INTENSIVE SOIL SURVEY FOR LAND PLANNING

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in cooperation with

USDA, Soil Conservation Service and DeKalb County Soil and Water Conservation District

October 15-16, 1992

Patrick Kelsey, Editor ISCA Newsletter The Morton Arboretur Route 53 Lisle, IL 60532





INTENSIVE SOIL SURVEY FOR LAND PLANNING OCTOBER 15-16, 1992

DeKalb County Farm Bureau Building

Sponsored by

Illinois Soil Classifiers Association

in cooperation with

USDA Soil Conservation Service

and

DeKalb County Soil and Water Conservation District

BACKGROUND

The use of intensive scale soil survey as a planning tool is growing in popularity. The application of soil survey interpretation requires an in-depth understanding of both soils and the development process. This conference will focus on both the mechanisms involved in intensive scale soil survey and the use of the soil survey product in the development process. The Illinois Soil Classifiers Association is sponsoring this workshop to increase the awareness of the value of intensive soil survey in land planning.

SCHEDULE

October 15, 1992

Registration - 10:00 -12:00 Noon

12:30 PM Introduction - History. Bruce Putman, President, ISCA

192

141

12:45 PM Panel Discussion: Perspectives on Intensive Soil Surveys in Subdivision Ordinances. Moderator: Steve Zwicker, Area 1 Soil Scientist. Panel: Ben Reintz, Ogle County Board Member; Bob Leonard, Kane County Health Dept.; Patrick McNulty, McHenry County Health Dept.; B. Insley, Kane County Developer; Chris Aiston, Dekalb County Planning Dept.

1:45 PM Research in Soil Survey Interpretations. Dr. E. Jerry Tyler, Professor of Soil Science, University of Wisconsin-Madison

2:30 PM Break

2:45 PM Value of Soil Survey in Land Use Planning. Chuck Hanlon, Land Planner

3:30 PM Construction of Intensive Soil Surveys. Don Fehrenbacher, Area 2 Soil Scientist, SCS

4:15 PM Application and Benefits of Intensive Mapping. Kenneth Anderson, Kane County Development Dept.

5:00 PM Adjourn

October 16, 1992

8:30 AM Intensive Soil Survey for Subdivision Planning, Field Site, Rochelle, Illinois. Bruce Putman, Tom Huddelston, Chuck Hanlon

12:00 PM Lunch at Rochelle Park

1:00 PM Adjourn

ACCOMMODATIONS

Listed below are a number of motels in the DeKalb area. Participants are responsible for making their own reservations.

Days Inn 1212 W. Lincoln Highway (Rt.38) DeKalb, IL 60115 (815) 758-8661

Howard Johnson 1321 W. Lincoln Highway DeKalb, IL 60115 (815) 756-3398

Motel 6 1116 W. Lincoln Highway DeKalb, IL 60115 (815) 756-3398

Oxford Inn 2675 Sycamore Road (Rt. 23) DeKalb, IL 60115 (815) 756-3552 Stratford Inn 355 W. State Street Sycamore, IL 60178 (815) 895-6789

REGISTRATION

Registration includes: Instructional program, field trip, course materials, and second day luncheon. Mail the attached registration form along with a check (payable to Illinois Soil Classifiers Association) to:

Don Fehrenbacher ISCA Short Course USDA-SCS 18 Heritage Plaza Bourbonnais, IL 60914

FEES

ISCA Member or Affiliate \$25.00

Non-member \$30.00

Student \$15.00 Proof of Enrollment Required

Name	_
Organization	_
Address	_
City	-

State and Zip _____

INTENSIVE SOIL SURVEY FOR LAND PLANNING

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COURSE NOTES

Compiled and Edited by

P.D. Kelsey R.G. Hootman R. Reid

October 15-16, 1992

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PLANNING COMMITTEE

Don Fehrenbacher, Chair, SCS

Ken Anderson, Kane County Development Dept. Larry Gramm, Lake County Health Dept. Patrick Kelsey, Morton Arboretum Bruce Putman, Putman Soil Testing

SUBDIVIDING OF PARCELS TO BE SERVED BY SEPTIC SYSTEMS

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by Patrick McNulty McHenry County Department of Health

McHenry County has a population of 185,000 with approximately 45% of the population served by individual septic systems. The development of new home sites serviced by septic systems have become a large portion of the development that takes place in the County. In many of the areas serviced by individual septic systems, public sewers will not become available. Thus, septic systems are a permanent utility that must have adequate oversight from the platting of new lots, through the installation and the ongoing maintenance.

