SECTION 2 – NATURAL RESOURCES INFORMATION

1. Soils

Soil Interpretations

Nonagricultural Interpretations

General

The purpose of these interpretative ratings is to help engineers, planners, and others understand how soil properties influence behavior when used for nonagricultural uses such as building site development or construction materials. Soils are rated for the uses expected to be important or potentially important to users of soil survey information. Ratings for proposed uses are given in terms of limitations and restrictive features; suitability and restrictive features; or only restrictive features. Only the most restrictive features are listed. Other features may need to be treated to overcome soil limitations for a specific purpose.

Soils are rated in their "natural" state, that is, no unusual modification of the soil site or material is made other than that which is considered normal practice for the rated use. Even though soils may have limitations, it is important to remember that engineers and others can modify soil features or can design or adjust the plans for a structure to compensate for most degrees of limitations. Most of these practices, however are costly. The final decision in selecting a site for a particular use generally involves weighing the costs for site preparation and maintenance.

Building Site Development

(See Part 620 – National Soil Survey Handbook - Soil Interpretations Rating Guides)

The soil interpretations for building site development are designed to be used as a tool in evaluating soil suitability and identifying soil limitations for various construction purposes. As part of the interpretation process, the rating applies to each soil in its present condition and does not consider present land use. The limitation rating provided is based on the influence of existing soil properties for that use.

The soil feature(s) is identified for its affects on structure design and construction techniques to be used. These soil feature(s) also determines the performance to be expected after construction and the kind and degree of future maintenance required. Minor soil features are not identified or considered as part of the initial rating process but could be important factors where the major soil feature restrictions are overcome through design application.

Use of the soil interpretation rating guides in the planning and evaluation process allow the user to identify and recommend site selection and to plan alternative measures that minimize impacts on the soil resource.

Dwellings without Basements

If soil properties within 150 cm (60 in) of the surface of the soil are limitations for buildings without basements than buildings without basements have construction and performance limitations.

Dwellings without basements are single-family houses of three stories or less without basements. The foundation is assumed to be spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper.

Rating criteria are based on soil properties and qualities affecting the capacity of soil to support a load without movement and on those that affect excavation and construction costs. The properties and qualities affecting load-supporting capacity without movement are the presence of a high water table, flooding, and the shrink-swell behavior and compressibility of the soils. Compressibility is inferred from the Unified classification. Properties influencing the ease and amount of excavation are a seasonal high water table, slope, depth to bedrock or to a cemented pan, and the amount and size of rock fragments.

Dwellings With Basements

If soil properties within 150 cm (60 in) of the surface of the soil are limitations for dwellings with basements than excavation have construction and performance limitations.

Dwellings with basements are single-family houses of three stories or less with basements. The foundation is assumed to be spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet.

The ratings are based on properties and qualities that affect the capacity of a soil to bear a load without movement and those that affect excavation and construction costs. The properties affecting load supporting capacity without movement are presence of a seasonal high water table, flooding, and the shrink-swell behavior and compressibility of the soils. Compressibility is inferred from the Unifiedclassification. Properties influencing the ease and amount of excavation are flooding, a high water table, slope, depth to bedrock or to a cemented pan, and the amount and size of coarse fragments.

Lawn, Landscape, Golf Fairway

If soil properties within 150 cm (60 in) of the surface of the soil are limitations for shallow excavations than shallow excavation have construction and performance limitations.

The soils are rated for their use in establishing and maintaining turf for lawns and golf fairways and ornamental trees and shrubs for residential or commercial landscaping. The ratings are based on the use of soil material at the location that may have some land smoothing. Irrigation may or may not be needed and is not a criterion in rating. Traps, trees, roughs, and greens are not considered as part of the golf fairway. The soil properties and qualities considered in rating soils for lawns, landscaping, and golf fairways include those that affect growth and trafficability after vegetation is established. They are shown in Table 620-6. The properties that affect plant growth are the content of salt, sodium, or calcium carbonate; sulfidic materials; soil reaction; depth to the water table; depth to bedrock or a cemented pan; and the available water capacity in the upper 40 inches of soil. The properties that affect trafficability after vegetation is established

are flooding, wetness, slope, stoniness, and the amount of clay, sand, or organic matter in the surface layer.

Local Roads and Streets

If soil properties within 150 cm (60 in) of the surface of the soil are limitations for shallow excavations than shallow excavation have construction and performance limitations.

Local roads and streets are those roads and streets that have all-weather surfacing (commonly of asphalt or concrete) and that are expected to carry automobile traffic year-round. The roads and streets consist of (1) the underlying local soil material, either cut or fill, which is called "the subgrade"; (2) the base material, which may be lime-stabilized soil, cement-stabilized soil, gravel, or crushed rock; and (3) the actual road surface or street pavement, which is either flexible (asphalt), rigid (concrete), or gravel with binder in it. They are graded to shed water, and conventional drainage measures are provided. With the probable exception of the hard surface, roads and streets ar

The properties and qualities that affect local roads and streets are those that influence the ease of excavation and grading and the traffic-supporting capacity. The properties and qualities that affect the ease of excavation and grading are hardness of bedrock or a cemented pan, depth to bedrock or a cemented pan, depth to a water table, flooding, the amount of large stones, and slope. The properties that affect traffic-supporting capacity are soil strength as inferred from the AASHTO group index and the Unified classification, subsidence, shrink-swell behavior, potential frost action, and depth to the seasonal high water table.

