

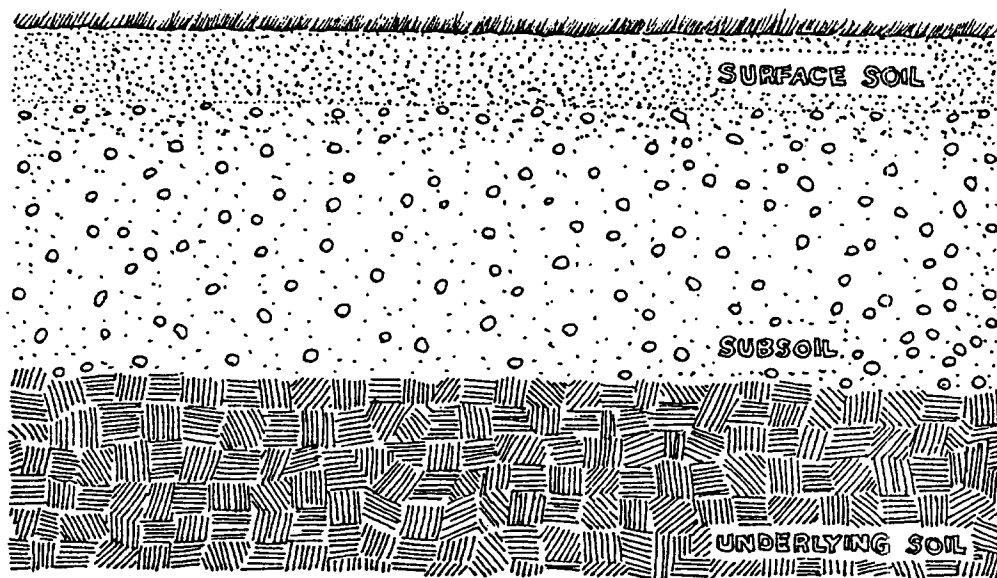
APPENDIX A

SOIL INTERPRETATIONS FOR SOIL TYPES FOUND IN THE ITASCA PLANNING AREA

The soil interpretations discussed in Chapter 4, Natural and Environmental Resources Inventory, presented generalized urban suitability data. However, the U. S. Department of Agriculture Soil Conservation Service, has provided more detailed information regarding the various layers of a particular soil type as well as its suitability for various types of urban and non-urban uses. In this manner, the soils information can be used at a more detailed level for land use and site planning.

Each soil type has three distinct parts to its profile: surface layer; subsoil; and underlying material. The composition and thickness of each part of the profile may vary from one soil type to another, and as a result, each soil type and its component parts may display distinctive characteristics for particular types of land uses.

FIGURE 15
GENERAL SOIL PROFILE



Listed on the following pages are the five soil suitability classes discussed in Chapter 4. Under each class are listed the soil types found in that class in the Itasca planning area, the general properties exhibited by that soil type, and the suitability of various land uses with that soil type.

Soils With Slight Limitations

Barrington (443) - Well to moderately well drained soils which have high organic matter content in the surface layer, moderate permeability in the subsoil, and a slow to medium surface water runoff. Properties exhibited by this soil type for various types of uses are as follows:

Soils With Moderate Limitations

Symerton (294) - Well drained soil with moderate permeability and high moisture holding capacity. Erosion and siltation are likely during construction and lawn establishment. Properties of this soil type for various uses are as follows:

SEPTIC TANK ABSORPTION FIELDS	Moderate: permeability on slow end of moderate.
SHALLOW EXCAVATIONS	Moderate: moderate shrink-swell.
GENERAL URBAN DEVELOPMENT	Moderate: erosion and siltation likely during construction and lawn establishment. Exposed underlying material is plastic and sticky when wet and very hard when dry; excavations tend to hold water. Foundations, slabs, walks, and streets subject to cracking and heaving due to shrink-swell and frost action.
LOCAL ROADS AND STREETS	Moderate; susceptibility to frost heave and shrink-swell.
DEPTH TO HIGH WATER TABLE	More than 3 feet.
WOODLAND	No natural Woodlands. Suitable species to plant: white pine, white spruce, sugar-maple, hackberry, white ash, white and red oak.
CROPLAND	Well suited to commonly grown crops with high level of management.
RECREATIONAL USES	Moderate limitations for playgrounds. Other recreational uses have only slight limitation.

Zurich (696) - Moderately and well drained soils which have a low organic matter content in surface layer, moderate permeability in the subsoil, and a slow to rapid surface water run-off. Erosion and siltation are likely during construction and lawn establishment. Limitations on various uses exhibited by this soil type are as follows:

TOPSOIL	Surface: Good - less than 2 percent organic matter: less than 8 inches thick on eroded slopes. Subsoil: Fair - sticky when wet; hard when dry; less than 1 percent organic matter.
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TOPSOIL	Surface: Good-usually more than 12 inches of silt loam with high organic matter content. Subsoil: Fair-silty clay loam, sticky when wet and hard when dry; low organic matter content.
ROAD FILL FOR HIGHWAY SUBGRADE	Subsoil: Poor-moderate shrink-swell potential in subsoil; plastic index more than 15. Underlying material: Fair to good-fair compaction characteristics; low shrink-swell.
HIGHWAY AND STREET LOCATION	Moderate: Subsoil has moderate shrink-swell potential and fair to good stability; underlying material highly erosive.
FOUNDATIONS FOR LOW BUILDINGS	Moderate: Subsoil has medium to high compressibility, moderate shrink-swell and fair stability to good stability; underlying material has low shrink-swell and fair stability.
POND RESERVOIR AREAS	Severe: Danger of excessive seepage through underlying material.
EMBANKMENTS	Slight in subsoil; Fair to good stability and compaction; good resistance to piping. Moderate in underlying material: Fair stability and compaction; poor resistance to piping.
DRAINAGE	Slight: Natural drainage is adequate.
TERRACES AND DIVERSIONS	Slight: Exposed silty clay loam subsoil is low in organic matter, dries out quickly, and is somewhat difficult to vegetate.
CROPLAND	Well suited to commonly grown crops; sloping area requires erosion control practices.
WOODLAND	No natural woodlands. Suitable species to plant: black walnut, white oak, ash, white pine, red pine.
WILDLIFE	Well suited for openland and woodland wildlife. Unsuitable for wetland wildlife.
RECREATIONAL USE	Slight limitations for most recreational uses.
GENERAL URBAN DEVELOPMENT	Slight: Slight grading for streets and lots. Erosion hazard on sloping areas.
SEPTIC TANK FILTER FIELDS	Slight: 0 to 4 percent slopes; moderate permeability in subsoil; percolation rate estimated to be faster than 45 minutes per inch; porous underlying material may allow effluent to travel long distances.
SEWAGE LAGOONS	Severe: Hazard of excess seepage through underlying porous layers.