McHenry County has had an aggressive subdivision review process since approximately 1975. This process includes an established subdivision ordinance and review by the County's Health, Planning, Building and Highway Departments. In an average year a dozen new developments representing several hundred lots are reviewed and platted in the county. In 1987 the County looked at an upgraded septic system siting process for new subdivisions from using percolation test to the exclusive use of onsite soil borings. The platting of new subdivisions and the permitting of individual lots for septic system was changed in 1988 to utilize onsite soil borings for determining the suitability. Previous to the Ordinance change, the Department relied on one engineer's percolation test per acre, one soil boring per ten (10) acres and the County's soil map. Areas would be restricted from development based upon this information with the developer showing at least one half acre of suitable soils per lot.

With the change in requirements in 1988 we required at least one soil boring per acre on a two hundred foot grid. More borings may be necessary to accurately reflect onsite soil conditions. The Department's objective was to locate via the soil borings one half acre of soil that could support a conventional septic system. The Department's recognizes the ability of soils in an unsaturated condition to provide the necessary treatment of sewage. Also that a conventional septic system requires minimal input from the home owner and provides satisfactory year round treatment of sewage.

In the subdivision review process the Department looked at other factors that could impact a site and its suitability for a conventional septic system. These included cutting or filling of a lot, road construction and temporary construction of access roads. The Department found that tight control in the planning stages is necessary to prevent damage of suitable soils.

The Department has been very pleased with the results of the current subdivision siting process. The effort put into the program has paid dividends in assuring vacant property owners that their parcels are suitable for development. The Department has less involvement in trying to devise or approve systems for less than optimum conditions.

The previous method (prior to 1988) of siting new subdivisions did not accurately reflect limitations of the property. High water tables with poor permeability were not accurately reflected by the people doing the work. These limitations became more pronounced at the time of individual permitting for a septic system. At that point we were dealing with a platted parcel that may have severe limitations that were very difficult if not impossible to overcome. The results were septic systems placed where they should not be and subsequent premature failures of systems that had gone through a comprehensive subdivision review process. It became obvious that a more comprehensive approach of assuring that suitable sites were being developed was needed.

Since the new siting method for subdivisions was implemented the Department is not aware of any failures due to improper soil conditions. Under the previous subdivision siting method several premature failures of systems routinely occurred.

MCHENRY COUNTY SUBDIVISION ORDINANCE

APPENDIX H

ADDITIONAL REQUIREMENTS FOR SUBDIVISION TO BE SERVED BY SEPTIC SYSTEMS

H-1 GENERAL

When it is proposed to utilize septic systems for the disposal of sewage, the soils and soil conditions present on the site are extremely important. The purpose of the Appendix is to specify the requirements which must be met by the owner at the three stages of the plat review procedure.

H-2 SKETCH PLAN STAGE

At the Sketch Plan stage, the owner must submit a Natural Resource Inventory showing the location of the property in question and the types of soils found on that property. The proposed Sketch Plan should take the soil types of the official McHenry County Maps into consideration to reasonably assure the ability generally to obtain one-half acre of suitable soil in one continuous area on each lot. Suitable soils are considered to be soils that are not specified as critical soils in the Soils Standards Manual for Waste Disposal Systems. Further on-site investigation will be required prior to submission of the Tentative Plat.

H-3 TENTATIVE PLAT STAGE

When a subdivision is to be served by septic systems, the Tentative Plat shall be prepared in accordance with the following additional requirements and procedures:

- A. Soil mapping based upon on-site determination of soil characteristics shall be conducted to determine soil suitability for septic systems. Soil survey and mapping shall be by a Soil Classifier as defined in this ordinance. To determine soil suitability for septic systems, the following procedure shall be utilized:
 - 1. There shall be a sufficient number of soil borings throughout the proposed acreage for platting so as to allow intensive mapping of soil characteristics and limiting factors related to suitability for septic systems. The mapping and overlay of such characteristics should be of sufficient detail to minimize the potential for inclusions and to determine the existence of at least 1/2 acre of suitable soils on each proposed lot. There shall be at least one boring on each acre of the proposed subdivision. The location of all borings shall be shown on the soil map overlay.

A 200 ft. grid system will be established and one boring at each grid point shall be performed. In addition, sufficient additional borings shall be completed to adequately identify each soil mapping unit.

