	Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
Ka Kalmarville	0-6	Silt loam	ML, CL, CL-ML	A-4	0	0	95-100	90-100	85-100	50-90	15-35	NP-10
	6-42	Fine sandy loam, sandy loam, silt loam.	ML, SM, SC-SM, CL-ML	A-4, A-2	0	0	95-100	90-100	60-85	30-60	15-25	NP-5
	42-60	Coarse sand, sand, fine sand.	SP, SM, SW, SP-SM	A-3, A-2, A-1	---	0-2	90-100	85-100	40-80	2-30	<25	NP
KeA Kert	0-3	Silt loam	CL, CL-ML	A-4	0	0	95-100	95-100	70-100	65-85	20-30	4-10
	3-8	Silt loam, silt.	CL, ML, CL-ML	A-4	0	0	95-100	95-100	70-100	65-85	<30	NP-9
	8-19	Silt loam	CL	A-6	0	0	95-100	95-100	70-100	65-85	30-40	10-20
	19-31	Loam, silty clay loam, sandy clay loam.	CL, SC	A-7, A-6, A-2-6	0	0	80-100	75-100	45-100	20-85	30-45	10-20
	31-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
LfC2, LfD2 La Farge	0-6	Silt loam	CL, CL-ML	A-4	0	0	100	100	90-100	85-100	20-30	5-10
	6-28	Silt loam, silty clay loam.	CL	A-6, A-7	0	0	100	100	90-100	85-100	25-45	10-25
	28-37	Fine sandy loam, loam, sandy clay loam.	CL, SC	A-6	0	0	80-100	75-100	65-100	45-65	20-35	10-20
	37-60	Unweathered bedrock, weathered bedrock.	---	---	---	---	---	---	---	---	---	---
LsD2: La Farge	0-6	Silt loam	CL, CL-ML	A-4	0	0	100	100	90-100	85-100	20-30	5-10
	6-28	Silt loam, silty clay loam.	CL	A-6, A-7	0	0	100	100	90-100	85-100	25-45	10-25
	28-37	Fine sandy loam, loam, sandy clay loam.	CL, SC	A-6	0	0	80-100	75-100	65-100	45-65	20-35	10-20
	37-60	Unweathered bedrock, weathered bedrock.	---	---	---	---	---	---	---	---	---	---
Seaton	0-9	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	100	95-100	20-35	5-15
	9-46	Silt loam	CL, CL-ML	A-6, A-4	0	0	100	100	100	90-100	25-40	5-20
	46-60	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	100	90-100	25-40	5-20
Lt Loxley	0-4	Peat	PT	A-8	0	0	---	---	---	---	---	---
	4-60	Muck, mucky peat.	PT	A-8	0	0	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 10 inches	Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
LuB---------- Ludington	0-4	Sand----------	SM, SP-SM	A-2, A-3, A-1	0	0	80-100	75-100	20-70	5-25	---	NP
	4-6	Sand, loamy sand.	SM, SP-SM	A-2, A-4, A-3, A-1	0	0	80-100	75-100	20-95	5-50	---	NP
	6-20	Sand, loamy sand.	SM, SP-SM	A-2, A-3, A-4, A-1	0	0	80-100	75-100	20-95	5-50	---	NP
	20-28	Sand, loamy sand.	SM, SP-SM	A-2, A-3, A-4, A-1	0	0	80-100	75-100	20-95	5-50	---	NP
	28-39	Loam, sandy clay loam, clay loam.	SC, CL, SC-SM, CL-ML	A-4, A-6, A-7, A-2	0	0	80-100	75-95	45-90	20-80	20-45	4-21
	39-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
LxB: Ludington----	0-3	Sand----------	SM, SP-SM	A-2, A-3, A-1	0	0	80-100	75-100	20-70	5-25	---	NP
	3-13	Sand, loamy sand.	SM, SP-SM	A-2, A-4, A-3, A-1	0	0	80-100	75-100	20-95	5-50	---	NP
	13-20	Sand, loamy sand.	SM, SP-SM	A-2, A-3, A-4, A-1	0	0	80-100	75-100	20-95	5-50	---	NP
	20-27	Sand, loamy sand.	SM, SP-SM	A-2, A-3, A-4, A-1	0	0	80-100	75-100	20-95	5-50	---	NP
	27-39	Loam, sandy clay loam, clay loam.	SC, CL, SC-SM, CL-ML	A-4, A-6, A-7, A-2	0	0	80-100	75-95	45-90	20-80	20-45	4-21
	39-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
Fairchild----	0-4	Sand----------	SM, SP-SM	A-2, A-3, A-1	0	0	100	100	20-75	5-35	---	NP
	4-13	Sand, loamy sand.	SP-SM, SM	A-2, A-3, A-1, A-4	0	0	100	100	20-95	5-50	---	NP
	13-21	Sand, loamy sand.	SM, SP-SM	A-2, A-3, A-1, A-4	0	0	100	100	20-95	5-50	---	NP
	21-32	Sand, loamy sand.	SP-SM, SM	A-3, A-2, A-4, A-1	0	0	100	100	20-95	5-50	---	NP
	32-39	Clay loam, loam, sandy clay loam.	CL-ML, CL, SC-SM, SC	A-4, A-6, A-7, A-2	0	0	80-100	75-95	45-90	20-80	20-45	4-21
	39-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
MaB---------- Mahtomedi	0-4	Loamy sand----	SM, SC-SM	A-2, A-1	0	0-2	95-100	75-100	40-85	15-30	15-20	NP-4
	4-20	Sand, coarse sand, loamy sand.	SM, SP-SM	A-1, A-2, A-3	0	0-2	80-100	70-100	30-75	5-15	15-20	NP
	20-26	Gravelly coarse sand, gravelly sand.	SP-SM, SM	A-2, A-3, A-1	0	0-10	70-95	50-85	30-75	5-15	15-20	NP
	26-60	Gravelly coarse sand, gravelly sand.	SP, SM, SP-SM	A-2, A-3, A-1	0	0-10	40-95	35-85	30-70	2-15	15-20	NP

Table 17.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 10 inches	Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
MbA----------	0-4	Loamy fine sand.	SM, SP-SM	A-2-4, A-4	0	0	80-100	75-100	55-95	20-50	<21	NP-4
Majik	4-7	Sand, fine sand, loamy fine sand.	SM, SP	A-1, A-3, A-2, A-4	0	0	80-100	75-100	20-95	4-50	<21	NP-4
	7-29	Loamy fine sand, fine sand, sand.	SM, SP	A-1, A-3	0	0	80-100	75-100	20-95	4-50	---	NP
	29-60	Fine sand, sand.	SM, SP	A-1, A-3	0	0	80-100	75-100	20-85	4-35	---	NP
MmA----------	0-9	Silt loam-----	CL-ML, CL	A-4, A-6	0	0	80-100	75-100	60-100	50-85	23-30	6-11
Merimod	9-17	Silt loam-----	CL	A-4, A-6	0	0	80-100	75-100	60-100	50-85	28-34	9-14
	17-32	Loam, sandy loam, sandy clay loam.	CL, SC	A-4, A-6, A-2-4, A-2-6	0	0	80-100	75-100	45-95	20-80	28-34	9-14
	32-60	Sand, fine sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-85	5-35	---	NP
MnB----------	0-9	Silt loam-----	CL-ML, CL	A-4, A-6	0	0	80-100	75-100	60-100	50-85	23-30	6-11
Merit	9-12	Silt loam-----	CL	A-4, A-6	0	0	80-100	75-100	60-100	50-85	28-34	9-14
	12-30	Loam, sandy loam, sandy clay loam.	CL, SC	A-4, A-6, A-2-4, A-2-6	0	0	80-100	75-100	45-95	20-80	28-34	9-14
	30-60	Sand, fine sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-85	5-35	---	NP
MoB:												
Merit---------	0-9	Silt loam-----	CL-ML, CL	A-4, A-6	0	0	80-100	75-100	60-100	50-85	23-30	6-11
	9-12	Silt loam-----	CL	A-4, A-6	0	0	80-100	75-100	60-100	50-85	28-34	9-14
	12-30	Loam, sandy loam, sandy clay loam.	CL, SC	A-4, A-6, A-2-4, A-2-6	0	0	80-100	75-100	45-95	20-80	28-34	9-14
	30-60	Sand, fine sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-85	5-35	---	NP
Gardenvale---	0-8	Silt loam-----	CL	A-4	0	0	80-100	75-100	60-100	50-85	25-30	7-11
	8-26	Silt loam-----	CL	A-6	0	0	80-100	75-100	60-100	50-85	28-37	9-16
	26-30	Sandy loam, loam, sandy clay loam.	CL, SC	A-4, A-6	0	0	80-100	75-100	45-95	25-70	25-37	7-16
	30-50	Fine sand, sand.	SM, SP-SM	A-3, A-1-b, A-2-4	0	0	80-100	75-100	20-85	5-35	<21	NP-4
	50-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 10 inches	Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
MpA---------- Merrillan	0-5	Fine sandy loam.	SM, SC-SM	A-4, A-2-4	0	0	80-100	75-100	45-90	20-50	15-23	2-6
	5-10	Fine sandy loam, sandy loam.	SM, SC-SM	A-4, A-2-4	0	0	80-100	75-100	45-90	20-50	18-25	3-7
	10-18	Sandy loam, fine sandy loam.	SM, SC-SM	A-4, A-2-4	0	0	80-100	75-100	45-90	20-50	18-25	3-7
	18-24	Sandy loam, fine sandy loam.	SC, SC-SM	A-4, A-2-4	0	0	80-100	75-100	45-90	20-50	21-28	4-9
	24-34	Clay loam, silty clay loam, clay.	CL, CH	A-7-6	0	0	80-100	75-100	65-95	50-85	43-65	21-40
	34-60	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
MrA: Merrillan----	0-4	Fine sandy loam.	SM, SC-SM	A-4, A-2-4	0	0	80-100	75-100	45-90	20-50	15-23	2-6
	4-6	Fine sandy loam, sandy loam.	SM, SC-SM	A-4, A-2-4	0	0	80-100	75-100	45-90	20-50	18-25	3-7
	6-15	Sandy loam, fine sandy loam.	SM, SC-SM	A-4, A-2-4	0	0	80-100	75-100	45-90	20-50	18-25	3-7
	15-21	Sandy loam, fine sandy loam.	SC, SC-SM	A-4, A-2-4	0	0	80-100	75-100	45-90	20-50	21-28	4-9
	21-31	Clay loam, silty clay loam, clay.	CL, CH	A-7-6	0	0	80-100	75-100	65-95	50-85	43-65	21-40
	31-60	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Veedum-------	0-3	Muck----------	PT	A-8	0	0	---	---	---	---	---	---
	3-9	Silt loam-----	ML, ML, SM, SC	A-4, A-1	0	0	95-100	95-100	70-100	65-85	15-30	NP-9
	9-17	Silt loam-----	SC, CL	A-6, A-4	0	0	95-100	95-100	70-100	65-85	30-40	10-20
	17-33	Clay loam, silty clay loam, sandy loam.	CL, SC	A-7, A-6, A-2-6	0	0	80-100	75-100	45-100	20-85	30-45	10-20
	33-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
MxA: Moppet-------	0-4	Fine sandy loam.	SC, SC-SM, CL, CL-ML	A-4, A-2-4	0	0	100	100	60-95	30-65	21-26	4-8
	4-32	Fine sandy loam, loam, loamy sand.	ML, SM, SC, CL	A-4	0	0	100	100	75-100	40-85	18-28	3-9
	32-60	Sand, fine sand, loamy fine sand.	SM, SP-SM, SP	A-1-b, A-2-4, A-4	0	0-5	80-100	75-100	35-95	2-50	15-21	NP-4