ROAD FILL FOR HIGHWAY SUB- GRADE	Subsoil: Poor - moderate shrink-swell potential; plastic index 15 or more. Underlying material: Fair to good; low shrink-swell; plastic index less than 15.
HIGHWAY AND STREET LOCATION	Moderate: Slopes less than 12 percent; somewhat plastic subsoil has fair to good stability; underlying material has fair to poor stability.
FOUNDATIONS FOR LOW BUILDINGS	Moderate: Subsoil - has medium compressibility; moderate shrink-swell; fair shear strength. Underlying material; slight to medium compressibility; low shrink-swell; fair to good shear strength.
POND RESERVOIR AREAS	Severe: Danger of excessive seepage through underlying stratified materials; some areas too porous to hold water.
EMBANKMENTS	Slight in subsoil - fair to good stability and compaction; good workability and resistance to piping. Moderate to underlying material - poor to good stability, compaction, workability and resistance to piping.
DRAINAGE	Slight: Natural drainage is adequate.
CROPLAND	Well suited to commonly grown crops; all slopes require erosion control practices; soil loss is critical on slopes exceeding 7 percent.
WOODLAND	Species to favor in existing stands: White oak, red oak, black walnut, yellow poplar -- Suitable species to plant: black walnut, white oak, ash, white pine, yellow poplar.
WILDLIFE	Well suited to openland and woodland wildlife. Unsited to wetland wildlife.
RECREATIONAL USE	Slight to moderate limitations for most recreational uses, depending upon the percent slope on the site.
GENERAL URBAN DEVELOPMENT	Moderate: 0 - 7 percent slopes; slight grading for streets and lots. 7 to 12 percent slopes; slopes limit use; moderate grading for streets and lots; erosion and siltation likely during construction and lawn establishment.
SEPTIC TANK FILTER FIELDS	Slight: On 0 - 7 percent slopes and Moderate: on 7 - 12 percent slopes; slopes limit use. Coarse underlying material in some places may allow unfiltered effluent to travel long distances.
SEWAGE LAGOONS	Severe: Underlying material is porous. Seepage hazard of effluent.

Soils With Severe Limitations

Blount (23) - Poorly drained soils which have a low organic matter content in the surface layer, slow permeability, and slow-medium surface water runoff. The subsoils are very clayey with periodic water saturation and are plastic and sticky when wet and very hard when dry. Lawns are difficult to establish and soil has a high shrink-swell potential. Other properties for various uses are as follows:

TOPSOIL	Surface: Fair - less than 12 inches of silt loam low in organic matter. Subsoil: Poor - clayey; sticky when wet and hard when dry; seasonal high water table.
ROAD FILL FOR HIGHWAY SUBGRADE	Poor in subsoil and underlying material - moderate to high shrink-swell in subsoil; difficult to work or compact when wet. Plastic index usually more than 20 in the subsoil and ranges from 15 to 20 in the underlying material.
HIGHWAY AND STREET LOCATION	Moderate: Somewhat poorly drained; seasonal high water table; susceptible to frost heave; subsoil has moderate to high shrink-swell; fair stability.
FOUNDATIONS FOR LOW BUILDINGS	Moderate: Somewhat poorly drained; seasonal high water table; medium compressibility; moderate to high shrink-swell in the subsoil; susceptible to frost heave.
POND RESER- VOIR AREAS	Slight; Generally favorable; slow seepage; mainly has potential for dugout ponds.
DRAINAGE	Moderate: Somewhat poorly drained; seasonal high water table; slow permeability in the subsoil; nearly level to gently sloping.
CROPLAND	Well suited to commonly grown crops where adequately drained. Used mainly for growing corn and soybeans.
WOODLAND	Species to favor in existing stands: white oak, red oak, black oak, bur oak, ash - Suitable species to plant: ash, white pine, red pine, Norway spruce.
WILDLIFE	Generally well suited to openland and woodland wildlife. Also suited for a number of wetland wildlife species.
RECREATIONAL USE	Moderate limitations for all types of recreational uses.
GENERAL URBAN DEVELOPMENT	Severe: Periodic water saturation; excavations hold water and dry out slowly; wet basements probable; foundations, slabs, walks, and streets subject to cracking because of frost heave and shrink-swell of subsoil.
SEPTIC TANK FILTER FIELDS	Severe: Slow permeability in the subsoil; periodically saturated with water at depths of 1 to 3 feet in the spring. Estimated percolation rate slower than 60 minutes per inch.

SEWAGE LAGOONS Moderate; Seasonal water table at depths of 1 to 3 feet; slopes that exceed 2 percent affect design and construction. Slow permeability in subsoil and moderately slow permeability in underlying material.