Shallow Excavations

If soil properties within 150 cm (60 in) of the surface of the soil are limitations for shallow excavations than shallow excavation have construction and performance limitations.

Shallow excavations are trenches or holes dug in the soil to a maximum depth of 5 or 6 feet. They are used for pipelines, sewer lines, telephone and power transmission lines, basements, open ditches, grave sites, etc. The excavations are most commonly made by trenching machines or backhoes.

The ratings are based on the soil properties that influence ease of digging and resistance to sloughing. Depth to bedrock or cemented pan, hardness of bedrock or a cemented pan, and the amount of large stones influence the ease of digging, filling, and compacting. Depth to the seasonal high water table and flooding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture and depth to water table influence the resistance to sloughing.

Small Commercial Buildings

If soil properties within 150 cm (60 in) of the surface of the soil are limitations for buildings without basements than buildings without basements have construction and performance limitations.

Small commercial buildings are those buildings that are less than three stories without basements. The foundation is assumed to be spread footings of reinforced concrete at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper.

The ratings are based on properties and qualities affecting the capacity of the soil to support a load without movement and those that affect excavation and construction costs. The properties

and qualities affecting load-supporting capacity without movement are presence of a high water table, flooding, and the shrink-swell behavior and compressibility of the soils. Compressibility is inferred from the Unified classification. Properties influencing the ease and amount of excavation are flooding, a high water table, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan.

These reports are available on the Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/) under *Building Site Development.*

Construction Materials

(See Part 620 – National Soil Survey Handbook - Soil Interpretations Rating Guides)

Soil survey interpretations for construction materials are made to provide guidance to users in selecting the site of a potential source. Individual soils or groups of soils may be selected as potential source materials because their source is close at hand, is the only source available, or meets some or all of the physical or chemical properties required for the intended application. In theory every soil may be used as source materials, but in reality only a few soils have the profile characteristics that meet the defined criteria and performance requirements when rated for a specific propose. The use of rating guides can provide the user a means to select potential sites for further evaluation.

As a part of the soil survey process, each soil is rated in its present condition. Suitability ratings and associated restrictive features are given for roadfill, topsoil, and soil reconstruction material. Ratings of probable and improbable sources of material are given for sand and gravel. The ratings do not consider the quality of the source material because quality depends on how the source material is to be used. Final site evaluation and site selection require an onsite inspection to determine the suitability of the materials for the intended purpose. Implementation of these interpretations helps to minimize the need for excessive random exploratory investigation by pinpointing potential sites.

Soil interpretations for construction material have a potential for broader application by the user than the name implies. The use of these interpretations in planning may include various needs directed towards urban and rural development. The interpretations may apply to farm and ranch operations; stockpiling materials for borrow pits and new mine reclamation; source material used to rehabilitate areas of soil disturbance; thin layer cover material for parking areas, roads, trails etc.; and other uses. Where the present headings for the interpretations do not meet desired application in the local area, the user may request a change to the headings. Caution should be exercised to ensure that the proposed changes are within the original intent of the original interpretation guides.

Soils are rated as sources for roadfill, topsoil, sand, gravel, and soil reconstruction material used for drastically disturbed areas. Suitability ratings of good, fair, or poor and restrictive features are given for soils used as a source of roadfill and topsoil. Ratings of probable and improbable are given for soils used as a source of sand and gravel. A rating of probable means that, on the basis of the available evidence, the source material is likely to be in or below the soil. A rating of improbable means that the source material is unlikely to be in or below the soil. The ratings do not consider the quality of the source material because quality depends on how the source material is to be used.

Topsoil, Roadfill, and Reclamation Material Source

This table gives information about the soils as potential sources of topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.The soils are rated good, fair, or poor as potential sources of topsoil, reclamation material, and roadfill. The features that limit the soils as sources of these materials are specified in the table. Numerical ratings between 0.00 and 1.00 are given after the specified features. These numbers indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

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. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material. 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.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content

of rock fragments; and content of organic matter and other features that affect fertility.

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 whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread. The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a 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 AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Sand and Gravel source

This table gives information about the soils as potential sources of gravel and sand. Normal compaction, minor processing, and other standard construction practices are assumed. 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. Only the likelihood 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 Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness. The ratings are for the whole soil, from the surface to a depth of about 6 feet. The soils are rated good, fair, or poor as potential sources of sand and gravel. A rating of good or fair means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

These reports are available on the Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/) under *Construction Materials.*