Table 17.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 10 inches	Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
MxA:												
Fordum-------	0-6	Silt loam-----	ML, CL, SM, SC	A-4, A-6	0	0-15	80-100	75-100	55-100	45-85	20-35	3-15
	6-35	Silt loam, sandy loam, gravelly loam.	SM, SC, ML, CL	A-2, A-4, A-1	0	0-15	60-100	55-100	30-100	10-90	<30	3-10
	35-60	Sand, gravelly loamy fine sand.	SP, SM, GP, SM	A-3, A-2, A-1	0	0-15	60-100	55-100	12-95	1-50	---	NP
Ne----------	0-3	Muck----------	PT	A-8	0	0	---	---	---	---	---	---
Newlang	3-6	Mucky sand, loamy sand.	SM, SP	A-1, A-3, A-2-4	0	0	80-100	75-100	20-75	4-35	---	NP
	6-22	Sand, loamy sand.	SM, SP	A-1, A-3, A-2-4	0	0	80-100	75-100	20-75	4-35	---	NP
	22-63	Sand, loamy sand.	SM, SP	A-1, A-3, A-2-4	0	0	80-100	75-100	20-75	4-35	---	NP
OrA----------	0-8	Silt loam-----	CL, CL-ML	A-4, A-6	0	0	100	100	85-100	80-100	25-35	4-12
Orion	8-32	Stratified silt loam to very fine sand.	CL, CL-ML	A-4	0	0	100	100	90-100	70-80	20-30	4-10
	32-40	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	0	100	100	85-100	85-100	20-40	4-18
	40-60	Stratified silt loam to very fine sand.	CL, CL-ML	A-4	0	0	80-100	80-100	80-100	80-100	20-30	4-10
Pa----------	0-40	Muck----------	PT	A-8	0	0	---	---	---	---	---	NP
Palms	40-60	Silt loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0	0	85-100	80-100	70-95	50-90	25-40	5-20
Pt. Pits												
Pu----------	0-4	Muck----------	PT	A-8	0	0	---	---	---	---	---	---
Ponycreek	4-6	Mucky sand----	SM, SP-SM	A-1-b, A-3	0	0	80-100	75-100	20-70	5-25	---	NP
	6-29	Sand, coarse sand.	SM, SP-SM	A-1-b, A-3	0	0	80-100	75-100	20-70	5-25	---	NP
	29-64	Sand, coarse sand.	SM, SP-SM	A-1-b, A-3	0	0	80-100	75-100	20-70	5-25	---	NP
Pv:												
Ponycreek----	0-6	Muck----------	PT	A-8	0	0	---	---	---	---	---	---
	6-8	Mucky sand----	SM, SP-SM	A-1-b, A-3	0	0	80-100	75-100	20-70	5-25	---	NP
	8-21	Sand, coarse sand.	SM, SP-SM	A-1-b, A-3	0	0	80-100	75-100	20-70	5-25	---	NP
	21-66	Sand, coarse sand.	SM, SP-SM	A-1-b, A-3	0	0	80-100	75-100	20-70	5-25	---	NP
Dawsil-------	0-20	Mucky peat----	PT	A-8	0	0	---	---	---	---	---	---
	20-40	Muck----------	PT	A-8	0	0	---	---	---	---	---	---
	40-60	Sand, coarse sand, loamy sand.	SC-SM, SM, SC, SP-SM	A-2, A-3, A-1, A-4	0	0	45-100	35-100	15-90	0-45	<20	NP-10

Table 17.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
Pw---------- Psammaquents	0-6	Sand, loamy sand.	SM, SP-SM	A-3, A-1-b	0	0-3	90-100	85-100	20-75	1-35	---	NP
	6-60	Sand, loamy sand.	SM, SP-SM	A-3, A-1-b	0	0-3	90-100	85-100	20-75	1-35	---	NP
RkA---------- Rockdam	0-3	Sand----------	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-70	5-25	---	NP
	3-6	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-70	5-25	---	NP
	6-19	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-70	5-25	---	NP
	19-27	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-70	5-25	---	NP
	27-61	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-70	5-25	---	NP
RoA---------- Rowley	0-11	Silt loam-----	CL	A-4, A-6	0	0	100	100	90-100	85-95	25-35	8-13
	11-38	Silt loam-----	CL	A-6, A-7	0	0	100	100	90-100	85-95	30-50	10-25
	38-50	Stratified silt loam to sand.	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0	100	100	80-100	35-75	20-30	4-11
	50-60	Sand, fine sand.	SM, SP-SM	A-2, A-3	0	0	100	100	50-90	5-35	---	NP
SeB---------- Seaton	0-9	Silt loam-----	CL, CL-ML, ML	A-4, A-6, A-7	0	0	100	100	100	95-100	20-45	5-20
	9-46	Silt loam-----	CL, CL-ML	A-6, A-4, A-7	0	0	100	100	100	90-100	25-45	5-25
	46-60	Silt loam, silt.	CL, CL-ML	A-4, A-6	0	0	100	100	100	90-100	25-40	5-20
SeC2---------- Seaton	0-9	Silt loam-----	CL, CL-ML	A-4, A-6	0	0	100	100	100	95-100	20-35	5-15
	9-46	Silt loam-----	CL, CL-ML	A-6, A-4, A-7	0	0	100	100	100	90-100	25-45	5-25
	46-60	Silt loam-----	CL, CL-ML	A-4, A-6	0	0	100	100	100	90-100	25-40	5-20
SmB---------- Sebbo	0-9	Loam----------	SC, CL	A-4, A-6	0	0	80-100	75-100	60-90	40-80	25-32	7-13
	9-44	Loam, silt loam.	SC, CL	A-6	0	0	80-100	75-100	60-95	40-85	28-35	9-15
	44-60	Silt loam, loam.	SC, CL	A-4, A-6	0	0	80-100	75-100	60-95	40-85	25-32	7-13
SnA---------- Sechler	0-9	Loam----------	CL, CL-ML, ML	A-4	0	0-9	80-100	75-100	60-100	50-85	18-28	3-9
	9-12	Loam, gravelly silt loam.	SM, SC, CL, ML	A-4	0	0-9	65-100	60-100	45-100	35-85	18-28	3-9
	12-16	Very gravelly loam, very gravelly silt loam.	SM, SC, CL, ML	A-4, A-2-4, A-1-b	0	0-9	30-95	25-70	20-70	15-65	18-28	3-9
	16-22	Very gravelly fine sandy loam, very gravelly sandy loam.	SM, SP-SM, SC-SM	A-4, A-1-a, A-2-4	0	0-9	30-95	25-70	15-65	9-40	15-25	NP-7
	22-27	Loamy fine sand, loamy sand.	SM, SP-SM	A-1-b	0	0	80-100	75-100	30-95	10-50	---	NP
	27-60	Fine sand, sand.	SM, SP-SM	A-1-b, A-3	0	0	80-100	75-100	20-85	5-35	---	NP

Table 17.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
SoA----------	0-9	Silt loam-----	CL-ML, CL	A-4, A-6	0	0	80-100	75-100	60-100	50-85	23-30	6-11
Sooner	9-15	Silt loam-----	CL	A-4, A-6	0	0	80-100	75-100	60-100	50-85	28-34	9-14
	15-27	Loam, sandy clay loam.	SC, CL	A-4, A-6	0	0	80-100	75-100	50-95	40-80	28-34	9-14
	27-31	Sandy loam, loam, sandy clay loam.	SC, CL	A-4, A-6	0	0	80-100	75-100	50-95	40-75	28-34	9-14
	31-60	Sand, coarse sand.	SM, SP-SM	A-3, A-1-b	0	0	80-100	75-100	20-85	5-35	---	NP
SpA----------	0-16	Sand----------	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	50-75	5-35	---	NP
Sparta	16-42	Fine sand, sand.	SP-SM, SM	A-2, A-3	0	0	85-100	85-100	50-95	2-35	---	NP
	42-60	Sand, fine sand.	SP-SM, SM, SP	A-2, A-3	0	0	85-100	85-100	50-95	2-30	---	NP
TrB, TrC------	0-8	Sand----------	SM, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	20-70	5-25	---	NP
Tarr	8-36	Sand, fine sand.	SP, SP-SM	A-1, A-3, A-2	0	0	95-100	90-100	45-80	1-10	---	NP
	36-60	Sand, fine sand.	SP, SP-SM	A-1, A-3, A-2	0	0	95-100	90-100	45-80	1-10	---	NP
TrF----------	0-2	Sand----------	SM, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	20-70	5-25	---	NP
Tarr	2-30	Sand, fine sand.	SP, SP-SM	A-1, A-3, A-2	0	0	95-100	90-100	45-80	1-10	---	NP
	30-60	Sand, fine sand.	SP, SP-SM	A-1, A-3, A-2	0	0	95-100	90-100	45-80	1-10	---	NP
TtA----------	0-9	Sand----------	SM, SP	A-1, A-3, A-2-4	0	0	80-100	75-100	20-70	4-25	---	NP
Tint	9-29	Sand, fine sand.	SM, SP	A-1, A-3, A-2-4	0	0	80-100	75-100	20-85	4-35	---	NP
	29-60	Sand, fine sand.	SM, SP	A-1, A-3, A-2-4	0	0	80-100	75-100	20-85	4-35	---	NP
TuB----------	0-8	Sand----------	SM, SP	A-2, A-1, A-3	0	0	95-100	90-100	25-70	4-25	<21	NP-4
Tintson	8-46	Sand, fine sand.	SM, SP	A-1, A-2, A-3	0	0	95-100	90-100	20-85	4-35	---	NP
	46-60	Loam, silt loam, sandy loam.	ML, CL, SM, SC	A-4, A-2	0	0	95-100	90-100	55-100	30-90	<30	3-10
TwA----------	0-17	Silt loam-----	CL	A-4, A-6	0	0	100	100	90-100	85-95	25-35	8-13
Toddville	17-42	Silt loam, silty clay loam.	CL	A-6, A-7	0	0	100	100	90-100	80-95	35-50	15-25
	42-55	Stratified silt loam to sand.	CL-ML, CL, SC-SM, SC	A-4, A-6	0	0	100	100	85-100	35-75	20-30	4-11
	55-60	Sand, fine sand.	SM, SP-SM	A-2, A-3	0	0	100	100	50-90	5-35	---	NP
UdF----------	0-60	Silt loam, loam, sandy loam.	ML, CL, SM, SC	A-4, A-6, A-2	0	0-5	80-100	75-100	45-90	20-80	<40	NP-18
Udorthents												