Milford (69) - Poorly drained soils which have a high organic matter content in the surface layer, moderately slow permeability, and slow to ponded surface water runoff. Water saturation is frequent or continuous, and shrink-swell potential is high. Other properties exhibited by the soil are as follows:

TOPSOIL	Fair - if remaining soil at construction site is to be covered by buildings, roads, etc. Poor - if remaining soil is to be reclaimed - poorly drained; seasonal high water table.
ROAD FILL FOR HIGHWAY SUBGRADE	Poor in subsoil: Fair to poor compaction; high shrink-swell potential; plastic index more than 20. Fair in underlying material: Fair workability and compaction, moderate to low shrink-swell potential; frequently saturated with water; plastic index usually less than 15.
HIGHWAY AND STREET LOCATION	Severe: Poorly drained; seasonal high water table; subject to frost heave: high shrink-swell potential in the subsoil.
FOUNDATIONS FOR LOW BUILDINGS	Severe: Poorly drained; seasonal high water table; high shrink-swell potential in the subsoil; subject to frost heave.
POND RESERVOIR AREAS	Slight: Has natural high water table and potential for dugout ponds.
DRAINAGE	Severe: Poorly drained; moderately slow permeability; seasonal high water table.
CROPLAND	Well suited to continuous row crops when adequately drained and properly managed. Used mainly for growing corn and soybeans.
WOODLAND	Woodlands do not occur naturally on these soils. -- Suitable species to plant: pin oak, green ash, eastern larch.
WILDLIFE	Well suited in drained areas for openland and woodland wildlife. Well suited in undrained areas for wetland wildlife.
RECREATIONAL USES	Severe limitations on all types of recreational uses.
GENERAL URBAN DEVELOPMENT	Severe: Frequent or continuous water saturation; slow or very slow runoff of surface water: may pond in some areas; excavations fill with water in the spring; slow to dry; wet basements probable; foundations, slabs, walks, and streets subject to cracking and heaving due to frost and shrinking and swelling of soil.

SEPTIC TANK FILTER FIELDS Severe: Seasonal high water table; moderately low permeability; percolation rate slower than 60 minutes per inch.

SEWAGE LAGOONS Severe: Seasonal water table near the surface; high organic matter content in upper 18 inches; not suitable for embankment or floor of lagoon.

Elliot (146)- Poorly drained soils which have a high organic matter content in the surface soil, moderately slow permeability, and slow to medium surface water runoff. Clayey subsoils and periodic water saturation are common. Plastic and sticky when wet, very hard when dry. High shrink-swell potential.

TOPSOIL Surface: Good; high organic matter content; thin, if eroded. Subsoil: Poor; clayey; seasonal high water table.

ROAD FILL HIGHWAY SUBGRADE Poor in subsoil and underlying material - moderate shrink-swell; difficult to work and compact when wet. Plastic index usually more than 20.

HIGHWAY AND STREET LOCATION Moderate: Occasional high water table; subject to frost heave; fair stability.

FOUNDATIONS FOR LOW BUILDINGS Moderate: Moderate to high shrink-swell potential; fair shear strength; medium to high compressibility; occasional high water table.

POND RESERVOIR AREAS Slight: Generally favorable; occasional high water table.

DRAINAGE Moderate: Somewhat poorly drained; occasional high water table; moderately slow permeability.

CROPLAND Well suited to continuous row cropping. Used mainly for growing corn and soybeans.

WOODLAND Woodlands usually do not occur naturally on these soils. Suitable species to plant: white ash, white pine, Norway spruce, red pine.

WILDLIFE Well suited for openland and woodland wildlife. Generally poorly suited for wetland wildlife.

RECREATIONAL USE Moderate limitations due to drainage problems for most recreational uses.

GENERAL URBAN DEVELOPMENT Severe: Clayey subsoil material that is plastic and sticky when wet and very hard when dry; periodic water saturation; excavations fill with water in the spring and dry out slowly; wet basements probable; foundations, slabs, walks, and streets subject to cracking and heaving due to frost heave; lawns and shrubs difficult to establish.

SEPTIC TANK FILTER FIELDS Severe: Moderately slow permeability; occasional high water table; percolation rate estimated to be slower than 60 minutes per inch.

SEWAGE LAGOONS Moderate: A seasonal water table is temporarily at depths less than 40 inches in the spring. Surface layer is poor for embankment material and floor of lagoon.

Drummer (152)- Poorly drained soils with high organic matter content in surface soil, moderate permeability, and slow or ponded surface water runoff. Frequent or continuous water saturation and high shrink-swell potential. These soils exhibit the following characteristics for other uses:

TOPSOIL Fair - if remaining soil at construction site is to be covered by buildings, roads, etc. Poor - if remaining soil is to be reclaimed - poorly drained; seasonal high water table.

ROAD FILL FOR HIGHWAY SUBGRADE Poor in subsoil: Moderate shrink-swell; saturated with water in spring; plastic index 15 to 25. Fair to good in underlying material: Low shrink-swell; plastic index usually less than 15.

HIGHWAY AND STREET LOCATION Severe: Poorly drained; normally high water table; high organic matter content in upper 14 inches; high frost heave potential; moderate shrink-swell potential in upper 4 feet.

FOUNDATIONS FOR LOW BUILDINGS Severe: Poorly drained; seasonal high water table; moderate shrink-swell potential in the subsoil; subject to frost heave.

POND RESERVOIR AREAS Slight to Moderate: Moderately permeable; has natural high water table and potential for dugout ponds in places; seepage likely to occur if underlying material is exposed in areas that have been tile drained.

DRAINAGE Severe: Poorly drained; moderately permeable; normally high water table; tile function well if outlets are available.

CROPLAND Well suited to continuous row cropping when adequately drained. Used mainly for growing corn and soybeans.

WOODLAND Woodlands do not occur naturally on these soils. Suitable species to plant: black spruce, green ash, eastern larch, pin oak.

WILDLIFE Well suited in drained areas for openland and woodland wildlife. Undrained areas well suited for wetland wildlife.

RECREATIONAL USE Severe limitations on most recreational uses due to poor drainage and slow drying of soil.

GENERAL URBAN
DEVELOPMENT

Severe: Frequent or continuous water saturation; slow or very slow runoff of surface water; may pond in some areas; excavations fill with water in the spring; slow to dry; wet basements probable; foundations, slabs, walks, and streets subject to cracking and heaving due to frost and shrinking and swelling of soil.