- 2. The McHenry County Department of Health shall be notified at least 24 hours before commencement of on-site boring so that the Department may observe the boring and sampling procedures, if it so desires. Any boring conducted without the Department being notified may not be acceptable.
- 3. A map, report and logs of each soil series mapped on the site shall be prepared and included in the Soil Classifier's report. Logs should be available on request.
- 4. The date/s of all field work shall be indicated.
- 5. The entire subdivision area shall be mapped showing soil types present with boundaries of each defined considering areas of transition. This mapping shall be coordinated with site topography.
- 6. The map shall also depict areas of seasonal high groundwater as determined by the Soil Scientist's observation of the drainage characteristics of the soil; long-term monitoring of observation wells approved by the Department of Health may be used to supplement this information. Boundaries of the following areas shall be defined:
 - a. seasonal high groundwater or other limiting layer at less than 18".
 - b. seasonal high groundwater or other limiting layer at 18" to 30".
 - c. seasonal high groundwater or other limiting layer at 30" to 42".
 - d. seasonal high groundwater or other limiting layer at 42" to 60".

- e. seasonal high groundwater or other limiting layer greater than 60".
- B. A detailed map showing the soils present and locations of borings (per H-3-A.)
- C. Only soil types depicted on the site soil map and classified as suitable soils for septic systems may irrefutably be included in the one half (1/2) acre of soils suitable for septic systems required for each lot.
 - 1. Soils not considered suitable for septic systems shall not be included in the 1/2 acre of required soils, and in addition, shall be indicated as being restricted for septic systems on the plat.
 - 2. If earth fill is intended to be placed as an adjunct to an engineering plan proposed per C.1 above, all areas of filling and/or cutting must be clearly delineated. It should be known that this may influence septic suitability.
- D. Where small lot size dictates, a uniform location of wells and septic systems shall be shown on the lots to eliminate conflicts between wells and septic systems.
- E. Septic system restriction lines shall be shown on the Tentative Plat in conjunction with all drainage easements, detention and retention easements and dry wells, in accordance with the following:
 - 1. <u>Drainage Easements</u> must have a twenty-five (25) foot septic restriction line shown on the Tentative Plat, such line being at least twenty-five (25) feet from the edge of the drainage of the drainage easement. If the drainage easement is for pipe or conduit, the restriction line shall be fifteen (15) feet beyond the easement. The portrayal shall clearly indicate which side of the line is restricted.
 - 2. <u>Pond type retention facilities</u> must have a septic restriction line shown on the Tentative Plat at least fifty (50) feet from the maximum perimeter of the pond, at high water level (100 year event).
 - 3. <u>Dry retention basins and dry wells</u> must have a septic restriction line at least twentyfive (25) feet from the easement protecting the structure or detention area.
- F. The developer must prove to the satisfaction of the Staff Plat Review Committee that each lot on the Tentative Plat has generally one-half (1/2) acre of suitable soil in a continuous location.
- G. The signature of the Soil Classifier by whom the soil mapping was done and the report prepared, must be affixed to both the report and the Tentative Plat.

H-4 FINAL PLAT STAGE

When a subdivision is to be served by septic systems, all septic system requirements of the Tentative Plat stage must continue to be met at the Final Plat stage. The following requirements must be met during the preparation of the Final Plat and engineering drawings:

- A. All areas restricted for septic systems must be designated on the Final Plat.
- B. Where site-specific engineering has been approved, the engineering plans must include details of such engineering.

H-5 EXTENSIVE AREAS OF FLOOD HAZARD OR CRITICAL SOILS - SPECIAL PROCEDURES

If an extensive area of Flood Hazard or critical soils makes it impossible to obtain the required one-half (1/2) acre continuous piece of land without restrictions for septic systems on one or more lots, the procedures of this Section may be followed.

A. Land designated as Flood Hazard is not acceptable for the installation of a septic system, and cannot be included as part of the one-half (1/2) acre of land suitable for septic systems required on every lot. Consideration of any alterations of such areas is discouraged, and any proposals for changes must be handled on a case by case basis.

NOTE: A Conditional Use Permit to fill-in Flood Hazard Land is based partly on the provision of "compensatory storage". In brief, this means that for every cubic yard of fill added to an area of Flood Hazard, one cubic yard of material must be removed from a nearby area of the same Flood Hazard area so that there is no net loss of flood storage volume.