Table 17.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
UfC2, UfD2---- Urne	0-2	Fine sandy loam.	SM, ML, CL-ML, SC-SM	A-4	0	0	90-100	90-100	65-95	35-65	<26	2-7
	2-36	Very fine sandy loam, loam, sandy loam.	SM, ML, CL, SC	A-2, A-4, A-1	0	0	70-100	65-100	40-95	20-65	20-30	3-9
	36-60	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
UrF:												
Urne----------	0-2	Fine sandy loam.	SM, ML, CL-ML, SC-SM	A-4	0	0	90-100	90-100	65-95	35-65	<26	2-7
	2-36	Very fine sandy loam, loam, sandy loam.	SM, ML, CL, SC	A-2, A-4, A-1	0	0	70-100	65-100	40-95	20-65	20-30	3-9
	36-60	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Council------	0-7	Loam----------	ML, SM	A-4	0	0	80-100	75-100	55-100	45-85	<20	NP-4
	7-45	Loam, silt loam, sandy loam.	CL, CL-ML, SC, SC-SM	A-4	0	0	80-100	75-100	50-100	35-85	20-28	4-9
	45-60	Sandy loam, loam, silt loam.	ML, CL, SM, SC	A-4, A-2	0	0	80-100	75-100	50-100	30-85	<28	NP-9
Vs:												
Veedum-------	0-7	Muck----------	PT	A-8	0	0	---	---	---	---	---	---
	7-11	Silt loam-----	ML, ML, SM, SC	A-4, A-1	0	0	95-100	95-100	70-100	65-85	15-30	NP-9
	11-21	Silt loam-----	SC, CL	A-6, A-4	0	0	95-100	95-100	70-100	65-85	30-40	10-20
	21-31	Clay loam, silty clay loam, sandy loam.	CL, SC	A-7, A-6, A-2-6	0	0	80-100	75-100	45-100	20-85	30-45	10-20
	31-67	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
Elm Lake-----	0-6	Muck----------	PT	A-8	0	0	---	---	---	---	---	---
	6-28	Sand, loamy sand, fine sand.	SP-SM, SM	A-2, A-3, A-1	0	0	80-100	75-100	30-75	5-35	---	NP
	28-38	Silty clay loam, loam, sandy clay loam.	CL, CL-ML, SC, SC-SM	A-6, A-2, A-4	0	0	80-100	75-95	45-95	25-85	20-45	4-22
	38-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 10 inches	Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
WmA---------- Whitehall	0-12	Silt loam-----	CL, CL-ML, ML	A-4	0	0	100	100	90-100	85-100	20-29	3-10
	12-28	Silt loam, silty clay loam.	CL, ML	A-6	0	0	100	100	90-100	80-100	25-40	10-20
	28-32	Loam, sandy loam.	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0	100	100	60-95	35-80	20-29	5-12
	32-60	Loamy sand, sand.	SM, SP-SM	A-3, A-2	0	0	100	100	50-75	5-30	---	NP