SEPTIC TANK
FILTER FIELDS

Severe: Poorly drained; seasonal water table near the surface; ponding in low areas.

SEWAGE
LAGOONS

Severe: Seasonal water table near the surface; high organic matter content in upper 14 inches; not suitable for embankment or floor of lagoon; porous strata below 4 feet in places.

Martinton (189) - Poorly drained soils which have a high organic matter content in the surface layer, moderately slow permeability, and slow to medium surface water runoff. These soils exhibit the following characteristics for other uses:

TOPSOIL

Surface: Good - thick, high organic matter content. Subsoil: Poor-clayey; sticky when wet and hard when dry; seasonal high water table.

ROAD FILL FOR
HIGHWAY SUB-
GRADE

Poor in subsoil and underlying material-moderate shrink-swell in the subsoil; difficult to work or compact when wet; plastic index usually more than 20 in the subsoil and more than 15 in the underlying material.

ROAD FILL FOR
HIGHWAY AND
STREET LOCA-
TION

Moderate: Somewhat poorly drained; seasonal high water table; subject to frost heave; fair stability; moderate shrink-swell potential in the subsoil.

FOUNDATIONS
FOR LOW
BUILDINGS

Moderate: Somewhat poorly drained; seasonal high water table; subject to frost heave; moderate shrink-swell potential in the subsoil; medium compressibility.

POND RESER-
VOIR AREAS

Slight: Generally favorable; has seasonal high water table and potential for dugout ponds; slow to moderate seepage in underlying material.

DRAINAGE

Moderate: Somewhat poorly drained; seasonal high water table; moderately slow permeability in the subsoil.

CROPLAND

Well suited to commonly grown crops where adequately drained. Used mainly for growing corn and soybeans.

WOODLAND

No natural woodlands. Suitable species to plant: ash, white pine, Norway spruce, red pine, red maple.

WILDLIFE

Well suited in drained areas with openland, hardwood, and upland. Suited for wet land but species limited.

RECREATIONAL
USE

Moderate limitations due to poor drainage and is slow to dry.

GENERAL URBAN DEVELOPMENT	Severe: Periodic water saturation: excavations hold water a dry out slowly: wet basements probable: foundations, slabs, walks, and streets subject to cracking because of frost heave and shrink-swell of subsoil.
SEPTIC TANK FILTER FIELDS	Severe: Moderately slow permeability in the subsoil; periodically saturated with water at depths of 1 to 3 feet during the spring. Estimated percolation rate slower than 60 minutes per inch.
SEWAGE LAGOONS	Moderate: Seasonal water table at depths of 1 to 3 feet; moderately slow permeability in the subsoil; slow to moderate permeability in the underlying material.

Morely (194) - Moderately well drained soils with a low organic material content in surface layer. Moderate slow permeability in subsoil and high available water capacity. Surface water runoff medium to very rapid. These soils exhibit the following characteristics for other uses:

TOPSOIL	Surface: Good-less than 2 percent organic matter: less than 8 inches thick on eroded slopes. Subsoil: Poor-very sticky when wet and very hard when dry: less than 1 percent organic matter.
ROAD FILL FOR HIGHWAY SUBGRADE	Poor in subsoil and underlying material-moderate shrink-swell potential; plastic index usually more than 20 in the subsoil and ranges from 15 to 20 in the underlying material.
HIGHWAY AND STREET LOCATION	Moderate: on 1 to 12 percent slopes; plastic subsoil has fair stability: underlying material has fair to good stability. Severe: On 12 to 30 percent slopes: requires more cutting and filling; severe erosion hazard.
FOUNDATIONS FOR LOW BUILDINGS	Moderate: Moderate shrink-swell potential, fair to poor shear strength, medium to high compressibility.
POND RESERVOIR AREAS	Slight on slopes of less than 12 percent. Moderate on slopes exceeding 12 percent - slopes restrict storage potential.
DRAINAGE	Slight: Natural drainage is adequate.
CROPLAND	Well suited to commonly grown crops: all slopes require erosion control practices: soil loss is critical on slopes exceeding 7 percent.
WOODLAND	Species to favor in existing stands: white oak, red oak, black oak, ash, black walnut, yellow poplar. Suitable species to plant: black walnut, white oak, ash, white pine, yellow poplar.
WILDLIFE	Generally suited for openland and woodland, unsuited for wetland.

- RECREATIONAL USES Moderate limitations on shallow slopes and severe limitations on steep slopes.
- GENERAL URBAN DEVELOPMENT Severe on 2 to 12 percent slopes; clayey subsoil material is plastic and sticky when wet and very hard when dry; slight to moderate grading for streets and lots: excavations tend to hold water; erosion and siltation during construction and lawn establishment: lawns difficult to establish and maintain. Severe on slopes exceeding 12 percent.
- SEPTIC TANK FILTER FIELDS Severe: Moderately slow permeability: percolation rate estimated to be slower than 60 minutes per inch.
- SEWAGE LAGOONS Moderate: 2 to 7 percent slopes; slope affects design and construction. Severe: 7 to 30 percent slopes: slopes severely limit use.