- B. Removal of native soils and replacement with suitable soils shall be considered a "madeland" situation, and for the most part are not considered acceptable for on-site wastewater disposal purposes. Any such consideration of this approach should be only after consultation with the Health Department personnel prior to preparing any plans.
- C. Certain soils are designated as "critical" for septic systems due to a high groundwater elevation. The use of an extensive system of curtain drains or tiling in such a situation will not be permitted due to possible problems with maintenance in the future and the uncertainty as to whether curtain drains are capable of affecting groundwater elevation except in specific situations.
- D. It is suggested that all proposals for site-specific engineering designs be discussed with the Health Department before detailed plans are prepared.

RESEARCH IN SOIL SURVEY INTERPRETATIONS

by E. Jerry Tyler University of Wisconsin-Madison

Land planners and decision makers need objective information about the potential of land for a variety of uses. The demands on the land resources are accelerating and there is need for faster and more accurate decisions. Decisions must be based on accurate readily available and logically applied soil information.

The use of specific land based technology is partially determined by the acceptance of the probability of successful operation of the technology. Acceptance of a level of success is a decision made prior to use of the technology. Success can be estimated by determining the success of the components of the technology. Components may include land and soil factors, engineering design, construction, use intensity and management. The technology with the highest probability of success of each of the components has the greatest overall probability of success.

Soil scientists assess land and soil properties for general mapping and for single uses. The ability of the soil scientist to provide correct assessment depends in part on the nature of soil variability. Soil variability is dependent on perspective and the scale of resolution. The perspective of those considering intense land uses is one of detail with costly consequences should failure of technologies occur.

Soil variability can be grouped into two broad categories: systematic and random. Systematic variability is a change in soil properties as a function of landform or soil forming factors. Random variations are associated with soil properties that cannot be related to known causes. Soil scientists successfully predict soil properties and their variation based upon systematic variability; however, random variability creates considerable difficulty for prediction.

The soil scientist is to predict soil properties such that all points within the area of consideration will be beyond defined limits. Therefore, the soil scientist must know the magnitude of the variability and the outer limits of the variability with a level of confidence. Confidence of the estimation of the properties can be increased in highly variable soil regions by increasing the number and intensity of observations. The intensity of observation needed to reach the same level of confidence of prediction of soil properties is different in different soil settings.

Selection and application of land technologies is based on the soil properties and the defined limits. In many cases the limits used are those of regulations. Regulations generally set limits on soil conditions for a high success rate of specific engineering application. The limits set by some regulations allow for applications with low probability of success.

One technology important to the planning and use of soil and land in unsewered areas is the use of onsite wastewater disposal systems. In most areas, onsite wastewater disposal systems are the most limiting land applied technologies for housing. Therefore, it is a very important consideration for planning the uses of land. Onsite wastewater disposal systems have siting, design, construction, use and management components. Each component has a probability success. Those components with the highest success performance probability are the least likely to be a primary cause of failure. The siting success is dependent on the proper estimation of soil properties. Increasing performance with correct soil evaluation and interpretation reduces the health and environmental risks by increasing the probability of successful systems.

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CONSTRUCTION OF INTENSIVE SOIL SURVEYS

by Donald Fehrenbacher Soil Conservation Service

<u>The Purpose of Intensive Soil Surveys</u> is to provide very detailed information beyond existing Soil Survey Reports. National Cooperative Soil Surveys published for an entire county are designed for general land use planning, including regional planning, zoning decisions and conceptual planning. These soil survey maps were never designed to provide site specific soils data due to four inherent limitations:

- 1. The scale of maps (1:15,840 or 1 inch = 1320 feet) does not allow soil delineations less than about 3 acres in size to be displayed.
- 2. The number of soil samples examined establishes the standard of purity of soil map units. A smaller number of soil sample sites reduces the accuracy of the map because of increased inclusions of other soils.
- 3. The lack of precise sample locations and the use of a photographic base reduces the precision of locating soil boundaries.
- 4. The lack of detailed soil boring logs at most sites does not allow independent review of the data used to create the soil map.

Intensive soil surveys provide the required accuracy and precision for the dedication of areas for specific land uses. This is needed to insure an acceptable level of detail for site suitability planning. Suitabilities are determined by the land use decision makers in an individual county or village, not by the soil classifier. However, a common methodology for intensive soil surveys should be adopted by soil classifiers to insure consistent map quality.