Table 18.--Physical and Chemical Properties of the Soils

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
AbA----------	0-4	4-15	1.30-1.60	6.0-20	0.10-0.12	4.5-7.3	Low----------	0.10	5	2	.5-2
Absco	4-14	0-10	1.45-1.65	6.0-20	0.05-0.11	4.5-7.3	Low----------	0.17			
	14-42	2-10	1.45-1.65	6.0-20	0.05-0.09	4.5-7.3	Low----------	0.15			
	42-60	0-10	1.55-1.70	6.0-20	0.04-0.06	4.5-7.3	Low----------	0.15			
AcA:											
Absco----------	0-4	4-15	1.30-1.60	6.0-20	0.10-0.12	4.5-7.3	Low----------	0.10	5	2	.5-2
	4-14	0-10	1.45-1.65	6.0-20	0.05-0.11	4.5-7.3	Low----------	0.17			
	14-42	2-10	1.45-1.65	6.0-20	0.05-0.09	4.5-7.3	Low----------	0.15			
	42-60	0-10	1.55-1.70	6.0-20	0.04-0.06	4.5-7.3	Low----------	0.15			
Northbend-------	0-7	10-14	1.35-1.45	0.6-2.0	0.20-0.24	3.5-6.5	Low----------	0.37	4	5	2-4
	7-34	5-17	1.35-1.85	0.6-2.0	0.12-0.22	3.5-6.5	Low----------	0.43			
	34-36	4-8	1.45-1.70	2.0-6.0	0.08-0.13	4.5-7.3	Low----------	0.17			
	36-60	2-5	1.55-1.70	6.0-20	0.04-0.10	4.5-7.3	Low----------	0.15			
Ad----------	0-22	---	0.30-0.55	0.2-6.0	0.35-0.45	5.1-7.3	----------	----	2	2	55-75
Adder	22-60	2-8	1.55-1.75	6.0-60	0.03-0.08	5.6-7.3	Low----------	0.15			
ArA----------	0-32	10-18	1.20-1.55	0.6-2.0	0.20-0.24	5.6-7.8	Low----------	0.37	5	5	1-3
Arenzville	32-42	10-27	1.25-1.45	0.6-2.0	0.18-0.22	5.6-7.8	Moderate-----	0.37			
	42-60	10-20	1.20-1.40	0.6-2.0	0.20-0.22	5.6-7.8	Low----------	0.37			
BeB----------	0-9	15-22	1.35-1.60	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	4	5	1-3
Bertrand	9-43	18-30	1.55-1.65	0.6-2.0	0.18-0.22	5.1-6.5	Moderate-----	0.37			
	43-48	10-20	1.55-1.65	0.6-6.0	0.09-0.22	5.1-6.5	Low----------	0.37			
	48-60	1-4	1.55-1.65	6.0-20	0.05-0.09	5.1-6.5	Low----------	0.15			
BkA----------	0-9	5-15	1.45-1.65	0.6-2.0	0.14-0.16	4.5-7.3	Low----------	0.17	4	3	1-2
Bilmod	9-24	6-18	1.40-1.70	0.6-2.0	0.10-0.17	4.5-6.5	Low----------	0.20			
	24-32	3-10	1.50-1.70	2.0-6.0	0.05-0.10	4.5-6.5	Low----------	0.17			
	32-60	1-5	1.60-1.70	6.0-20	0.03-0.08	4.5-6.5	Low----------	0.15			
BlB----------	0-8	5-15	1.45-1.65	0.6-2.0	0.14-0.16	5.1-7.3	Low----------	0.17	4	3	1-2
Bilson	8-32	6-18	1.40-1.70	0.6-6.0	0.10-0.17	5.1-6.5	Low----------	0.20			
	32-60	1-8	1.60-1.70	6.0-20	0.03-0.08	4.5-6.5	Low----------	0.15			
BnB:											
Bilson----------	0-8	5-15	1.45-1.65	0.6-2.0	0.14-0.16	5.1-7.3	Low----------	0.17	4	3	1-2
	8-32	6-18	1.40-1.70	0.6-6.0	0.10-0.17	5.1-6.5	Low----------	0.20			
	32-60	1-8	1.60-1.70	6.0-20	0.03-0.08	4.5-6.5	Low----------	0.15			
Silverhill------	0-8	5-15	1.35-1.70	0.6-6.0	0.13-0.15	5.1-7.3	Low----------	0.24	4	3	1-2
	8-26	10-17	1.40-1.70	0.6-6.0	0.12-0.19	5.1-6.5	Low----------	0.24			
	26-32	5-10	1.45-1.70	6.0-20	0.06-0.11	5.1-6.5	Low----------	0.17			
	32-50	1-10	1.50-1.70	6.0-20	0.05-0.10	4.5-6.5	Low----------	0.15			
	50-60	---	---	0.2-2.0	---	---	----------	----			
BnC2, BnD2:											
Bilson----------	0-8	5-15	1.45-1.65	0.6-2.0	0.14-0.16	5.1-7.3	Low----------	0.20	4	3	1-2
	8-32	6-18	1.40-1.70	0.6-6.0	0.10-0.17	5.1-6.5	Low----------	0.20			
	32-60	1-8	1.60-1.70	6.0-20	0.03-0.08	4.5-6.5	Low----------	0.15			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
BnC2, BnD2:											
Elevasil--------	0-3	8-13	1.40-1.60	0.6-6.0	0.10-0.16	3.5-7.3	Low----------	0.28	3	3	1-2
	3-27	10-17	1.45-1.60	0.6-6.0	0.06-0.14	4.5-6.0	Low----------	0.24			
	27-31	2-10	1.50-1.70	6.0-20	0.03-0.10	4.5-6.5	Low----------	0.17			
	31-39	1-8	1.50-1.70	6.0-20	0.02-0.08	4.5-6.5	Low----------	0.15			
	39-60	---	---	0.2-2.0	---	---	----------	----			
BoB, BoC, BoF----	0-3	2-3	1.55-1.65	6.0-20	0.07-0.10	3.5-7.3	Low----------	0.02	3	1	<1
Boone	3-8	1-5	1.55-1.70	6.0-20	0.03-0.12	3.5-7.3	Low----------	0.15			
	8-35	0-3	1.55-1.70	6.0-20	0.02-0.11	4.5-6.5	Low----------	0.15			
	35-61	---	---	0.2-2.0	---	---	----------	----			
BpF:											
Boone-----------	0-3	2-3	1.55-1.65	6.0-20	0.07-0.10	3.5-7.3	Low----------	0.02	3	1	<1
	3-8	1-5	1.55-1.70	6.0-20	0.03-0.12	3.5-7.3	Low----------	0.15			
	8-35	0-3	1.55-1.70	6.0-20	0.02-0.11	4.5-6.5	Low----------	0.15			
	35-61	---	---	0.2-2.0	---	---	----------	----			
Elevasil--------	0-3	8-13	1.40-1.60	0.6-6.0	0.10-0.16	3.5-7.3	Low----------	0.24	3	3	1-2
	3-27	10-17	1.45-1.60	0.6-6.0	0.06-0.14	4.5-6.0	Low----------	0.24			
	27-31	2-10	1.50-1.70	6.0-20	0.03-0.10	4.5-6.5	Low----------	0.17			
	31-39	1-8	1.50-1.70	6.0-20	0.02-0.08	4.5-6.5	Low----------	0.15			
	39-60	---	---	0.2-2.0	---	---	----------	----			
Cd----------	0-12	---	0.20-0.35	0.2-6.0	0.55-0.65	3.6-5.0	----------	----	2	5	65-85
Citypoint	12-26	---	0.15-0.40	0.2-6.0	0.35-0.45	3.6-5.0	----------	0.10			
	26-34	0-50	1.55-1.75	0.06-20	0.05-0.18	3.6-5.0	Low----------	0.15			
	34-60	---	---	0.00-0.6	---	---	----------	----			
CfA----------	0-11	15-22	1.35-1.55	0.6-2.0	0.22-0.25	5.6-7.3	Low----------	0.32	5	5	2-4
Coffton	11-38	10-17	1.40-1.60	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.43			
	38-60	5-15	1.50-1.70	0.6-2.0	0.11-0.19	5.6-7.3	Low----------	0.43			
CoC2----------	0-7	6-10	1.35-1.60	0.6-2.0	0.17-0.24	4.5-7.3	Low----------	0.32	5	5	1-2
Council	7-45	10-17	1.55-1.65	0.6-2.0	0.14-0.22	4.5-6.5	Low----------	0.32			
	45-60	6-17	1.55-1.65	0.6-2.0	0.12-0.20	5.1-7.3	Low----------	0.24			
CpC2, CpD2:											
Council---------	0-9	6-10	1.35-1.60	0.6-2.0	0.11-0.18	4.5-7.3	Low----------	0.32	5	3	1-2
	9-41	10-17	1.55-1.65	0.6-2.0	0.14-0.22	4.5-6.5	Low----------	0.32			
	41-60	6-17	1.55-1.65	0.6-2.0	0.12-0.20	5.1-7.3	Low----------	0.24			
Bilson----------	0-8	5-15	1.45-1.65	0.6-2.0	0.14-0.16	5.1-7.3	Low----------	0.28	4	3	1-2
	8-27	6-18	1.40-1.70	0.6-6.0	0.10-0.17	5.1-6.5	Low----------	0.20			
	27-60	1-8	1.60-1.70	6.0-20	0.03-0.08	4.5-6.5	Low----------	0.15			
CsD2:											
Council---------	0-7	6-10	1.35-1.60	0.6-2.0	0.17-0.24	4.5-7.3	Low----------	0.32	5	5	1-2
	7-45	10-17	1.55-1.65	0.6-2.0	0.14-0.22	4.5-6.5	Low----------	0.32			
	45-60	6-17	1.55-1.65	0.6-2.0	0.12-0.20	5.1-7.3	Low----------	0.24			
Seaton----------	0-9	15-22	1.10-1.20	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.49	5	5	1-3
	9-46	18-27	1.15-1.30	0.6-2.0	0.20-0.22	4.5-7.3	Low----------	0.37			
	46-60	15-25	1.20-1.40	0.6-2.0	0.20-0.22	5.6-8.4	Low----------	0.37			
CsE:											
Council---------	0-7	6-10	1.35-1.60	0.6-2.0	0.17-0.24	4.5-7.3	Low----------	0.32	5	5	1-2
	7-45	10-17	1.55-1.65	0.6-2.0	0.14-0.22	4.5-6.5	Low----------	0.32			
	45-60	6-17	1.55-1.65	0.6-2.0	0.12-0.20	5.1-7.3	Low----------	0.24			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
CsE:											
Seaton	0-9	10-22	1.10-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.43	5	5	1-3
	9-38	18-27	1.20-1.60	0.6-2.0	0.20-0.22	4.5-7.3	Low	0.37			
	38-60	10-25	1.20-1.50	0.6-2.0	0.20-0.22	5.6-8.4	Low	0.37			
Da	0-20	---	0.20-0.35	0.6-6.0	0.45-0.55	3.6-4.4	---	---	2	5	65-85
Dawsil	20-40	---	0.15-0.40	0.2-6.0	0.35-0.45	3.6-4.4	---	0.10			
	40-60	0-10	1.55-1.70	6.0-20	0.03-0.10	3.6-6.5	Low	0.15			
DuA	0-16	5-10	1.35-1.70	0.6-6.0	0.12-0.22	5.1-6.5	Low	0.20	4	3	1-3
Dunnville	16-24	10-18	1.40-1.65	0.6-6.0	0.11-0.19	5.1-6.5	Low	0.28			
	24-27	5-10	1.55-1.70	0.6-6.0	0.09-0.17	5.1-6.5	Low	0.28			
	27-60	1-5	1.55-1.70	>6.0	0.03-0.07	5.1-6.5	Low	0.15			
ElB	0-3	8-13	1.40-1.60	0.6-6.0	0.10-0.16	3.5-7.3	Low	0.24	4	3	1-2
Elevasil	3-27	10-17	1.45-1.60	0.6-6.0	0.06-0.14	4.5-6.0	Low	0.24			
	27-31	2-10	1.50-1.70	6.0-20	0.03-0.10	4.5-6.5	Low	0.17			
	31-39	1-8	1.50-1.70	6.0-20	0.02-0.08	4.5-6.5	Low	0.15			
	39-60	---	---	0.2-2.0	---	---	---	---			
ElC2, ElD2	0-3	8-13	1.40-1.60	0.6-6.0	0.10-0.16	3.5-7.3	Low	0.28	3	3	1-2
Elevasil	3-27	10-17	1.45-1.60	0.6-6.0	0.06-0.14	4.5-6.0	Low	0.24			
	27-31	2-10	1.50-1.70	6.0-20	0.03-0.10	4.5-6.5	Low	0.17			
	31-39	1-8	1.50-1.70	6.0-20	0.02-0.08	4.5-6.5	Low	0.15			
	39-60	---	---	0.2-2.0	---	---	---	---			
Eo	0-4	3-8	1.20-1.40	2.0-6.0	0.16-0.20	3.6-6.0	Low	0.02	3	2	10-20
Elm Lake	4-28	2-8	1.45-1.65	6.0-20	0.06-0.10	3.6-6.0	Low	0.15			
	28-38	10-35	1.45-1.70	0.2-2.0	0.10-0.19	3.6-5.5	Moderate	0.43			
	38-60	---	---	0.00-0.6	---	---	---	---			
Et	0-15	15-27	1.25-1.35	0.6-2.0	0.22-0.29	6.1-7.8	Low	0.32	5	6	4-12
Ettrick	15-40	20-35	1.30-1.45	0.2-0.6	0.18-0.29	6.1-8.4	Moderate	0.28			
	40-60	8-27	1.30-1.50	0.2-2.0	0.20-0.25	6.1-8.4	Low	0.28			
FaA	0-4	2-8	1.25-1.45	2.0-20	0.06-0.12	3.5-7.3	Low	0.02	3	1	2-5
Fairchild	4-13	1-6	1.35-1.65	6.0-20	0.06-0.10	3.5-6.0	Low	0.15			
	13-21	2-8	1.45-1.65	6.0-20	0.06-0.10	3.5-6.0	Low	0.15			
	21-32	2-8	1.50-1.65	6.0-20	0.06-0.10	3.5-6.0	Low	0.15			
	32-39	10-35	1.45-1.70	0.2-2.0	0.10-0.19	3.5-5.5	Moderate	0.32			
	39-60	---	---	0.00-0.6	---	---	---	---			
FeA:											
Fairchild	0-4	2-8	1.25-1.45	2.0-20	0.06-0.12	3.5-7.3	Low	0.02	3	1	2-5
	4-13	1-6	1.35-1.65	6.0-20	0.06-0.10	3.5-6.0	Low	0.15			
	13-21	2-8	1.45-1.65	6.0-20	0.06-0.10	3.5-6.0	Low	0.15			
	21-32	2-8	1.50-1.65	6.0-20	0.06-0.10	3.5-6.0	Low	0.15			
	32-39	10-35	1.45-1.70	0.2-2.0	0.10-0.19	3.5-5.5	Moderate	0.32			
	39-60	---	---	0.00-0.6	---	---	---	---			
Elm Lake	0-4	---	0.15-0.45	0.2-6.0	0.35-0.45	3.6-6.0	Low	0.10	3	2	50-80
	4-28	2-8	1.45-1.65	6.0-60	0.06-0.10	3.6-6.0	Low	0.15			
	28-38	10-35	1.45-1.70	0.2-2.0	0.10-0.19	3.6-5.5	Moderate	0.43			
	38-60	---	---	0.00-0.6	---	---	---	---			