Varna (223) - Moderate to well drained soils which are high in organic matter in surface layer and have moderate to slow permeability in the subsoil. The soil is high in available water capacity and surface water runoff is medium to rapid. These soils exhibit the following characteristics:

- TOPSOIL Surface: Good - 2 to 3 percent organic matter content if not eroded; less than 8 inches thick on eroded slopes. Subsoil: Poor - very sticky when wet and very hard when dry: less than 3 percent organic matter.
- ROAD FILL FOR HIGHWAY SUBGRADE Poor: Moderate shrink-swell potential in the subsoil; plastic index usually more than 20 in the subsoil and ranges from 15 to 20 in the underlying material.
- HIGHWAY AND STREET LOCATION Moderate: 2 to 12 percent slopes; plastic subsoil has fair stability; underlying material has fair to good stability.
- FOUNDATIONS FOR LOW BUILDINGS Moderate: Moderate shrink-swell potential, fair shear strength, medium compressibility: 2 to 12 percent slopes.
- POND RESERVOIR AREAS Slight: Features are generally favorable.
- EMBANKMENTS Moderate in subsoil - fair stability, compaction and workability; good resistance to piping. Slight in underlying material - fair to good stability and compaction; good workability and resistance to piping.
- DRAINAGE Slight: Natural drainage is adequate.
- CROPLAND Well suited to commonly grown crops; all slopes require erosion control practices; soil loss is critical on slopes exceeding 7 percent.
- WOODLAND No natural croplands. Suitable species to plant; black walnut, white ash, white pine, red pine, Norway spruce.

WILDLIFE	Well suited for openland and woodlands but unsuited for wetlands.
RECREATIONAL USE	Slight to moderate limitations depending on the slope.
GENERAL URBAN DEVELOPMENT	Severe: Clayey subsoil material is plastic and sticky when wet and very hard when dry; erosion and siltation during construction and lawn establishment; excavations tend to hold water; lawns and shrubs difficult to establish and maintain; slight to moderate grading for streets.
SEPTIC TANK FILTER FIELDS	Severe: Moderately slow permeability; percolation rate estimated to be slower than 60 minutes per inch.
SEWAGE LAGOONS	Moderate on 2 to 7 percent slopes; slopes affect design and construction. Severe on 7 to 12 percent slopes; severely limiting use.

Ashkum (232)- Poorly drained soils with high organic matter content in surface layer, with moderate to slow permeability in the subsoil, and a high available water capacity. Surface water runoff is slow to ponded. These soils exhibit the following characteristics for other uses:

TOPSOIL	Fair if remaining soil at construction site is to be covered buildings, roads, etc. Poor if remaining soil is to be relevelled - poorly drained; seasonal high water table.
ROAD FILL FOR HIGHWAY SUBGRADE	Poor: Saturated with water in the spring; moderate to high shrink-swell potential; plastic index usually more than 20.
HIGHWAY AND STREET LOCATION	Severe: Poorly drained; seasonal high water table; susceptible to frost heave; plastic material; moderate to high shrink-swell.
FOUNDATIONS FOR LOW BUILDINGS	Severe: Poorly drained; seasonal high water table; moderate to high shrink-swell; subject to frost heave.
POND RESERVOIR AREAS	Slight: Moderately slow permeability; has natural high water table and potential for dugout ponds.
DRAINAGE	Severe: Poorly drained; moderately slow permeability; normal to high water table; artificial drainage needed.
CROPLAND	Well suited to continuous row cropping when adequately drained. Used mainly for growing corn and soybeans.
WOODLAND	No natural woodlands. Suitable species to plant: black spruce, pin oak, green ash, eastern larch.
WILDLIFE	Well suited on drained soils for both openland and woodlands; poorly suited on undrained except in wet areas.
RECREATIONAL USES	Severe limitations due to poor drainage, high water table and slow drying.

GENERAL URBAN
DEVELOPMENT

Severe: Frequent or continuous water saturation; slow or very slow runoff of surface water; may pond in some areas; excavations fill with water in the spring; slow to dry; wet basements probable; foundations, slabs, walks, and streets subject to cracking and heaving due to frost.

SEPTIC TANK
FILTER FIELDS

Severe: Moderately slow permeability; subsoil saturated with water in the spring; percolation rate estimated to be slower than 60 minutes per inch.

SEWAGE LAGOONS

Severe: Surface layer poor for embankment material and floor of lagoon; seasonal water table near the surface.

Andres (293)- Poorly drained soils with a high organic matter content in the surface layer, moderate permeability, and slow to medium surface water runoff. Periodic water saturation and shrink-swell due to frost heave is common.

TOPSOIL

Surface: Good - thick; high organic matter content. Subsoil: fair - somewhat clayey; seasonal high water table.

ROAD FILL FOR
HIGHWAY SUBGRADE

Poor in subsoil and underlying material - moderate shrink-swell in subsoil; plastic index usually more than 20 in the subsoil and ranges from 15 to 20 in the underlying material.

HIGHWAY AND
STREET LOCATION

Moderate: Somewhat poorly drained; seasonal high water table; susceptible to frost heave; subsoil has moderate shrink-swell and fair to good stability.

FOUNDATIONS FOR
LOW BUILDINGS

Moderate: Somewhat poorly drained; seasonal high water table; medium compressibility; moderate shrink-swell in the subsoil; susceptible to frost heave.

POND RESERVOIR
AREAS

Slight; Generally favorable; slow seepage; mainly has potential for dugout ponds.

DRAINAGE

Moderate: Somewhat poorly drained; seasonal high water table; moderately permeable subsoil but underlying material has moderately slow permeability.

CROPLAND

Well suited to continuous row cropping. Used mainly for growing corn and soybeans.

WOODLAND

No natural woodlands. Suitable species to plant: white ash, white pine, Norway spruce, red pine.

WILDLIFE

Well suited to openland and woodland wildlife. Also suited to a number of wetland wildlife species.

RECREATIONAL
USES

Moderate limitations due to poorly drained soils and slowness of drying.

GENERAL URBAN
DEVELOPMENT

Severe: Periodic water saturation; excavations hold water and dry out slowly; wet basements probable; foundations, slabs, walks, and streets subject to cracking because of frost heave and shrink-swell of subsoil.

SEPTIC TANK FILTER FIELDS Severe: Moderate in some areas. Moderately slow permeability below subsoil. Soils periodically saturated with water at depths of 1 to 3 feet during the spring. Estimated percolation rate ranges from 45 minutes per inch to slower than 60 minutes per inch.

SEWAGE LAGOONS Moderate: Seasonal water table is temporarily at depths less than 3 feet in the spring. Moderately slow permeability below subsoil. Surface layer poor for embankment material and floor of lagoon.