The Methodology for Intensive Soil Surveys includes the following minimum standards:

- 1. Topographic base map of a 1 or 2 foot contour interval.
- 2. Base map scale of 1:1,200 or 1 inch = 100 feet.
- 3. Two hundred foot grid for sample location.
- 4. Soil sampling density of 200 x 200 feet plus additional, intermediate samples. Actual samples may vary from grid points to identify soil-landscape changes. (This sampling density is based on minimum 1 acre lot size.)

- 5. Soil sampling procedures soil pits are ideal to identify small scale soil variation. Two to three inch core samples are minimum to identify soil structure. A combination of soil pits and cores can be used.
- 6. Soil boring log data required:
 - a) Soil color, matrix, mottles and coatings by soil layer
 - b) Soil texture by layer
 - c) Soil structure by layer
 - d) Soil consistence by layer
 - e) Depth to limiting layers
- 7. Map units soil series, variants and phases
- 8. Depth to limiting layers:
 - a) Seasonal high water table
 - b) Slow and very rapid permeabilities
 - c) Bedrock
- 9. Professional standards and qualifications soil classifiers certified with:

Illinois Soil Classifiers Association (ISCA) Mark Bramstedt, Secretary/Treasurer ISCA Certification Board 320 E. Locust Watseka, IL 60970

American Registry of Certified Professionals in Agronomy, Crops and Soils (ARCPACS) 677 South Segoe Road Madison, WI 53711-1086

APPLICATION AND BENEFITS OF INTENSIVE MAPPING IN KANE COUNTY

by Kenneth N. Anderson, Jr. Kane County Development Department

Kane County is located west of the major urban growth and development areas. The county has been experiencing growing pains from the expansion of urban growth to its unincorporated areas which are typically serviced by well and septic. This growth has stimulated the county to develop a subdivision ordinance that addresses procedure and proper layout and development of a site.

In 1983, the county board amended its subdivision ordinance to incorporate a soils program. This change provided for the use of the <u>Soil Survey of Kane County</u>, <u>Illinois</u> (1979) in the concept stage of the subdivision process. The ordinance requires each concept plan to display the soils according to the soil survey, indicating limitations for septic use by color coordinating the soil map with green for slight limitations, yellow for moderate limitations, and red for severe limitations. This early staged warning system provides the county an initial evaluation of the site characteristics and limitations for development.

Upon completion of the concept stage and proceeding to the preliminary plan stage requires further evaluation of site characteristics. The soils are evaluated through the use of an intensive soil survey conducted by a certified soil classifier. This investigation provides the necessary information to evaluate a subdivision lot layout. Intensive subdivision soil mapping identifies and provides various information:

- 1. Soils data
 - a. Soil series and classification;
 - b. Depth to seasonally high water table;
 - c. Depth to observed water table;
 - d. Estimated permeability (in./hr.); and
 - e. Depth to moderate slow or slower permeability.
- 2. Soils information for use in siting a conventional septic system
 - a. Identifies unsuitable soil areas for septic;
 - b. Areas requiring subsurface drainage improvements;

- c. Areas in need of septic fill; and
- d. Locations for suitable fill.
- 3. House pad locations that are in need of bearing capacity investigation.
- 4. Road locations that may require further study.
- 5. Stormwater management facilities and pond design.
- 6. Soil erosion potential for soil erosion and sediment control plan.

The county has benefited from the present program with some of the following:

- 1. Soils information incorporated into a subdivision layout reduces the potential septic system failure rate. This is due to septic areas being located in soils that are considered suitable for such use.
- 2. Home sites are being located in areas that should not experience seasonally high water tables. This is because the house pads are being designated in soils with limited seasonally high water table or a required subsurface drainage system is constructed to lower the water table.
- 3. House pads are further evaluated for bearing capacity upon review of intensive soil mapping. When soil areas are in question bearing capacity borings are completed to insure there are reduced problems for footings and foundations.

Kane County has adjusted and upgraded its subdivision ordinance with the ever increasing understanding and knowledge that each piece of land undergoing development has its own unique characteristics and that standards need to be developed that will support the proper development of such areas.

The intensive subdivision mapping program provides the best available soils information to promote proper land planning and subdivision design.

KANE COUNTY SUBDIVISION ORDINANCE: APPENDIX II

Additional Requirements For Subdivisions To Be Served By On-Site Waste Disposal Systems

A. GENERAL

When it is proposed to utilize on-site waste disposal systems it is extremely important to determine which soils and their characteristics and limitations are present on the proposed site. The purpose of this Appendix is to specify the requirements that must be met by the owner/developer at the concept and preliminary plan stages of the subdivision review process.