GaC2, GaD2	0-8	12-20	1.35-1.45	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.43	3	5	1-3
Gale	8-27	20-32	1.45-1.55	0.6-2.0	0.18-0.22	4.5-6.5	Moderate	0.37			
	27-31	18-30	1.45-1.55	0.6-2.0	0.17-0.22	4.5-6.5	Moderate	0.37			
	31-39	1-14	1.30-1.50	6.0-20	0.05-0.14	4.5-6.5	Low	0.15			
	39-60	---	---	0.2-2.0	---	---	---	---			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
GoB, GoC----------	0-9	2-4	1.35-1.55	6.0-20	0.09-0.12	4.5-7.3	Low----------	0.10	5	2	.5-2
Gosil	9-27	5-10	1.40-1.60	6.0-20	0.09-0.13	5.1-6.5	Low----------	0.17			
	27-36	3-5	1.40-1.60	6.0-20	0.05-0.11	5.1-6.5	Low----------	0.15			
	36-60	1-3	1.50-1.70	6.0-20	0.04-0.07	5.1-6.5	Low----------	0.15			
HkB:											
Hiles----------	0-8	10-20	1.35-1.55	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	3	5	1-3
	8-12	10-20	1.45-1.65	0.6-2.0	0.18-0.22	4.5-6.0	Low----------	0.43			
	12-20	20-27	1.45-1.65	0.6-2.0	0.18-0.22	4.5-6.0	Moderate-----	0.43			
	20-28	20-35	1.55-1.70	0.2-2.0	0.13-0.18	3.5-5.5	Moderate-----	0.32			
	28-60	---	---	0.00-0.6	---	---	----------	----			
Kert----------	0-3	10-20	1.40-1.55	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	3	5	2-4
	3-8	6-18	1.40-1.70	0.6-2.0	0.18-0.24	4.5-6.0	Low----------	0.43			
	8-19	18-30	1.55-1.70	0.6-2.0	0.18-0.22	4.5-6.0	Moderate-----	0.43			
	19-31	20-35	1.55-1.70	0.2-2.0	0.15-0.20	3.5-5.5	Moderate-----	0.37			
	31-60	---	---	0.00-0.6	---	---	----------	----			
HnB, HnC2, HnD2--	0-9	12-16	1.35-1.55	0.6-2.0	0.20-0.22	5.1-6.5	Low----------	0.32	3	5	1-2
Hixton	9-32	18-27	1.55-1.65	0.6-2.0	0.12-0.19	5.1-6.5	Low----------	0.32			
	32-39	2-6	1.55-1.70	6.0-20	0.05-0.10	5.1-6.5	Low----------	0.15			
	39-60	---	---	0.2-2.0	---	---	----------	----			
HpA----------	0-11	8-14	1.35-1.70	0.6-2.0	0.11-0.15	4.5-7.3	Low----------	0.20	4	3	2-3
Hoop	11-24	10-17	1.45-1.70	0.6-2.0	0.10-0.17	4.5-6.5	Low----------	0.20			
	24-34	2-10	1.50-1.75	>6.0	0.03-0.11	5.1-6.5	Low----------	0.15			
	34-60	1-8	1.50-1.80	>6.0	0.02-0.08	5.1-6.5	Low----------	0.15			
Ht----------	0-60	---	0.15-0.45	0.2-6.0	0.35-0.45	6.1-7.3	----------	----	3	2	>70
Houghton											
HuB----------	0-3	6-13	1.35-1.60	0.6-6.0	0.12-0.18	4.5-7.3	Low----------	0.28	3	3	1-3
Humbird	3-6	2-6	1.35-1.65	0.6-6.0	0.09-0.14	4.5-6.0	Low----------	0.17			
	6-18	8-17	1.45-1.70	0.6-6.0	0.09-0.14	4.5-6.0	Low----------	0.24			
	18-30	35-60	1.50-1.75	0.06-0.2	0.08-0.13	3.5-5.5	High----------	0.32			
	30-60	---	---	0.00-0.6	---	---	----------	----			
HxB:											
Humbird----------	0-3	6-13	1.35-1.60	0.6-6.0	0.12-0.18	4.5-7.3	Low----------	0.28	3	3	1-3
	3-6	2-6	1.35-1.65	0.6-6.0	0.09-0.14	4.5-6.0	Low----------	0.17			
	6-18	8-17	1.45-1.70	0.6-6.0	0.09-0.14	4.5-6.0	Low----------	0.24			
	18-30	35-60	1.50-1.75	0.06-0.2	0.08-0.13	3.5-5.5	High----------	0.32			
	30-60	---	---	0.00-0.6	---	---	----------	----			
Merrillan-------	0-4	6-13	1.35-1.70	0.6-6.0	0.13-0.15	4.5-7.3	Low----------	0.28	3	3	3-5
	4-6	8-14	1.35-1.55	0.6-6.0	0.20-0.22	4.5-6.0	Low----------	0.24			
	6-15	8-14	1.35-1.65	0.6-6.0	0.10-0.12	4.5-6.0	Low----------	0.24			
	15-21	10-18	1.50-1.70	0.6-6.0	0.06-0.14	4.5-6.0	Low----------	0.24			
	21-31	35-60	1.50-1.70	0.06-0.2	0.13-0.20	3.5-5.5	Moderate-----	0.32			
	31-60	---	---	0.00-0.6	---	---	----------	----			
ImA----------	0-14	3-5	1.35-1.65	6.0-20	0.08-0.10	5.1-6.5	Low----------	0.02	5	1	1-2
Impact	14-30	0-6	1.50-1.65	6.0-20	0.05-0.13	4.5-6.0	Low----------	0.15			
	30-60	0-2	1.50-1.65	6.0-20	0.05-0.07	5.1-6.5	Low----------	0.15			
IrA----------	0-4	3-7	1.35-1.60	6.0-20	0.06-0.09	3.5-7.3	Low----------	0.02	5	1	2-5
Ironrun	4-12	3-5	1.50-1.65	>6.0	0.05-0.08	3.5-7.3	Low----------	0.15			
	12-16	3-5	1.50-1.65	>6.0	0.05-0.09	3.5-6.0	Low----------	0.15			
	16-30	3-5	1.50-1.65	>6.0	0.05-0.09	3.5-6.0	Low----------	0.15			
	30-62	3-5	1.50-1.65	>6.0	0.04-0.07	5.1-6.5	Low----------	0.15			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
IxA:											
Ironrun	0-4	3-7	1.35-1.60	6.0-20	0.06-0.09	3.5-7.3	Low	0.02	5	1	2-5
	4-12	3-5	1.50-1.65	>6.0	0.05-0.08	3.5-7.3	Low	0.15			
	12-16	3-5	1.50-1.65	>6.0	0.05-0.09	3.5-6.0	Low	0.15			
	16-30	3-5	1.50-1.65	>6.0	0.05-0.09	3.5-6.0	Low	0.15			
	30-62	3-5	1.50-1.65	>6.0	0.04-0.07	5.1-6.5	Low	0.15			
Ponycreek	0-4	---	0.30-0.50	0.2-6.0	0.35-0.45	3.5-6.5	---	0.05	5	2	20-70
	4-6	4-8	1.35-1.65	>6.0	0.09-0.12	3.5-6.5	Low	0.15			
	6-29	4-8	1.50-1.70	>6.0	0.06-0.11	3.5-6.5	Low	0.15			
	29-64	3-5	1.50-1.70	>6.0	0.05-0.07	4.5-6.5	Low	0.15			
IzB:											
Ironrun	0-4	3-7	1.35-1.60	6.0-20	0.06-0.09	3.5-7.3	Low	0.02	5	1	2-5
	4-12	3-5	1.50-1.65	>6.0	0.05-0.08	3.5-7.3	Low	0.15			
	12-16	3-5	1.50-1.65	>6.0	0.05-0.09	3.5-6.0	Low	0.15			
	16-30	3-5	1.50-1.65	>6.0	0.05-0.09	3.5-6.0	Low	0.15			
	30-62	3-5	1.50-1.65	>6.0	0.04-0.07	5.1-6.5	Low	0.15			
Ponycreek	0-4	---	0.30-0.50	0.2-6.0	0.35-0.45	3.5-6.5	---	0.05	5	2	20-70
	4-6	4-8	1.35-1.65	>6.0	0.09-0.12	3.5-6.5	Low	0.15			
	6-29	4-8	1.50-1.70	>6.0	0.06-0.11	3.5-6.5	Low	0.15			
	29-64	3-5	1.50-1.70	>6.0	0.05-0.07	4.5-6.5	Low	0.15			
Arbutus	0-3	2-10	1.30-1.60	6.0-20	0.09-0.12	3.5-6.0	Low	0.10	2	2	.5-2
	3-6	1-10	1.30-1.60	6.0-20	0.07-0.11	3.5-6.0	Low	0.17			
	6-17	1-10	1.45-1.65	6.0-20	0.07-0.11	3.5-6.0	Low	0.17			
	17-32	1-10	1.40-1.70	6.0-20	0.05-0.11	3.5-6.0	Low	0.15			
	32-36	---	---	0.01-20	---	---	---	----			
JaA, JaB	0-9	15-22	1.35-1.60	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.37	4	5	2-3
Jackson	9-50	18-30	1.55-1.65	0.6-2.0	0.18-0.22	5.6-7.3	Moderate	0.37			
	50-60	1-4	1.55-1.65	6.0-20	0.05-0.09	5.1-6.5	Low	0.15			
Ka	0-6	13-23	1.35-1.45	0.6-2.0	0.20-0.24	6.6-7.8	Low	0.32	4	5	2-4
Kalmarville	6-42	8-18	1.40-1.50	2.0-6.0	0.13-0.18	6.6-7.8	Low	0.20			
	42-60	2-5	1.55-1.65	6.0-20	0.06-0.09	6.6-7.8	Low	0.10			
KeA	0-3	10-20	1.40-1.55	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.37	3	5	2-5
Kert	3-8	6-18	1.40-1.70	0.6-2.0	0.18-0.24	4.5-6.0	Low	0.43			
	8-19	18-30	1.55-1.70	0.6-2.0	0.18-0.22	4.5-6.0	Moderate	0.43			
	19-31	20-35	1.55-1.70	0.2-2.0	0.15-0.20	3.5-5.5	Moderate	0.37			
	31-60	---	---	0.00-0.6	---	---	---	----			
LfC2, LfD2	0-6	14-17	1.35-1.55	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.43	3	5	1-3
La Farge	6-28	20-30	1.35-1.75	0.6-2.0	0.18-0.22	4.5-6.5	Moderate	0.37			
	28-37	6-30	1.55-1.70	0.6-2.0	0.15-0.19	4.5-6.5	Moderate	0.37			
	37-60	---	---	0.06-2.0	---	---	---	----			
LsD2:											
La Farge	0-6	14-17	1.35-1.55	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.43	3	5	1-3
	6-28	20-30	1.35-1.75	0.6-2.0	0.18-0.22	4.5-6.5	Moderate	0.37			
	28-37	6-30	1.55-1.70	0.6-2.0	0.15-0.19	4.5-6.5	Moderate	0.37			
	37-60	---	---	0.06-2.0	---	---	---	----			
Seaton	0-9	15-22	1.10-1.20	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.49	5	5	1-3
	9-46	18-27	1.15-1.30	0.6-2.0	0.20-0.22	4.5-7.3	Low	0.37			
	46-60	15-25	1.20-1.40	0.6-2.0	0.20-0.22	5.6-8.4	Low	0.37			
Lt	0-4	---	0.30-0.40	>6.0	0.35-0.65	<4.5	---	----	3	7	70-90
Loxley	4-60	---	0.10-0.35	0.2-6.0	0.35-0.45	<4.5	---	----			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
LuB----------	0-4	2-4	1.35-1.55	2.0-20	0.04-0.09	3.5-7.3	Low----------	0.02	3	1	1-4
Ludington	4-6	1-6	1.35-1.65	6.0-20	0.06-0.10	3.5-6.0	Low----------	0.15			
	6-20	2-8	1.45-1.65	6.0-20	0.06-0.10	3.5-6.0	Low----------	0.15			
	20-28	2-8	1.50-1.65	6.0-20	0.06-0.10	3.5-6.0	Low----------	0.15			
	28-39	10-35	1.45-1.70	0.2-2.0	0.10-0.19	3.5-5.5	Moderate-----	0.32			
	39-60	---	---	0.00-0.6	---	---	----------	----			
LxB:											
Ludington-------	0-3	2-4	1.35-1.55	2.0-20	0.04-0.09	3.5-7.3	Low----------	0.02	3	1	1-4
	3-13	1-6	1.35-1.65	6.0-20	0.06-0.10	3.5-6.0	Low----------	0.15			
	13-20	2-8	1.45-1.65	6.0-20	0.06-0.10	3.5-6.0	Low----------	0.15			
	20-27	2-8	1.50-1.65	6.0-20	0.06-0.10	3.5-6.0	Low----------	0.15			
	27-39	10-35	1.45-1.70	0.2-2.0	0.10-0.19	3.5-5.5	Moderate-----	0.32			
	39-60	---	---	0.00-0.6	---	---	----------	----			
Fairchild-------	0-4	2-8	1.25-1.45	2.0-20	0.06-0.12	3.5-7.3	Low----------	0.02	3	1	2-5
	4-13	1-6	1.35-1.65	6.0-20	0.06-0.10	3.5-6.0	Low----------	0.15			
	13-21	2-8	1.45-1.65	6.0-20	0.06-0.10	3.5-6.0	Low----------	0.15			
	21-32	2-8	1.50-1.65	6.0-20	0.06-0.10	3.5-6.0	Low----------	0.15			
	32-39	10-35	1.45-1.70	0.2-2.0	0.10-0.19	3.5-5.5	Moderate-----	0.32			
	39-60	---	---	0.00-0.6	---	---	----------	----			
MaB----------	0-4	2-15	1.40-1.60	6.0-20	0.10-0.12	5.1-6.5	Low----------	0.10	5	2	.5-2
Mahtomedi	4-20	0-10	1.40-1.50	6.0-20	0.06-0.08	5.1-6.5	Low----------	0.10			
	20-26	0-10	1.45-1.75	6.0-20	0.05-0.07	5.1-6.5	Low----------	0.05			
	26-60	0-10	1.45-1.75	6.0-20	0.04-0.09	5.1-7.8	Low----------	0.05			
MbA----------	0-4	4-10	1.35-1.65	2.0-6.0	0.09-0.12	4.5-7.3	Low----------	0.15	5	2	2-5
Majik	4-7	4-10	1.35-1.65	6.0-20	0.06-0.12	4.5-7.3	Low----------	0.15			
	7-29	2-8	1.45-1.65	6.0-20	0.05-0.11	4.5-6.0	Low----------	0.17			
	29-60	1-5	1.50-1.70	6.0-20	0.04-0.07	5.6-7.3	Low----------	0.15			
MmA----------	0-9	12-20	1.35-1.55	0.6-2.0	0.20-0.24	4.5-7.3	Low----------	0.32	4	5	2-3
Merimod	9-17	18-27	1.40-1.65	0.6-2.0	0.18-0.22	4.5-6.5	Moderate-----	0.43			
	17-32	18-27	1.50-1.65	0.6-2.0	0.10-0.20	4.5-6.5	Moderate-----	0.32			
	32-60	1-6	1.65-1.85	6.0-20	0.03-0.07	4.5-6.5	Low----------	0.15			
