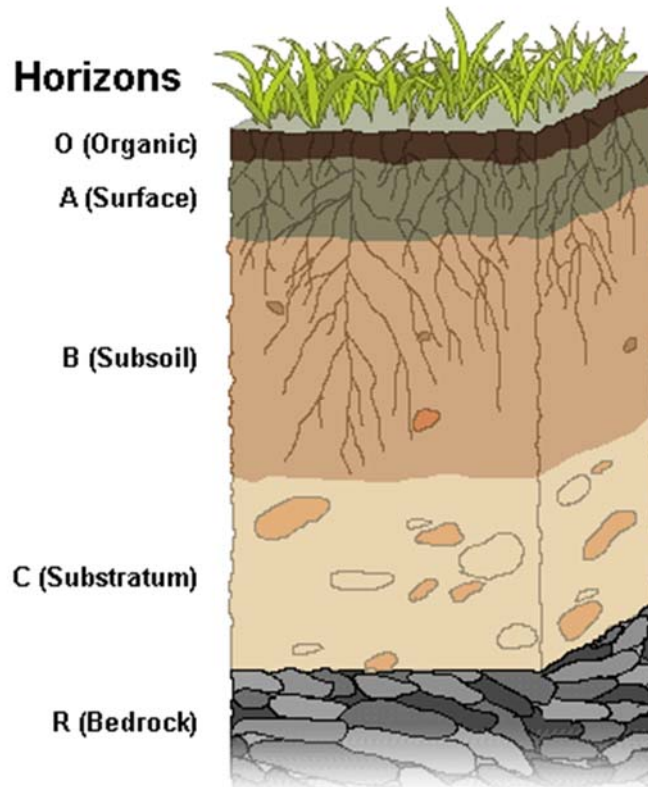




Subsurface conditions at any one location display a distinct layering with depth, which is referred to as the soil profile. This layering is the result of changes to some portion of the upper layer of the soil mass caused by time, water, climate, flooding, aeolian (wind) deposits, and organic deposition. Soil scientists have developed detailed descriptions and nomenclatures to distinguish these various layers. While studying and understanding this system may be beneficial, a more generalized approach to the soil profile may be more suitable for engineering purposes. [Figure 1](#) presents this generalized profile which includes the following divisions called horizons:

Figure 1 – Soil Horizons



**“O” Horizon:** This is a soil layer that must have at least 20% organic matter by mass. Two main scenarios result in the formation of an O horizon: saturated anaerobic conditions (wetland) or high production of leaf litter in a forested area. Organic soils are discussed further in [Geotech Chapter 4](#).

**“A” Horizon:** This is the uppermost mineral layer of the soil profile and is commonly called topsoil. It has a relatively high organic content, normally ranging from about 4% to 15%. Owing to its position on the surface, it is the most heavily weathered horizon of the soil profile. Its color can range from light brown to black depending on the amount and origin of the organic content. An “A” horizon developed in leaf litter in a forest setting will tend to be browner in color while a grass or sedge environment produces a black colored horizon. Also, a colder climate will produce a thinner “A” horizon than one developed under warmer conditions. The depth of this horizon can vary from as little as 3 inches in a cool forest environment in the north part of the state, to as much as 24 inches in a rich prairie environment in the southeastern or southern areas of the state.

**“B” Horizon:** This horizon lies directly under the “A” horizon, and is the material that weathers to form the “A” horizon. It is commonly called the subsoil. The “B” horizon shows significant weathering of the soil particles along with significant accumulation of iron and other minerals due to leaching. This horizon often displays a distinct reddish or reddish brown coloration due to oxidation of the accumulated iron minerals. The degree of weathering is dependent on age and climate, with older soils in a warmer environment showing more weathering than younger soils in cooler conditions. The “B” horizon can range in thickness from more than 48 inches in some loess soils in the southwest part of the state, to being non-existent in some sandy outwash soils of the central and northern areas.

“C” Horizon: This horizon contains the parent material from which the “A” and “B” horizons have formed. There is little or no evidence of weathering or other alteration of the soil particles. As a result, this horizon normally displays a lighter color than that of the overlying horizons. In some glacial till soils or glacial outwash soils, the “C” horizon may be many feet thick while in shallow bedrock conditions it may be absent.

“D” Horizon: This horizon may be present in the soil profile, but it represents an underlying material that did not contribute to the development of the overlying soil horizons. It usually is a material of a different origin that was covered by deposition of younger materials. Examples include materials weathered from limestone or sandstone overlain by loess silts, outwash soils covered by loess or fluvial silts, older alluvial soils covered by younger alluvial deposits, and older till material overlain by younger till of differing texture.