Beecher (298)- Poorly drained soils which have moderate organic matter content in the surface layer, slow permeability in the subsoil, and slow to medium surface water runoff. Clayey subsoils and periodic water saturation are common. Plastic and sticky when wet and very hard when dry. Soils are slow drying and subject to frost heave and shrink-swell of subsoil.

TOPSOIL Surface: Good-thin if eroded. Subsoil: Poor-clayey; sticky when wet and hard when dry; seasonal high water table.

ROAD FILL FOR HIGHWAY SUBGRADE Poor in subsoil and underlying material-moderate to high shrink-swell in the subsoil; difficult to work or compact when wet; plastic index usually more than 20 in the subsoil and ranges from 15 to 20 in the underlying material.

HIGHWAY AND STREET LOCATION Moderate: Somewhat poorly drained; seasonal high water table; susceptible to frost heave; moderate to high shrink-swell in the subsoil; fair stability.

FOUNDATIONS FOR LOW BUILDINGS Moderate: Somewhat poorly drained; seasonal high water table; medium compressibility; moderate to high shrink-swell in the subsoil; susceptible to frost heave.

POND RESERVOIR AREAS Slight: Generally favorable; seasonal high water table; slow seepage.

DRAINAGE Moderate: Somewhat poorly drained; seasonal high water table; slow permeability in the subsoil.

CROPLAND Well suited to continuous row cropping. Used mainly for growing corn and soybeans.

WOODLAND Woodlands usually do not occur naturally on these soils. Suitable species to plant: white ash, white pine, Norway spruce, red pine.

WILDLIFE Well suited for openland and woodland wildlife. Generally poorly suited for wetland wildlife.

RECREATIONAL USES Moderate limitations for most recreational uses due to poor drainage and slow drying.

GENERAL URBAN DEVELOPMENT Severe: Seasonal high water table; slowly permeable; excavations fill with water in the spring and dry out slowly; wet basements probable; foundations, slabs, walks and streets subject to cracking because of frost heave and shrink-swell of soil.

SEPTIC TANK
FILTER FIELDS

Severe: Slowly permeable subsoil; periodically saturated with water at depths of 1 to 3 feet (usually in the spring); percolation rate estimated to be slower than 60 minutes per inch.

SEWAGE LAGOONS

Moderate: Seasonal water table at depths of 1 to 3 feet; slopes that exceed 2 percent affect design and construction; slow permeability in subsoil and moderately slow permeability in underlying material.

Mundelein (442)- Poorly drained soils which have a high organic matter content in the surface layer, moderate permeability, and slow to medium surface water runoff. Periodic water saturation and poor sidewall stability is common. Frost heave is likely. Other characteristics are as follows:

TOPSOIL

Surface: Good - 10 to 16 inches of silt loam; high organic matter content. Subsoil: Fair - silty clay loam; sticky when wet and hard when dry.

ROAD FILL FOR
HIGHWAY SUBGRADE

Subsoil: Poor - periodic water saturation; moderate shrink-swell; plastic index more than 15. Underlying material: Fair to good - low shrink-swell; fair compaction characteristics; plastic index less than 15.

HIGHWAY AND
STREET LOCATION

Moderate: Somewhat poorly drained; seasonal high water table; susceptible to frost heave; subsoil has fair to good stability and a moderate shrink-swell potential.

FOUNDATIONS FOR
LOW BUILDINGS

Moderate: Somewhat poorly drained; seasonal high water table; Susceptible to frost heave; subsoil has a moderate shrink-swell potential.

POND RESERVOIR
AREAS

Severe: Hazard of excessive seepage through underlying stratified materials; potential for dugout ponds only; nearly level topography.

DRAINAGE

Moderate: Somewhat poorly drained; seasonal high water table; moderate permeability.

CROPLAND

Well suited to commonly grown crops where adequately drained.

WOODLAND

No natural woodlands. Suitable species to plant: ash, white pine, red pine, Norway spruce.

WILDLIFE

Well suited to openland and woodland wildlife. Suited for a number of wetland wildlife species.

RECREATIONAL
USES

Moderate limitations due to poor drainage and slow drying.

GENERAL URBAN
DEVELOPMENT

Severe: Periodic water saturation excavations hold water and dry out slowly; wet basements probable; foundations, slabs, walks, and streets subject to cracking because of frost heave and shrink-swell of subsoil.

SEPTIC TANK FILTER FIELDS Severe: Moderate in some areas. Periodically saturated with water at depths of 1 to 3 feet usually in the spring; has moderate permeability; percolation rate estimated to range from 30 to 60 minutes per inch.

SEWAGE LAGOONS Severe: Seasonal water table at less than 40 inches; porous material at about 3 feet in places; hazard of excessive seepage; surface layer poor for embankment material and floor of lagoon.

Markham (531)- Moderately well drained soils which have a moderate organic content in surface layer, slow to medium permeability, and medium surface water runoff. Erosion and siltation are likely during construction and lawn establishment is difficult. Soil is plastic and sticky when wet, very hard when dry.

TOPSOIL Surface: Good - 2 to 4 percent organic matter content if not eroded; less than 8 inches thick on eroded slopes. Subsoil: Poor - very sticky when wet and very hard when dry; less than one percent organic matter.

ROAD FILL FOR HIGHWAY SUB-GRADE Poor in subsoil and underlying material - moderate shrink-swell potential; plastic index usually more than 20 in the subsoil and ranges from 15 to 20 in the underlying material.

HIGHWAY AND STREET LOCATION Moderate: 2 to 12 percent slopes; plastic subsoil has fair to good stability.

FOUNDATIONS FOR LOW BUILDINGS Moderate: Subsoil has moderate shrink-swell potential; fair to poor shear strength; medium to high compressibility. Underlying material has similar properties but low shrink-swell.

POND RESERVOIR AREAS Slight: Features are generally favorable.