MnB----------	0-9	12-20	1.35-1.55	0.6-2.0	0.20-0.24	4.5-7.3	Low----------	0.32	4	5	2-3
Merit	9-12	18-27	1.40-1.65	0.6-2.0	0.18-0.22	4.5-6.5	Moderate-----	0.43			
	12-30	18-27	1.50-1.65	0.6-2.0	0.10-0.20	4.5-6.5	Moderate-----	0.32			
	30-60	1-6	1.65-1.85	6.0-20	0.03-0.07	4.5-6.5	Low----------	0.15			
MoB:											
Merit----------	0-9	12-20	1.35-1.55	0.6-2.0	0.20-0.24	4.5-7.3	Low----------	0.32	4	5	2-3
	9-12	18-27	1.40-1.65	0.6-2.0	0.18-0.22	4.5-6.5	Moderate-----	0.43			
	12-30	18-27	1.50-1.65	0.6-2.0	0.10-0.20	4.5-6.5	Moderate-----	0.32			
	30-60	1-6	1.65-1.85	6.0-20	0.03-0.07	4.5-6.5	Low----------	0.15			
Gardenvale------	0-8	14-20	1.35-1.55	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	4	5	2-4
	8-26	18-27	1.35-1.55	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.43			
	26-30	14-27	1.55-1.65	0.6-2.0	0.16-0.22	4.5-6.0	Moderate-----	0.24			
	30-50	1-10	1.50-1.70	6.0-20	0.05-0.08	4.5-6.0	Low----------	0.15			
	50-60	---	---	0.2-2.0	---	---	----------	----			
MpA----------	0-5	6-13	1.35-1.70	0.6-6.0	0.13-0.15	4.5-7.3	Low----------	0.28	3	3	3-5
Merrillan	5-10	8-14	1.35-1.55	0.6-6.0	0.20-0.22	4.5-6.0	Low----------	0.24			
	10-18	8-14	1.35-1.65	0.6-6.0	0.10-0.12	4.5-6.0	Low----------	0.24			
	18-24	10-18	1.50-1.70	0.6-6.0	0.06-0.14	4.5-6.0	Low----------	0.24			
	24-34	35-60	1.50-1.70	0.06-0.2	0.13-0.20	3.5-5.5	Moderate-----	0.32			
	34-60	---	---	0.00-0.6	---	---	----------	----			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
MrA:											
Merrillan	0-4	6-13	1.35-1.70	0.6-6.0	0.13-0.15	4.5-7.3	Low	0.28	3	3	3-5
	4-6	8-14	1.35-1.55	0.6-6.0	0.20-0.22	4.5-6.0	Low	0.24			
	6-15	8-14	1.35-1.65	0.6-6.0	0.10-0.12	4.5-6.0	Low	0.24			
	15-21	10-18	1.50-1.70	0.6-6.0	0.06-0.14	4.5-6.0	Low	0.24			
	21-31	35-60	1.50-1.70	0.06-0.2	0.13-0.20	3.5-5.5	Moderate	0.32			
	31-60	---	---	0.00-0.6	---	---					
Veedum	0-3	---	0.25-0.85	0.2-0.6	0.35-0.45	3.5-6.0		0.37	3	2	20-40
	3-9	8-20	1.40-1.70	0.6-2.0	0.18-0.22	3.5-6.0	Low	0.43			
	9-17	18-30	1.40-1.70	0.6-2.0	0.18-0.22	3.5-6.0	Low	0.43			
	17-33	18-35	1.55-1.70	0.2-2.0	0.15-0.20	3.5-6.0	Moderate	0.37			
	33-60	---	---	0.00-0.6	---	---					
MxA:											
Moppet	0-4	10-15	1.40-1.70	0.6-6.0	0.13-0.22	3.6-6.0	Low	0.28	4	3	2-3
	4-32	8-17	1.45-1.70	0.6-6.0	0.15-0.22	3.6-6.0	Low	0.24			
	32-60	2-10	1.60-1.75	6.0-20	0.03-0.09	3.6-6.5	Low	0.10			
Fordum	0-6	10-23	1.35-1.45	0.6-2.0	0.17-0.24	4.5-8.4	Low	0.32	4	8	4-12
	6-35	8-17	1.40-1.50	0.6-6.0	0.10-0.22	4.5-8.4	Low	0.37			
	35-60	2-5	1.55-1.70	>6.0	0.04-0.10	5.6-8.4	Low	0.15			
Ne	0-3	---	0.30-0.50	0.2-6.0	0.35-0.45	3.5-6.0		0.05	5	2	20-70
Newlang	3-6	4-10	1.35-1.65	6.0-20	0.06-0.18	3.5-6.0	Low	0.17			
	6-22	5-10	1.50-1.70	6.0-20	0.06-0.11	5.6-7.3	Low	0.15			
	22-63	3-5	1.50-1.70	6.0-20	0.05-0.10	5.6-7.3	Low	0.15			
OrA	0-8	10-18	1.20-1.30	0.6-2.0	0.22-0.24	5.6-7.8	Low	0.37	5	5	1-3
Orion	8-32	10-18	1.20-1.30	0.6-2.0	0.20-0.22	5.6-7.8	Low	0.37			
	32-40	10-30	1.25-1.45	0.6-2.0	0.18-0.22	5.6-7.8	Low	0.37			
	40-60	10-18	1.20-1.40	0.6-2.0	0.18-0.22	5.6-7.8	Low	0.37			
Pa	0-40	---	0.25-0.45	0.2-6.0	0.35-0.45	5.1-7.8		---	2	2	>75
Palms	40-60	7-35	1.45-1.75	0.2-2.0	0.14-0.22	6.1-8.4	Low	0.37			
Pt.											
Pits											
Pu	0-4	---	0.30-0.50	0.2-6.0	0.35-0.45	3.5-6.5		0.05	5	2	20-70
Ponycreek	4-6	4-8	1.35-1.65	>6.0	0.09-0.12	3.5-6.5	Low	0.15			
	6-29	4-8	1.50-1.70	>6.0	0.06-0.11	3.5-6.5	Low	0.15			
	29-64	3-5	1.50-1.70	>6.0	0.05-0.07	4.5-6.5	Low	0.15			
Pv:											
Ponycreek	0-6	---	0.30-0.50	0.2-6.0	0.35-0.45	3.5-6.5		0.05	5	2	20-70
	6-8	4-8	1.35-1.65	>6.0	0.09-0.12	3.5-6.5	Low	0.15			
	8-21	4-8	1.50-1.70	>6.0	0.06-0.11	3.5-6.5	Low	0.15			
	21-66	3-5	1.50-1.70	>6.0	0.05-0.07	4.5-6.5	Low	0.15			
Dawsil	0-20	---	0.20-0.35	0.6-6.0	0.45-0.55	3.6-4.4		---	2	5	65-85
	20-40	---	0.15-0.40	0.2-6.0	0.35-0.45	3.6-4.4		0.10			
	40-60	0-10	1.55-1.70	6.0-20	0.03-0.10	3.6-6.5	Low	0.15			
Pw	0-6	0-3	1.35-1.60	6.0-20	0.07-0.09	5.1-6.5	Low	0.02	5	8	1-10
Psammaquents	6-60	0-3	1.45-1.70	6.0-20	0.05-0.08	5.1-6.5	Low	0.15			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
RkA---	0-3	3-5	1.35-1.60	6.0-20	0.06-0.09	3.5-7.3	Low---	0.02	5	1	1-3
Rockdam	3-6	1-5	1.50-1.65	>6.0	0.05-0.08	3.5-7.3	Low---	0.15			
	6-19	1-5	1.50-1.65	>6.0	0.04-0.07	3.5-6.0	Low---	0.15			
	19-27	1-5	1.50-1.65	>6.0	0.04-0.07	3.5-6.5	Low---	0.15			
	27-61	1-5	1.50-1.65	>6.0	0.04-0.07	4.5-6.5	Low---	0.15			
RoA---	0-11	15-22	1.35-1.45	0.6-2.0	0.22-0.24	5.1-7.3	Low---	0.28	4	5	2-5
Rowley	11-38	20-27	1.35-1.65	0.6-2.0	0.18-0.22	5.1-7.3	Low---	0.43			
	38-50	10-20	1.55-1.65	0.6-2.0	0.12-0.16	5.1-7.3	Low---	0.43			
	50-60	1-4	1.55-1.65	6.0-20	0.05-0.07	5.6-7.3	Low---	0.15			
SeB---	0-9	10-22	1.10-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low---	0.43	5	5	1-3
Seaton	9-46	18-27	1.20-1.60	0.6-2.0	0.20-0.22	4.5-7.3	Low---	0.37			
	46-60	10-25	1.20-1.50	0.6-2.0	0.20-0.22	5.6-8.4	Low---	0.37			
SeC2---	0-9	15-22	1.10-1.20	0.6-2.0	0.22-0.24	5.6-7.3	Low---	0.49	5	5	1-3
Seaton	9-46	18-27	1.15-1.30	0.6-2.0	0.20-0.22	4.5-7.3	Low---	0.37			
	46-60	15-25	1.20-1.40	0.6-2.0	0.20-0.22	5.6-8.4	Low---	0.37			
SmB---	0-9	15-22	1.35-1.60	0.6-2.0	0.16-0.22	4.5-7.3	Low---	0.24	5	5	2-5
Sebbo	9-44	18-26	1.50-1.65	0.6-2.0	0.14-0.22	4.5-6.5	Low---	0.32			
	44-60	15-22	1.50-1.65	0.6-2.0	0.12-0.20	5.1-7.3	Low---	0.43			
SnA---	0-9	8-17	1.35-1.55	0.6-2.0	0.20-0.24	3.5-7.3	Low---	0.32	4	5	2-5
Sechler	9-12	8-17	1.40-1.65	0.6-2.0	0.12-0.18	3.5-5.5	Low---	0.28			
	12-16	8-17	1.40-1.65	0.6-2.0	0.08-0.16	3.5-5.5	Low---	0.24			
	16-22	6-15	1.40-1.65	0.6-2.0	0.06-0.12	3.5-5.5	Low---	0.17			
	22-27	2-6	1.45-1.65	2.0-6.0	0.05-0.10	3.5-5.5	Low---	0.17			
	27-60	1-4	1.55-1.70	6.0-20	0.05-0.07	4.5-6.0	Low---	0.15			
SoA---	0-9	12-20	1.35-1.55	0.6-2.0	0.20-0.24	4.5-7.3	Low---	0.32	4	5	2-5
Sooner	9-15	18-27	1.40-1.65	0.6-2.0	0.18-0.22	4.5-6.5	Moderate---	0.43			
	15-27	18-27	1.50-1.65	0.6-2.0	0.12-0.20	4.5-6.5	Moderate---	0.32			
	27-31	18-27	1.50-1.65	0.6-2.0	0.10-0.18	4.5-6.5	Moderate---	0.24			
	31-60	1-6	1.65-1.85	>6.0	0.03-0.07	5.1-6.5	Low---	0.15			
SpA---	0-16	1-5	1.30-1.50	6.0-20	0.06-0.09	5.1-7.3	Low---	0.02	5	1	1-2
Sparta	16-42	1-8	1.40-1.60	6.0-20	0.05-0.11	5.1-7.3	Low---	0.15			
	42-60	0-5	1.50-1.70	6.0-20	0.04-0.07	5.1-7.8	Low---	0.15			
TrB, TrC---	0-8	3-5	1.35-1.65	6.0-20	0.08-0.10	3.5-7.3	Low---	0.02	5	1	.5-2
Tarr	8-36	3-8	1.50-1.65	6.0-20	0.05-0.07	3.5-6.0	Low---	0.15			
	36-60	3-8	1.50-1.65	6.0-20	0.05-0.07	4.5-6.5	Low---	0.15			
TrF---	0-2	3-5	1.35-1.65	6.0-20	0.08-0.10	3.5-7.3	Low---	0.02	5	1	.5-2
Tarr	2-30	3-8	1.50-1.65	6.0-20	0.05-0.07	3.5-6.0	Low---	0.15			
	30-60	3-8	1.50-1.65	6.0-20	0.05-0.07	4.5-6.5	Low---	0.15			
TtA---	0-9	4-8	1.35-1.65	6.0-20	0.06-0.09	4.5-7.3	Low---	0.02	5	1	.5-2
Tint	9-29	0-5	1.45-1.65	6.0-20	0.05-0.08	4.5-6.0	Low---	0.15			
	29-60	0-5	1.50-1.70	6.0-20	0.04-0.07	5.1-6.5	Low---	0.15			
TuB---	0-8	5-10	1.35-1.65	6.0-20	0.07-0.09	4.5-7.3	Low---	0.02	5	1	.5-2
Tintson	8-46	0-5	1.45-1.65	6.0-20	0.05-0.08	4.5-6.0	Low---	0.15			
	46-60	3-20	1.50-1.70	0.6-2.0	0.13-0.22	4.5-6.0	Low---	0.32			
TwA---	0-17	15-22	1.35-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low---	0.28	4	5	3-7
Toddville	17-42	18-30	1.55-1.65	0.6-2.0	0.18-0.22	5.1-7.3	Moderate---	0.43			
	42-55	10-20	1.55-1.65	0.6-2.0	0.12-0.16	5.1-7.3	Low---	0.43			
	55-60	1-4	1.55-1.65	6.0-20	0.05-0.07	5.6-7.3	Low---	0.15			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
UdF----------	0-60	5-30	---	0.6-6.0	0.12-0.20	4.5-7.8	Low----------	0.32	5	3	0-1
Udorthents											
UfC2, UfD2-------	0-2	7-15	1.35-1.65	2.0-6.0	0.15-0.22	5.1-7.8	Low----------	0.32	3	3	.5-1
Urne	2-36	10-18	1.55-1.65	0.6-6.0	0.09-0.19	5.1-7.8	Low----------	0.37			
	36-60	---	---	0.06-2.0	---	---	----------	----			
UrF:											
Urne----------	0-2	7-15	1.35-1.65	2.0-6.0	0.15-0.22	5.1-7.8	Low----------	0.28	3	3	.5-2
	2-36	10-18	1.55-1.65	0.6-6.0	0.09-0.19	5.1-7.8	Low----------	0.37			
	36-60	---	---	0.06-2.0	---	---	----------	----			
Council---------	0-7	6-10	1.35-1.60	0.6-2.0	0.17-0.24	4.5-7.3	Low----------	0.32	5	5	1-2
	7-45	10-17	1.55-1.65	0.6-2.0	0.14-0.22	4.5-6.5	Low----------	0.32			
	45-60	6-17	1.55-1.65	0.6-2.0	0.12-0.20	5.1-7.3	Low----------	0.24			
Vs:											
Veedum----------	0-7	---	0.15-0.55	2.0-6.0	0.35-0.45	3.5-6.0	Low----------	0.37	3	2	20-50
	7-11	8-20	1.40-1.70	0.6-2.0	0.18-0.22	3.5-6.0	Low----------	0.43			
	11-21	18-30	1.40-1.70	0.6-2.0	0.18-0.22	3.5-6.0	Low----------	0.43			
	21-31	18-35	1.55-1.70	0.2-2.0	0.15-0.20	3.5-6.0	Moderate-----	0.37			
	31-67	---	---	0.00-0.6	---	---	----------	----			
Elm Lake--------	0-6	---	0.15-0.45	0.2-6.0	0.35-0.45	3.6-6.0	Low----------	0.10	3	2	50-80
	6-28	2-8	1.45-1.65	6.0-20	0.06-0.10	3.6-6.0	Low----------	0.15			
	28-38	10-35	1.45-1.70	0.2-2.0	0.10-0.19	3.6-5.5	Moderate-----	0.43			
	38-60	---	---	0.00-0.6	---	---	----------	----			
WmA----------	0-12	15-25	1.35-1.55	0.6-2.0	0.22-0.24	6.1-7.3	Low----------	0.32	4	5	3-4
Whitehall	12-28	24-32	1.55-1.65	0.6-2.0	0.18-0.22	4.5-6.0	Moderate-----	0.43			
	28-32	15-27	1.55-1.65	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.43			
	32-60	1-5	1.55-1.70	>6.0	0.05-0.10	4.5-5.5	Low----------	0.15			

