



Organic soils can be divided into the following groups:

4-2.1 Peat

Peat is by far the most common and the most widespread organic soil in Wisconsin. Peat is composed primarily of the partially decomposed remains of wetland plants along with lesser amounts of mineral material. It can be olive green to black in color in its natural state, and often exhibits an odorous smell. Depending on the state of decomposition and/or preservation of the organic material, peat can vary from an amorphous mass with little or no recognizable plant material to a coarse matrix of readily identifiable remains of aquatic plants, sedges, woody plants, and wetland trees. Peat can be divided into subcategories based on the type of plant material present and the degree of decomposition.

NRCS divides Wisconsin peats and peat soils into the three classes of sapric, hemic, and fibric, based on the decomposition state of the plant remains. Sapric materials are the most decomposed and are defined as having less than 1/6 of the total organic content identifiable as plant fiber after rubbing with ones fingers. Fibric materials are defined as those having 3/4 or more identifiable plant remains after rubbing. Hemic materials are those that do not meet the requirements as either sapric or fibric material. While this system needs to be understood to obtain the full benefit of NRCS mapping of organic soils, it is common in engineering practice to use a more visual identification system.

Engineering texts generally categorize peat into three types: sedimentary, fibrous, or woody, as described below.

4-2.1.1 Sedimentary Peat

Sedimentary peat has a fine textured matrix of olive green to gray color with little to no identifiable plant remains. As the name suggests, sedimentary peat consists of reworked organic material eroded from adjacent wetlands deposited along with some mineral material in lakes or deeper ponds. The organic content of the material varies but it often exceeds 50% by weight. Since this is a sedimentary material, lenses or thin layers of sand, silt, or clay are often found in the matrix. Sedimentary peat is soft, spongy and somewhat gelatinous in its natural wet state. It normally has a Liquid Limit in the range of 100 to 400, and moisture content often above the Liquid Limit. It also has low shear strength and high consolidation potential. Sedimentary peat deposits can reach depths of more than 40 feet. It is usually found as an underlying layer covered by fibrous peat in marsh-filled basins. Occasionally it will be found as a bottom deposit in ponds or shallow lakes. When encountered, its properties create significant problems for the construction of transportation facilities.

4-2.1.2 Fibrous Peat

Fibrous peat is dark brown to black in color and is composed of the remains of aquatic, semi-aquatic, and shore line emergent plant growth. Some amount of visually identifiable plant remains including stems, leaves, seeds, roots, and twigs are found in this material. The type of vegetation, and the degree of preservation, impact the amount of the visually identifiable material in the matrix. This may vary from a small amount of material to what appears as a thick mat of preserved material. Fibrous peat is formed as a shoreline deposit in ponds, lakes, and wet basins. As aquatic and semi-aquatic plants begin to colonize the shallows along the shorelines, the yearly cycle of growth and die-back produces a constant source of plant remains that sink to the bottom. Since these plant remains are covered by water, the normal process of decay and destruction resulting from oxidation, aerobic bacteria, and animal disturbance does not occur. Although some amount of decomposition by anaerobic bacteria does occur, the pH level of the water may limit this action. This process results in a gradual accumulation of semi-preserved plant remains that eventually builds up and reaches the water surface. This allows shoreline emergent species such as sedges and brushy woody plants to gain a foothold and add their debris to the formation and accumulation of the peat layer. Eventually this process will result in the complete filling of smaller ponds, shallow basins, and shallow lakes. Larger or deeper lakes take much longer to be filled, but often develop a ring of peat along their shorelines. This process is evident today in the many marsh-filled basins and marsh ringed lakes found throughout Wisconsin.

Fibrous peat is the source of sedimentary peat and the organic portions of organic sand, silt, or clay. Wind and wave action disturb peat deposits along the shoreline and cause the organic material to go into suspension in the water. It is then carried to the deeper parts of the water body where it eventually goes out of suspension and is accumulated as a bottom deposit. The amount of organic material present relative to the amount of mineral material present determines the final composition of the bottom deposit. Sedimentary peat develops when high amounts of organic material are present in the suspension.

Fibrous peats are soft, spongy material with Liquid Limits often in the range of 200 to 500, and water contents usually in excess of the Liquid Limit. The material tends to have very low shear strength and high consolidation potential. Normal depths of fibrous peat range from 2 feet to about 25 feet, but depths of 50 feet or more are not uncommon. Its presence creates significant problems for transportation facility construction.

4-2.1.3 Woody Peat

Woody peat is less common than fibrous peat but is often found in conjunction with that material. It is formed as emergent woody vegetation becomes established either on accumulations of fibrous peat, or directly in shallow wet basins. As the name suggests, woody peat has a coarse matrix with a high content of partially preserved leaves, cones, twigs, branches, trunks, and roots of brush and trees partial to a wet environment. It is most commonly found as a surface layer in marshes with brush and tree development. However, major fluctuations in water levels during development of the peat deposit causes significant changes to the dominate vegetation. This can result in layers of woody peat intermixed and covered by thick layers of fibrous peat. Woody peat tends to have somewhat lesser depths than fibrous peat. Its properties are similar to those of fibrous peat.

4-2.2 Marl

Marl is a gray to white deposit of fresh water calcium carbonate occurring as a bottom deposit in lakes or marshes. It often contains small shells and some plant remains, and generally exhibits an odorous smell. Marl is formed as a precipitate from the water in lakes and ponds having high calcium carbonate content. In smaller basins it is often covered by fibrous peat while in larger bodies of water, it is visible as a bottom deposit. Marl is found in the glaciated east central and the southeastern parts of the state. It is rare to non-existent in the northern areas. It has low shear strength and high consolidation potential. Liquid Limit values and natural moisture content are also high. It is another troublesome material for transportation facilities construction.

4-2.3 Organic Silt, Sand, or Clay

These materials are dark gray to black mixtures of primarily mineral soil with lesser amounts of organic material. The organic material is normally in the 5% to 15% range, but this is of sufficient content to impact the engineering properties of the material. While all three materials do occur, organic silt is probably the most common occurrence. These materials are a sedimentary deposit formed when both mineral material and reworked organic material are brought into lakes or shallow basins. The thickness of these layers is highly variable ranging from a few feet to more than 50 feet. Occurrences of these materials can be found throughout the state, but they are most common in the southeast and southern areas. They also occur in oxbows and cutoffs along all of the major rivers of the state. Organic sands, silts, or clays have relatively low shear strength and high consolidation potential due to their organic content. Liquid Limits and natural moisture content are also elevated by the organic material. Depending on composition, they can be another troublesome material for transportation facilities construction.

4-2.4 Buried Organic Material

While material of this type is not a distinct organic soil, its occurrence is common enough to warrant some discussion. Organic material of all types can be buried by mineral soils brought in by erosion, floods, scour, or other changes in water levels. The resulting surface may have all of the typical features and appearances of a mineral soil, but the buried organic layer may cause significant problems relating to strength, stability, and consolidation for construction of embankments or other features. River flood plains, flat bottom valleys in hilly terrain, depressions in glacial till plains, and potholes in pitted outwash are all potential sources of this feature. While there is no simple indicator of buried organic material, the geotechnical engineer must be aware of this possible condition and closely examine potential sites.