EMBANKMENTS Moderate in subsoil - fair stability, compaction, and workability; good resistance to piping. Slight in underlying material - fair to good stability and compaction; good workability and resistance to piping.

DRAINAGE Slight: Natural drainage is adequate.

CROPLAND Well suited to commonly grown crops; all slopes require erosion control practices; soil loss is critical on slopes exceeding 7 percent.

WOODLAND Woodlands seldom occur naturally on these soils. Suitable species to plant: black walnut, white pine, red pine, Norway spruce.

WILDLIFE Well suited for openland and woodland wildlife. Unsuitable for wetland wildlife due to good drainage.

RECREATIONAL USES Slight to moderate limitations for most uses. Severe limitations when landscaping is necessary.

GENERAL URBAN
DEVELOPMENT

Severe: Clayey subsoil material is plastic and sticky when wet and very hard when dry; erosion and siltation during construction and lawn establishment; excavations tend to hold water; lawns and shrubs difficult to establish and maintain; slight to moderate grading for streets.

SEPTIC TANK
FILTER FIELDS

Severe: Moderately slow or slow permeability; percolation rate estimated to be slower than 60 minutes per inch.

SEWAGE LAGOONS

Moderate on 2 to 7 percent slopes; slope affects design and construction. Severe on 7 to 12 percent slopes; slopes severely limit use.

Wauconda (697)- Poorly drained soils with periodic water saturation and fair to poor sidewall stability. The soil has moderate organic matter content in the surface layer, moderate permeability, and slow to medium surface water runoff. Shrink-swell potential is common.

TOPSOIL

Surface: Good - 8 to 15 inches of silt loam; moderate organic matter content (about 3%). Subsoil: Fair - silty clay loam; sticky when wet and hard when dry.

ROAD FILL FOR
HIGHWAY SUBGRADE

Subsoil: Poor - periodic water saturation; moderate shrink-swell; plastic index more than 15. Underlying material: Fair to good - low shrink-swell; fair compaction characteristics; plastic index less than 15.

HIGHWAY AND
STREET LOCATION

Moderate: Somewhat poorly drained: seasonal high water table; susceptible to frost heave; subsoil has fair to good stability and a moderate shrink-swell potential.

FOUNDATIONS FOR
LOW BUILDINGS

Moderate: Somewhat poorly drained; seasonal high water table; susceptible to frost heave; subsoil has a moderate shrink-swell potential.

POND RESERVOIR
AREAS

Severe: Hazard of excessive seepage through underlying stratified materials; potential for dugout ponds only; nearly level topography.

DRAINAGE

Moderate: Somewhat poorly drained; seasonal high water table; moderate permeability.

CROPLAND

Well suited to commonly grown crops where adequately drained.

WOODLAND

Species to favor in existing stands: white oak, red oak, black oak, ash, black walnut. Suitable species to plant: ash, white pine, red pine, white oak, Norway spruce.

WILDLIFE

Well suited for openland and woodland wildlife. Also suited for some wetland wildlife.

RECREATIONAL
USES

Moderate limitations for most recreational uses due to poor drainage.

GENERAL URBAN DEVELOPMENT	Severe: Periodic water saturation, excavations hold water and dry out slowly; wet basements probable; foundations, slabs, walks and streets subject to cracking because of frost heave and swell of subsoil.
SEPTIC TANK FILTER FIELDS	Severe: Moderate in some areas. Periodically saturated with water at depths of 1 to 3 ft. usually in the spring; has moderate permeability; percolation rate estimated to range from 30 to 60 minutes per inch.
SEWAGE LAGOONS	Severe: Seasonal water table at less than 40 inches; porous material at about 3 ft. in places; hazard of excessive seepage.

Soils With Very Severe Limitations

Houghton (103) - Very poorly drained soils with moderately rapid permeability, high organic matter content, and very slow or ponded surface water runoff. Continuous or frequent water saturation is common. Soil is very unstable and highly compressible.

TOPSOIL	Poor: Organic material; water table at or near the surface.
ROAD FILL FOR HIGHWAY SUBGRADE	Not suitable - organic material.
HIGHWAY AND STREET LOCATION	Very severe: Not suitable - organic material; water table at or near the surface.
FOUNDATIONS FOR LOW BUILDINGS	Very severe: Not suitable - unstable organic material; water table at or near the surface.
POND RESERVOIR AREAS	Severe: Not suitable for embankment ponds; water table near surface in dugout areas.
DRAINAGE	Severe: Water table at or near surface; moderately rapid permeability; material subsides when water table is lowered.
CROPLAND	Used mainly for specialty crops such as potatoes, onions, etc.
WOODLAND	Woodlands do not occur naturally.
WILDLIFE	Unsuited for open land and wood land wildlife. Well suited to most species of wetland wildlife.
RECREATIONAL USES	Very severe limitations on most recreational uses due to high organic matter content instability.
GENERAL URBAN DEVELOPMENT	Very severe: Continuous water saturation; water table at or near the surface; organic material very unstable; highly compressible and subsides when drained; site investigations required to determine thickness of organic material.
SEPTIC TANK FILTER FIELDS	Very severe: Continuous water saturation; unstable organic material; poor supporting strength for septic tank and disposal system tile.
SEWAGE LAGOONS	Very severe: Moderately rapid permeability; organic material.

Sawmill (107) - Poorly drained soils with very high organic matter content, moderate to moderately slow permeability, and slow surface water runoff. Subject to flooding and frequent water saturation. Soil is slow to dry, subject to frost heave, and has fair to poor stability.