Table 19.--Soil and Water Features

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Total subsidence	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness			Uncoated steel	Concrete
					Ft			In		In			
AbA---------- Absco	A	Occasional	Brief-----	Mar-Jun	3.5-6.0	Apparent	Nov-Jun	>60	---	---	Low------	Low------	Low.
AcA:													
Absco----------	A	Occasional	Brief-----	Mar-Jun	3.5-6.0	Apparent	Nov-Jun	>60	---	---	Low------	Low------	Low.
Northbend------	C	Frequent----	Brief-----	Mar-Jun	1.0-2.0	Apparent	Nov-May	>60	---	---	High-----	High-----	Moderate.
Ad---------- Adder	A/D	Frequent----	Long------	Oct-Jun	+1-1.0	Apparent	Sep-Jun	>60	---	29-33	High-----	High-----	Moderate.
ArA---------- Arenzville	B	Occasional	Brief-----	Nov-Jun	3.5-6.0	Perched	Oct-May	>60	---	---	High-----	Moderate	Moderate.
BeB---------- Bertrand	B	None--------	---	---	>6.0	---	---	>60	---	---	High-----	Low------	Moderate.
BkA---------- Bilmod	B	None--------	---	---	3.5-6.0	Apparent	Oct-May	>60	---	---	Moderate	Low------	Moderate.
BlB---------- Bilson	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Low------	Moderate.
BnB:													
Bilson---------	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Low------	Moderate.
Silverhill-----	B	None--------	---	---	>6.0	---	---	40-60	Soft	---	Moderate	Low------	Moderate.
BnC2, BnD2:													
Bilson---------	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Low------	Moderate.
Elevasil-------	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	Moderate	Low------	Moderate.
BoB, BoC, BoF--- Boone	A	None--------	---	---	>6.0	---	---	20-40	Soft	---	Low------	Low------	Moderate.
BpF:													
Boone----------	A	None--------	---	---	>6.0	---	---	20-40	Soft	---	Low------	Low------	Moderate.
Elevasil-------	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	Moderate	Low------	Moderate.
Cd---------- Citypoint	A/D	None--------	---	---	+1-1.0	Perched	Oct-Jun	20-51	Soft	---	High-----	High-----	High.

Table 19.--Soil and Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Total subsidence	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness			Uncoated steel	Concrete
					Ft			In		In			
CfA---------- Coffton	B	Occasional	Brief-----	Mar-May	1.0-2.0	Apparent	Nov-May	>60	---	---	High-----	High-----	Moderate.
CoC2---------- Council	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Low------	Moderate.
CpC2, CpD2:													
Council--------	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Low------	Moderate.
Bilson---------	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Low------	Moderate.
CsD2, CsE:													
Council--------	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Low------	Moderate.
Seaton---------	B	None--------	---	---	>6.0	---	---	>60	---	---	High-----	Low------	Moderate.
Da---------- Dawsil	A/D	None--------	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	30-36	High-----	High-----	High.
DuA---------- Dunnville	B	None--------	---	---	>6.0	---	---	>60	---	---	Low------	Moderate	Moderate.
ElB, ElC2, ElD2- Elevasil	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	Moderate	Low------	Moderate.
Eo---------- Elm Lake	A/D	None--------	---	---	+1-1.0	Perched	Oct-Jun	20-40	Soft	---	Moderate	High-----	High.
Et---------- Ettrick	B/D	Frequent----	Brief or long.	Nov-May	+1-1.0	Apparent	Nov-Jun	>60	---	---	High-----	High-----	Low.
FaA---------- Fairchild	C	None--------	---	---	1.0-2.0	Perched	Oct-Jun	20-40	Soft	---	Moderate	High-----	High.
FeA:													
Fairchild------	C	None--------	---	---	1.0-2.0	Perched	Oct-Jun	20-40	Soft	---	Moderate	High-----	High.
Elm Lake-------	A/D	None--------	---	---	+1-1.0	Perched	Oct-Jun	20-40	Soft	---	Moderate	High-----	High.
GaC2, GaD2------ Gale	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	High-----	Moderate	Moderate.
GoB, GoC-------- Gosil	A	None--------	---	---	>6.0	---	---	>60	---	---	Low------	Low------	High.
HkB:													
Hiles----------	B	None--------	---	---	1.5-3.0	Perched	Oct-May	20-40	Soft	---	Moderate	Moderate	High.
Kert-----------	C	None--------	---	---	1.0-2.5	Perched	Oct-May	20-40	Soft	---	High-----	High-----	High.

Table 19.--Soil and Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Total subsidence	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness			Uncoated steel	Concrete
					Ft			In		In			
HnB, HnC2, HnD2- Hixton	B	None	---	---	>6.0	---	---	20-40	Soft	---	Moderate	Low	Moderate.
HpA Hoop	B	None	---	---	1.0-2.0	Apparent	Nov-May	>60	---	---	Moderate	Low	Moderate.
Ht Houghton	A/D	Frequent	Long	Oct-May	+1-1.0	Apparent	Sep-Jun	>60	---	55-60	High	High	Low.
HuB Humbird	B	None	---	---	1.5-3.0	Perched	Oct-May	24-40	Soft	---	Moderate	High	High.
HxB:													
Humbird	B	None	---	---	1.5-3.0	Perched	Oct-May	24-40	Soft	---	Moderate	High	High.
Merrillan	C	None	---	---	1.0-2.0	Perched	Sep-Jun	20-40	Soft	---	High	High	High.
ImA Impact	A	None	---	---	>6.0	---	---	>60	---	---	Low	Low	High.
IrA Ironrun	B	None	---	---	1.0-2.0	Apparent	Nov-Jun	>60	---	---	Moderate	Low	High.
IxA:													
Ironrun	B	None	---	---	1.0-2.0	Apparent	Nov-Jun	>60	---	---	Moderate	Low	High.
Ponycreek	A/D	None	---	---	+1-1.0	Apparent	Oct-Jun	>60	---	---	Moderate	High	High.
IzB:													
Ironrun	B	None	---	---	1.0-2.0	Apparent	Nov-Jun	>60	---	---	Moderate	Low	High.
Ponycreek	A/D	None	---	---	+1-1.0	Apparent	Oct-Jun	>60	---	---	Moderate	High	High.
Arbutus	A	None	---	---	>6.0	---	---	20-40	Hard	---	Low	Low	High.
JaA, JaB Jackson	B	None	---	---	3.5-6.0	Apparent	Nov-Apr	>60	---	---	High	Moderate	Moderate.
Ka Kalmarville	B/D	Frequent	Brief	Mar-Jun	0-1.0	Apparent	Nov-Aug	>60	---	---	High	Moderate	Low.
KeA Kert	C	None	---	---	1.0-2.5	Perched	Oct-May	20-40	Soft	---	High	High	High.
LfC2, LfD2 La Farge	B	None	---	---	>6.0	---	---	24-40	Soft	---	High	Moderate	Moderate.
LsD2:													
La Farge	B	None	---	---	>6.0	---	---	24-40	Soft	---	High	Moderate	Moderate.

Table 19.--Soil and Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Total subsidence	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness			Uncoated steel	Concrete
					Ft			In		In			
LsD2:													
Seaton	B	None	---	---	>6.0	---	---	>60	---	---	High	Low	Moderate.
Lt Loxley	A/D	None	---	---	+1-1.0	Apparent	Oct-May	>60	---	50-55	High	High	High.
LuB Ludington	B	None	---	---	1.5-3.5	Perched	Oct-May	20-40	Soft	---	Low	Moderate	High.
LxB:													
Ludington	B	None	---	---	1.5-3.5	Perched	Oct-May	20-40	Soft	---	Low	Moderate	High.
Fairchild	C	None	---	---	1.0-2.0	Perched	Oct-Jun	20-40	Soft	---	Moderate	High	High.
MaB Mahtomedi	A	None	---	---	>6.0	---	---	>60	---	---	Low	Low	High.
MbA Majik	B	None	---	---	1.0-2.5	Apparent	Oct-Jun	>60	---	---	Moderate	Low	High.
MmA Merimod	B	None	---	---	3.5-6.0	Apparent	Oct-May	>60	---	---	Moderate	Low	Moderate.
MnB Merit	B	None	---	---	>6.0	---	---	>60	---	---	Moderate	Low	Moderate.
MoB:													
Merit	B	None	---	---	>6.0	---	---	>60	---	---	Moderate	Low	Moderate.
Gardenvale	B	None	---	---	>6.0	---	---	40-60	Soft	---	Moderate	Low	Moderate.
MpA Merrillan	C	None	---	---	1.0-2.0	Perched	Sep-Jun	20-40	Soft	---	High	High	High.
MrA:													
Merrillan	C	None	---	---	1.0-2.0	Perched	Sep-Jun	20-40	Soft	---	High	High	High.
Veedum	D	None	---	---	+1-1.0	Perched	Sep-Jun	20-40	Soft	---	High	High	High.
MxA:													
Moppet	B	Occasional	Very brief	Sep-Jun	2.5-3.5	Apparent	Sep-Jun	>60	---	---	Moderate	Moderate	Moderate.
Fordum	D	Frequent	Long	Mar-Jun	+1-1.0	Apparent	Jan-Dec	>60	---	---	High	High	High.
Ne Newlang	A/D	Occasional	Brief	Mar-Jun	+1-1.0	Apparent	Oct-Jun	>60	---	---	Moderate	High	High.
OrA Orion	C	Occasional	Brief	Mar-Nov	1.0-2.5	Apparent	Nov-May	>60	---	---	High	High	Low.