B. CONCEPT PLAN STAGE

At the concept plan stage, the owner must submit a Land Use Opinion report, obtained from the Kane-DuPage Soil and Water Conservation District, showing the location of the property in question and the types of soils found on that property. The concept plan should take the soil types of the official Soil Survey of Kane County into consideration to reasonably assure the ability to obtain one-half (1/2) acre suitable soil in one (1) continuous area on each lot for an on-site waste disposal system. Suitable soils are considered to be soils that are not specified as severe soils in the Kane County Septic Ordinance.

C. PRELIMINARY PLAN STAGE

When a subdivision is to be served by on-site waste disposal systems, the preliminary plan shall be prepared in accordance with the following:

- 1. Soil mapping, based upon the on-site determination of soil characteristics, shall be conducted by a soil classifier as defined in the Subdivision Regulations Ordinance. The soil map and report submitted by the soil classifier shall be used to determine the soil suitability for on-site waste disposal systems. Soil mapping shall done according to the following criteria:
 - a. There shall be a sufficient number of soil pits throughout the proposed acreage to allow intensive mapping of soil characteristics and limiting factors related to suitability for on-site waste disposal systems. The mapping and overlay of such characteristics shall be of sufficient detail to minimize the potential for inclusions and to determine the existence of suitable soils on each proposed lot. There shall be at least one (1) pit on each acre of the proposed subdivision. The location of all pits shall be shown on the soil map and each pit shall be numbered consecutively.
 - b. A two hundred (200) foot grid system will be established. At each grid point a pit shall be excavated. In addition, sufficient additional borings shall be required to

adequately determine soil boundaries between soil mapping units.

c. Soil pits shall be dug by backhoe to a minimum depth of five (5) feet and a minimum width of twenty-four (24) inches.

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- d. One (1) end of the pit shall be stepped or slanted to permit adequate ingress and egress.
- e. Alternative methods of soil investigation shall be at the discretion of the Plat Officer.
- f. The Kane County Development and Health Departments shall be notified at least one (1) week before commencement of on-site investigations so that the department(s) may observe the soil pits and sampling procedures, if they so desire. Any on-site investigation conducted without the department being notified will not be accepted.
- g. A detailed soil map and the logs of each soil series mapped on the site shall be prepared by the soil classifier and submitted with the soil report. The developer must prove to [the] satisfaction of the Development Department that each lot on the preliminary plan has the required square footage of suitable soil in a continuous location. Individual and intermediate pit locations shall be logged and submitted with the following information:
 - 1) pit number;
 - 2) sample method;
 - 3) soil series and classification;
 - 4) parent material;
 - 5) percent of slope;
 - 6) seasonal water table (in.);
 - 7) observed water table (in.);
 - 8) depth of moderately slow to very slow permeability layer (in.);
 - 9) horizon depth (in.);
 - 10) texture;
 - 11) structure;
 - 12) color and Munsell notation;
 - 13) mottles;
 - 14) coatings;
 - 15) consistence;
 - 16) estimated permeability (in./hr.);
 - 17) date of investigation.
- h. The date(s) of all field work shall be documented on the soil maps and report.
- i. The entire proposed subdivision area shall be mapped showing soil types present with boundaries of each defined considering areas of transition. This mapping shall be coordinated with site topography at a one (1) or two (2) foot contour intervals

at a minimum of a 1'' = 100' scale.

- j. In addition a map shall be submitted that depicts areas of seasonal high groundwater, limiting permeability, bedrock or other limiting layer as determined by the soil classifier's observation of the soil characteristics. Long-term monitoring wells, approved by the Development Department, may be used to supplement this information. Boundaries of the following areas shall be defined and shown on the soil map:
 - 1) seasonal high groundwater or other limiting layer at less than 12";
 - 2) seasonal high groundwater or other limiting layer at 12" to 30";
 - 3) seasonal high groundwater or other limiting layer at 30" to 48";
 - 4) seasonal high groundwater or other limiting layer at 48" to 60"; and,
 - 5) seasonal high groundwater or other limiting layer greater than 60".
- 2. Those soil types classified as suitable for an on-site waste disposal shall be permitted to be used for an on-site waste disposal system site. Those soil types shall be shown on the soil map.
- 3. Those soil types classified as not suitable for an on-site waste disposal system shall not be included in the waste disposal site area, and, shall [be] so shown as unsuitable soil on the soil map.
- 4. All on-site waste disposal systems shall be sized for each lot using the reported soils information in the following manner:

Map Unit	Series	Depth to Seasonal High Water Table (in)	Depth to Limiting Perme- ability (in)	Required On-site Waste Disposal Size (sq. feet)
24B	Dodge sil*	>30	>48	15,000
24C2	Dodge sil	>30	>48	15,000/20,000
27B	Miami sil	>30	>48	15,000/20,000
27C2	Miami sil	>30	>48	15,000/20,000
27D2	Miami sil	-	-	20,000
27D3	Miami cl	8	3	20,000
59	Lisbon sil	-	-	20,000
60C2	La Rose loam	>30	>48	15,000/20,000

		Depth to Seasonal	Depth to	Required On-site
Мар		High Water Table	Limiting Perme-	Waste Disposal
Unit	Series	(in)	ability (in)	Size (sq. feet)
60D2	La Rose loam			20,000
62	Herbert sil	1 2 1		20,000
67	Harpster sicl) (
69	Milford sicl	-	H	3 4
76	Otter sil	•	-	-
82	Millington loam	1		-
93F	Rodman Soils	■.3	-	-
103	Houghton muck		<u>_</u>	
104	Virgil sil	-	-	20,000
105A	Batavia sil	>30	>48	15,000
105A	Batavia sil	<30		20,000
105B	Batavia sil	>30	>60	15,000
105B	Batavia sil	<30	-	20,000
125	Selma loam	÷.	-	
134A	Camden sil	>30	>60	15,000
134A	Camden sil	<30	3,5	20,000
134B	Camden sil	>30	>60	15,000
134B	Camden sil	<30	: - :	20,000
134C2	Camden sil	>30	>60	15,000
134C2	Camden sil	<30	> _	20,000
145A	Saybrook sil	>30	>48	15,000/20,000
145B	Saybrook sil	>30	>48	15,000/20,000
145C2	Saybrook sil	>30	>48	15,000/20,000
146	Elliott sil	12 (25,000
148A	Proctor sil	>30	>60	15,000
148A	Proctor sil	<30	-	20,000
148B	Proctor sil	>30	>60	15,000
148B	Proctor sil	<30	-	20,000
149	Brenton sil	-	2 2 1	20,000
152	Drummer sicl			à:
154	Flanagan sil	-	÷	20,000
171A	Catlin sil	>30	>60	15,000
171A	Catlin sil	<30		20,000
171B	Catlin sil	>30	>60	15,000
171B	Catlin sil	<30		20,000
194B	Morley sil	-	•	25,000
194C	Morley sil		1	25,000
194D	Morley sil	-	-	25,000
194E	Morley sil	(*)	-	-
198	Elburn sil	-	<u>a</u>	20,000

		Depth to Seasonal	Depth to	Required On-site
Map		High Water Table	Limiting Perme-	Waste Disposal
Unit	Series	(in)	ability (in)	Size (sq. feet)
			• • • •	
199A	Plano sil	>30	>60	15,000
199A	Plano sil	<30	-	20,000
199B	Plano sil	>30	>60	15,000
199B	Plano sil	<30	-	20,000
206	Thorp sil	- -	-	¥ .
210	Lena muck	2 8	()	
219	Millbrook sil		1 	20,000
223B	Varna sil	-		25,000
223C2	Varna sil			25,000
233A	Birkbeck sil	>30	>60	15,000
233A	Birkbeck sil	<30		20,000
233B	Birkbeck sil	>30	>60	15,000
233B	Birkbeck sil	<30	-	20,000
233C2	Birkbeck sil	<30	•	20,000
236	Sabina sil	-		15,000
243A	St. Charles sil	>30	>60	15,000
243A	St. Charles sil	<30	•	20,000
243B	St. Charles sil	>30	>60	15,000
243B	St. Charles sil	<30	-	20,000
290A	Warsaw loam	>30	>60	15,000
290A	Warsaw loam	<30	<u>.</u>	20,000
290B	Warsaw loam	>30	>60	15,000
290B	Warsaw loam	<30	-	20,000
298	Beecher sil	H 3	-	25,000
318A	Lorenzo loam	>30	>60	10,000
318A	Lorenzo loam	<30		15,000
318B	Lorenzo loam	>30	>60	10,000
318B	Lorenzo loam	<30	-	15,000
318C2	Lorenzo cl	>30	>60	10,000
318C2	Lorenzo cl	<30	2 <u>-</u>	15,000
323C	Casco loam	-		15,000
323E	Casco loam	>30	>60	-
323E	Casco loam	<30	2 - 2	-
325A	Dresden sil	>30	>60	15,000
325A	Dresden sil	<30	-	20,000
325B	Dresden sil	>30	>60	15,000
325B	Dresden sil	<30		20,000
325C	Dresden sil	>30	>60	15,000
325C	Dresden sil	<30		20,000
327A	Fox sil	>30	>60	15,000