TOPSOIL	Fair if remaining soil at construction site is not to be reclaimed for growing plants. Poor if remaining soil is to be reclaimed - poorly drained; seasonal high water table.
ROAD FILL FOR HIGHWAY SUBGRADE	Poor: Saturated with water in the spring; moderate shrink-swell potential; plastic index is more than 20.
HIGHWAY AND STREET LOCATION	Severe: Subject to flooding; seasonal water table near surface; susceptible to frost heave; high organic matter content in upper 3 feet; poor stability when wet.
FOUNDATIONS FOR LOW BUILDINGS	Severe: Subject to flooding; high water table; medium to high compressibility; moderate shrink-swell; fair shear strength.
POND RESERVOIR AREAS	Moderate: Subject to flooding; high organic matter content; stratified material with rapid seepage below 5 feet in places; usually has high water table in the spring.
EMBANKMENTS	Moderate: Fair to poor stability and compaction in upper 3 feet - fair below; high compressibility; moderate shrink-swell; high organic matter content; water table may hinder excavation.
DRAINAGE	Severe: Seasonal water table near surface; moderate to moderately slow permeability; drainage needed; tile function satisfactorily if outlets are available; subject to flooding.
CROPLAND	Well suited for growing corn, soybeans and small grains where adequately drained and protected from flooding.
WOODLAND	Few existing woodlands. Species to favor: pin oak, cottonwood, cherrybark oak, ash, hackberry, sweetgum. Suitable species to plant: cottonwood, sweetgum, sycamore.
WILDLIFE	Well suited on drained areas for openland wildlife. Well suited generally for all woodland wildlife. Undrained areas well suited for wetland wildlife and suited for openland wildlife. Poorly suited for wetland wildlife on drained areas.
RECREATIONAL USES	Severe limitations due to poor drainage, flooding, and shrink-swell potential.
GENERAL URBAN DEVELOPMENT	Severe: Subject to flooding; frequent or continuous water saturation; excavations fill with water; slow to dry; foundations, slabs, walks, and streets subject to cracking and heaving because of frost heave and shrink-swell.
SEPTIC TANK FILTER FIELDS	Severe: Poorly drained; seasonal water table near surface; subject to flooding; estimated percolation rate slower than 45 minutes per inch.

SEWAGE LAGOONS Severe: Subject to flooding; seasonal high water table; porous material below 5 feet in places.

Peotone (330)- Very poorly drained soils with high organic matter content, moderately slow permeability, and very slow or ponded surface water runoff. Continuous water saturation and flooding is common. Fair to poor stability, shrink-swell potential, and slow drying are other common characteristics.

TOPSOIL Fair if remaining soil at construction site is to be covered by buildings, roads, etc. Poor if remaining soil is to be reclaimed - poorly drained; seasonal high water table.

ROAD FILL FOR HIGHWAY SUBGRADE Poor: Moderate shrink-swell; saturated with water in spring; plastic index 15 to 25.

HIGHWAY AND STREET LOCATION Severe: Normally high water table; susceptible to frost heave; plastic material; subject to ponding; moderate shrink-swell potential.

FOUNDATIONS FOR LOW BUILDING Severe: Very poorly drained; normally high water table; fair shear strength; medium compressibility; moderate shrink-swell.

POND RESERVOIR AREAS Slight: Moderately slowly permeable; normally high water table.

DRAINAGE Severe: Very poorly drained; moderately slow permeability; normally high water table; difficult to obtain outlets.

CROPLAND Well suited to continuous row cropping when adequately drained. Used mainly for growing corn and soybeans.

WOODLAND Woodlands do not occur naturally on these soils. Suitable species to plant: black spruce, pin oak, green ash, eastern larch.

WILDLIFE Well suited in drained areas for openland and woodland wildlife. Poorly suited for wetland wildlife in drained areas. Undrained areas are poorly suited for openland, suited for woodland, and well suited for wetland wildlife.

RECREATIONAL USES Severe limitations on all uses due to poor drainage, ponding, and flooding, and slow drying ability.

GENERAL URBAN DEVELOPMENT Severe: Frequent or continuous water saturation; very slow runoff of surface water; subject to ponding; excavations fill with water in the spring; wet basements probable; dries very slowly; foundations, slabs, walks, and streets subject to cracking and heaving due to frost heave and shrink-swell.

SEPTIC TANK FILTER FIELDS Moderate: High organic matter content in upper 2 feet; moderately slowly permeable.

SEWAGE LAGOONS Moderate: High organic matter content in upper 2 feet; moderately slowly permeable.

Marshland (718) - Wet marshy areas, generally too wet to identify the soil. Most marsh areas are covered with water for long periods of time and are underlain by muck or loamy to clayey mineral soils. The high organic content, severe instability, and poor drainage severely limits its use for almost all types of development.

Urbanized Lands

Markham-Ashkum Urban Land Complex (923) - Soils in this category are urbanized, but generally retain the original landscape. Markham soils are well to moderately well drained while Ashkum soils are poorly drained. Permeability is slow to moderately slow. Markham soils have moderate limitations for urban uses due to clayey subsoils. Erosion and siltation are likely during construction and lawns are difficult to establish. Excavations tend to hold water. Ashkum soils have severe limitations for most uses due to frequent to continuous water saturation. Surface water runoff is slow to ponded, excavations fill with water and the soil is generally slow to dry. Shrink-swell potential is high. Due to the highly urbanized nature of the Markham-Ashkum series, on-site investigations are necessary to more specifically detail soil types on a particular site.

Urban Land (533) - No rating given since more than seventy-five percent of area was covered by concrete and buildings.

Cut and Fill Land-Clayey (534) - No rating given since all of the original soil profiles were disturbed or mixed by grading, cutting and filling. Exposed clayey material is plastic and sticky when wet, very hard when dry. Severe hazard of erosion and siltation exists during construction.

Land Fill (536) - No rating given since area consists primarily of waste materials and rubble piles from demolished buildings, construction operations, abandoned pits, and sanitary landfills.

All soil types in the urbanized lands category require detailed on-site investigations to better determine soil characteristics.

Summary

The soil interpretations presented in this appendix are not meant to replace detailed on-site investigations. They are intended to serve as an alternative system from which potential problem areas can be determined and as an aid in interpreting soils analysis provided by potential developers. Detailed soils maps are available at the offices of the Du Page County Regional Planning Commission and the United States Department of Agriculture, Soil Conservation Service.