Table 19.--Soil and Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Total subsidence	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness			Uncoated steel	Concrete
					Ft			In		In			
Pa---------- Palms	A/D	Frequent----	Long------	Oct-Jun	+1-1.0	Apparent	Nov-May	>60	---	25-32	High-----	High-----	Moderate.
Pt. Pits													
Pu---------- Ponycreek	A/D	None--------	---	---	+1-1.0	Apparent	Oct-Jun	>60	---	---	Moderate	High-----	High.
Pv:													
Ponycreek------	A/D	None--------	---	---	+1-1.0	Apparent	Oct-Jun	>60	---	---	Moderate	High-----	High.
Dawsil---------	A/D	None--------	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	30-36	High-----	High-----	High.
Pw---------- Psammaquents	D	Frequent----	Brief-----	Jan-Dec	+1-1.0	Apparent	Jan-Dec	>60	---	---	Moderate	Moderate	Moderate.
RkA---------- Rockdam	A	None--------	---	---	3.5-6.0	Apparent	Nov-May	>60	---	---	Low------	Low------	High.
RoA---------- Rowley	C	None--------	---	---	1.0-2.0	Apparent	Nov-May	>60	---	---	High-----	High-----	Moderate.
SeB, SeC2------- Seaton	B	None--------	---	---	>6.0	---	---	>60	---	---	High-----	Low------	Moderate.
SmB---------- Sebbo	B	None--------	---	---	3.5-6.0	Perched	Oct-May	>60	---	---	Moderate	Low------	Moderate.
SnA---------- Sechler	B	Occasional	Brief-----	Mar-Jun	1.0-2.0	Apparent	Oct-Jun	>60	---	---	High-----	High-----	High.
SoA---------- Sooner	B	None--------	---	---	1.0-2.0	Apparent	Nov-May	>60	---	---	High-----	Moderate	Moderate.
SpA---------- Sparta	A	None--------	---	---	>6.0	---	---	>60	---	---	Low------	Low------	Moderate.
TrB, TrC, TrF--- Tarr	A	None--------	---	---	>6.0	---	---	>60	---	---	Low------	Low------	High.
TtA---------- Tint	A	None--------	---	---	3.5-6.0	Apparent	Oct-Jun	>60	---	---	Low------	Low------	High.
TuB---------- Tintson	A	None--------	---	---	2.5-3.5	Perched	Oct-Jun	>60	---	---	Low------	Low------	High.
TwA---------- Toddville	B	None--------	---	---	3.5-6.0	Apparent	Nov-Apr	>60	---	---	High-----	Moderate	Moderate.

Table 19.--Soil and Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Total subsidence	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness			Uncoated steel	Concrete
					Ft			In		In			
UdF---------- Udorthents	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate	Moderate.
UfC2, UfD2------ Urne	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	Moderate	Low------	Moderate.
UrF:													
Urne----------	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	Moderate	Low------	Moderate.
Council--------	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Low------	Moderate.
Vs:													
Veedum---------	D	None--------	---	---	+1-1.0	Perched	Sep-Jun	20-40	Soft	---	High-----	High-----	High.
Elm Lake-------	A/D	None--------	---	---	+1-1.0	Perched	Oct-Jun	20-40	Soft	---	Moderate	High-----	High.
WmA---------- Whitehall	B	Rare--------	---	---	3.5-6.0	Apparent	Nov-Apr	>60	---	---	High-----	Moderate	High.

Table 20.--Engineering Index Test Data

(Dashes indicate that data were not available. LL means liquid limit; PI, plasticity index; UN, Unified; and NP, nonplastic)

Soil name and location	Parent material	Report number	Horizon	Depth	Percentage passing sieve*--				Percentage smaller than*--				LL	PI	Classification	
					No. 4	No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm			AASHTO	UN
				In									Pct			
Council loam: NE1/4SE1/4 sec. 6, T. 19 N., R. 6 W.	Loamy colluvium.	S84WI-053-3-1	Bt1, Bt2	7-22	100	100	88	57	53	35	18	13	22.6	4.6	A-4(4)	CL-ML
		3-2	C	38-60	100	100	84	38	33	20	10	7	---	NP	A-4(1)	SM
Dunnville sandy loam: SW1/4NW1/4 sec. 31, T. 20 N., R. 4 W.	Loamy alluvium over sandy alluvium.	S85WI-053-1-1	Bw	16-24	100	100	70	37	36	28	15	11	25.7	8.5	A-4(0)	SC
		1-2	2C	27-60	100	100	79	1	1	1	1	1	---	NP	A-3(0)	SP
Elevasil sandy loam: NE1/4NW1/4 sec. 2, T. 23 N., R. 5 W.	Loamy colluvium and siliceous sandy residuum.	S85WI-053-6-1	Bt2	19-26	100	100	90	53	50	39	19	14	21.9	5.7	A-4(4)	CL-ML
Elm Lake muck: NE1/4SE1/4 sec. 14, T. 23 N., R. 4 W.	Siliceous sandy alluvium over loamy residuum.	S87WI-053-4-1	Cg2	15-28	100	100	90	25	19	12	7	4	---	NP	A-2-4(0)	SM
		4-2	2Cg3	28-38	100	100	99	66	60	48	38	32	41.8	22.0	A-7-6(11)	CL
Seaton silt loam: SW1/4NW1/4 sec. 18, T. 19 N., R. 5 W.	Loess---	S84WI-053-1-1	Bt1, Bt2	9-24	100	100	100	99	94	62	33	26	43.8	20.2	A-7-6(13)	CL
		1-2	C	42-60	100	100	100	98	92	55	28	23	37.2	13.7	A-6(9)	CL
Seaton silt loam: NW1/4SW1/4 sec. 19, T. 19 N., R. 5 W.	Loess---	S84WI-053-2-1	Bt1, Bt2	8-26	100	100	100	97	92	60	31	26	39.6	16.0	A-6(10)	CL
		2-2	C	36-60	100	100	100	99	93	57	28	22	38.0	14.4	A-6(10)	CL
Tarr sand: NE1/4SW1/4 sec. 24, T. 22 N., R. 3 W.	Siliceous sandy residuum derived from sandstone.	S90WI-053-8-2	Bw1	4-9	100	100	66	7	7	7	5	4	---	NP	A-3(0)	SP-SM
		8-5	C	27-60	100	100	73	1	1	1	1	1	---	NP	A-3(0)	SP

See footnote at end of table.

Table 20.--Engineering Index Test Data--Continued

Soil name and location	Parent material	Report number	Horizon	Depth	Percentage passing sieve*--				Percentage smaller than*--				LL	PI	Classification	
					No. 4	No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm			AASHTO	UN
				In									Pct			
Whitehall silt loam: NE1/4SE1/4 sec. 36, T. 20 N., R. 5 W.	Silty alluvium over siliceous sandy alluvium.	S85WI-053-3-1	Bt1, Bt2	11-26	100	100	97	83	78	54	29	23	38.5	12.9	A-6(9)	ML

* Mechanical analysis according to the AASHTO Designation T88-57 (AASHTO, 1986). Results from this procedure can differ somewhat from the results obtained by the soil survey procedure of the Natural Resources Conservation Service. In the AASHTO procedure, the fine material is analyzed by hydrometer method and the various grain-size fractions are calculated on the basis of all material up to and including that 3 inches in diameter. In the NRCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from the calculation of grain-size fraction. The mechanical analysis data used in this table are not suitable for use in naming soil textural classes.

Table 21.--Classification of the Soils

Soil name	Family or higher taxonomic class
Absco	Sandy, siliceous, mesic Typic Udifluvents
Adder	Sandy or sandy-skeletal, siliceous, euic, mesic Terric Medisaprists
Arbutus	Sandy, siliceous, frigid Entic Haplorthods
Arenzville	Coarse-silty, mixed, nonacid, mesic Typic Udifluvents
Bertrand	Fine-silty, mixed, mesic Typic Hapludalfs
Bilmod	Coarse-loamy, siliceous, mesic Mollic Hapludalfs
Bilson	Coarse-loamy, siliceous, mesic Mollic Hapludalfs
Boone	Mesic, uncoated Typic Quartzipsamments
Citypoint	Dysic Typic Borosaprists
Coffton	Coarse-silty, mixed, mesic Fluvaquentic Hapludolls
Council	Coarse-loamy, mixed, mesic Typic Hapludalfs
Dawsil	Sandy or sandy-skeletal, siliceous, dysic Terric Borosaprists
Dunnville	Coarse-loamy, mixed Udic Haploborolls
Elevasil	Coarse-loamy, siliceous, mesic Ultic Hapludalfs
Elm Lake	Sandy over loamy, siliceous, acid, frigid Humaqueptic Epiaquents
Ettrick	Fine-silty, mixed, mesic Fluvaquentic Haplaquolls
Fairchild	Sandy over loamy, siliceous, frigid Ultic Epiaquods
Fordum	Coarse-loamy, mixed, nonacid, frigid Mollic Fluvaquents
Gale	Fine-silty over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
Gardenvale	Fine-loamy over sandy or sandy-skeletal, siliceous, mesic Mollic Hapludalfs
Gosil	Mesic, coated Typic Quartzipsamments
Hiles	Fine-loamy, mixed Typic Glossoboralfs
Hixton	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
Hoop	Coarse-loamy, siliceous, mesic Aquic Argiudolls
Houghton	Euic, mesic Typic Medisaprists
Humbird	Coarse-loamy over clayey, mixed, frigid Alfic Haplorthods
Impact	Sandy, siliceous, mesic Quartzipsammentic Haplumbrepts
Ironrun	Sandy, siliceous, frigid Aquic Haplorthods
Jackson	Fine-silty, mixed, mesic Typic Hapludalfs
Kalmarville	Coarse-loamy, mixed, nonacid, mesic Mollic Fluvaquents
Kert	Fine-loamy, mixed Aquic Glossoboralfs
La Farge	Fine-silty, mixed, mesic Typic Hapludalfs
Loxley	Dysic Typic Borosaprists
Ludington	Sandy over loamy, siliceous, frigid Oxyaquic Haplorthods
Mahtomedi	Mixed, frigid Typic Udipsamments
Majik	Mesic, coated Aquic Quartzipsamments
Merimod	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Mollic Hapludalfs
Merit	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Mollic Hapludalfs
Merrillan	Coarse-loamy over clayey, mixed, frigid Aqualfic Haplorthods
Moppet	Coarse-loamy, mixed, frigid Oxyaquic Dystrochrepts
Newlang	Siliceous, mesic Humaqueptic Psammaquents
Northbend	Coarse-loamy over sandy or sandy-skeletal, mixed, mesic Fluvaquentic Dystrochrepts
Orion	Coarse-silty, mixed, nonacid, mesic Aquic Udifluvents
Palms	Loamy, mixed, euic, mesic Terric Medisaprists
Ponycreek	Siliceous, frigid Humaqueptic Psammaquents
Psammaquents	Psammaquents
Rockdam	Frigid, coated Typic Quartzipsamments
Rowley	Fine-silty, mixed, mesic Aquic Argiudolls
Seaton	Fine-silty, mixed, mesic Typic Hapludalfs
Sebbo	Fine-loamy, mixed, mesic Mollic Hapludalfs
Sechler	Coarse-loamy, siliceous, mesic Aquic Haplumbrepts
Silverhill	Coarse-loamy, siliceous, mesic Ultic Hapludalfs
Sooner	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Aquollic Hapludalfs
Sparta	Sandy, mixed, mesic Entic Hapludolls
Tarr	Mesic, uncoated Typic Quartzipsamments
Tint	Mesic, uncoated Typic Quartzipsamments
Tintson	Mesic, uncoated Oxyaquic Quartzipsamments
Toddville	Fine-silty, mixed, mesic Typic Argiudolls
Udorthents	Udorthents
Urne	Coarse-loamy, mixed, mesic Dystric Eutrochrepts
Veedum	Fine-loamy over sandy or sandy-skeletal, mixed, acid, frigid Typic Humaquepts
Whitehall	Fine-silty over sandy or sandy-skeletal, mixed, mesic Typic Argiudolls