		Depth to Seasonal	Depth to	Required On-site
Map		High Water Table	Limiting Perme-	Waste Disposal
Unit	Series	(in)	ability (in)	Size (sq. feet)
327A	Fox sil	<30	i∰n – ⊑	20,000
327B	Fox sil	>30	>60	15,000
327B	Fox sil	<30	e)	20,000
327C	Fox sil	>30	>60	15,000
327C	Fox sil	<30	-	20,000
327D	Fox sil	-	9.	20,000
329	Will sicl	•	-	· •
330	Peotone sicl	.=:	-	-
343	Kane sil	1		20,000
344A	Harvard sil	>30	>60	15,000
344A	Harvard sil	<30	÷.	20,000
344B	Harvard sil	>30	>60	15,000
344B	Harvard sil	<30	-	20,000
344C	Harvard sil	>30	>60	15,000
344C	Harvard sil	<30	5 1	20,000
347	Canisteo loam	-	-	
361B	Kidder sil	>30	>60	15,000
361B	Kidder sil	<30	-	20,000
361C	Kidder sil	>30	>60	15,000
361C	Kidder sil	<30	3 .	20,000
361D	Kidder sil	· ,	7 🖬 :	20,000
369A	Waupecan sil	>30	>60	15,000
369A	Waupecan sil	<30	-	20,000
369B	Waupecan sil	>30	>60	15,000
369B	Waupecan sil	<30	(*	20,000
392	Urban land	19 4	-	-
442	Mundelein sil		-	20,000
531B	Markham sil	-		25,000
531C2	Markham sil	-	-	25,000
570B	Martinsville loam	>30	>60	15,000
570B	Martinsville loam	<30	_	20,000
570C	Martinsville loam	>30	>60	15,000
570C	Martinsville loam	<30		20,000
656B	Octagon sil	>30	>60	15,000/20,000
656C2	Octagon sil	>30	>60	15,000/20,000
656D2	Octagon sil			20,000
696B	Zurich sil	>30	>60	15,000
696B	Zurich sil	<30	-	20,000
697	Wauconda sil			20,000
791A	Rush sil	>30	>60	15,000

		Depth to Seasonal	Depth to	Required On-site
Map		High Water Table	Limiting Perme-	Waste Disposal
Unit	Series	(in)	ability (in)	Size (sq. feet)
791A	Rush sil	<30	2) — 1	20,000
791B	Rush sil	>30	>60	15,000
791B	Rush sil	<30	28	20,000
791C2	Rush sil	>30	>60	15,000
791C2	Rush sil	<30		20,000
792A	Bowes sil	>30	>60	15,000
792A	Bowes sil	<30	-	20,000
792B	Bowes sil	>30	>60	15,000
792B	Bowes sil	>30		20,000
792C	Bowes sil	>30	>60	15,000
792C	Bowes sil	<30		20,000
864	Pits, limestone	-) 🖬 (-
865	Pits, gravel			
921B	Faxon-Ripon		3 - 1	-
938C	Miami-Casco	>30	>60	15,000/20,000
938D	Miami-Casco			20,000
938E	Miami-Casco	-	·•• (20,000
1103	Houghton muck	.).	-	-

*sil - silt loam, cl - clay loam, sicl - silty clay loam

- 5. When fill, if permitted, is to be placed on an on-site waste disposal system area, the areas to be filled shall be specifically shown on the preliminary plan and site development plan along with the proposed fill material (textural analysis) to be used and the methods by which the fill will be placed on the site.
- 6. If an on-site waste disposal site is permitted to have fill placed on it, the fill area must be allowed to settle for one (1) full year prior to installation of the on-site disposal system.
- 7. Where lot size dictates, a uniform location of houses, wells and on-site waste disposal systems shall be shown on the lots to eliminate conflicts between houses, wells and on-site waste disposal systems. All easements that will restrict the placement of a house, well and on-site waste disposal shall be displayed.
- 8. The developer must prove to the satisfaction of the development department that each lot on the preliminary plan has the required square footage of suitable soil in a continuous location.

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