Best Practices
for

Site Assessment

and the

Septic Test Pit Investigation

Ontario Onsite Wastewater Association

SepticDesign.ca

Gunnell Engineering Ltd.

Presentation Summary

- Best Practices – Code Context
- Prior to Attending the Site
- When on Site
  - Site Assessment
  - Assessing Existing Sewage Systems
  - The Septic Test Pit Excavation
- Soil Percolation Time
- Sewage System Design Drawings

Site Evaluation & Soils Investigation

Ontario OBC

- **According to OBC 8.2.1.2, a Site Evaluation must be done for every site where a new or replacement sewage system is to be installed.**
- **Consideration, for each site, must be given to:**
  - **Soil and subsurface conditions**
  - **Horizontal and vertical separation distances**
  - **Topography and flooding potential**
  - **Lot size, available area for an on-site sewage system**
  - **Usage / occupancy of property**
  - **Potential impacts on water resources**

Prior to Attending to the Site

- **Obtain & Review Existing Documents**
  - ***Legal survey, Site plans, Building design drawings***
  - ***Future swimming pool, landscaping***
  - ***Topographic survey***
  - ***Aerial photographs***
  - ***Soil Map or historical review***
  - ***Existing permits***
  - ***Inspection / maintenance records from Town, Health Units and service providers***
  - ***Geotechnical, Environmental reports***
  - ***Natural Heritage Evaluations***

Prior to Attending to the Site

- **Arrange for Utility Locates**
  - ***hydro, gas, water, communications***
- **Have a preliminary design in mind based on anticipated soil & ground water conditions (Q, field size, location)**
- **Determine what installation constraints may exist;**
  - ***Conservation Authority & NEC boundaries***
  - ***Environmental setbacks***
  - ***Zoning or NHE requirements***
  - ***Flood plain elevation / limit (if applicable)***

Prior to Attending the Site

- **Have tools & supplies organized;**
  - **Camera**
  - **Transit Level, Total Work Station**
  - **Soil T Probe, Hand Auger**
  - **Tape Measure**
  - **Shovel, Scraper**
  - **Soil Sample Bags**
  - **Safety Equipment**
  - **Supplies needed for recording observations and test pit logs**

Prior to Attending the Site

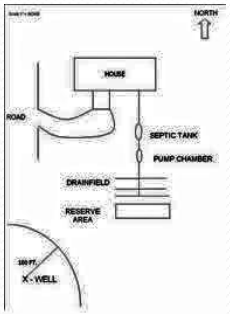
- **Contact Municipality / Health Unit Officials to determine their requirements and if they need inspectors on site for the test pit investigation / assessment, # of test pits**
- **Confirm dates / attendance with property owner**
- **Arrange for septic test pit digging equipment based on site accessibility**
  - ***Backhoe (septic contractor)***
  - ***Auger (when access is an issue)***

When On Site

Site Assessment

Take Photographs

Take Detailed Notes



Draw Sketches

When On Site

Site Assessment – Land Overview

When On Site

Site Assessment – Land Overview

When On Site

Site Assessment – Land Overview

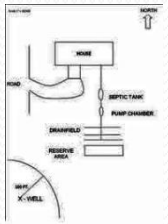
When On Site

Site Assessment

- **Walk the property to assess topography with maximum 4:1 slopes in mind (7:1 for Type 'B' Dispersal Beds) and note existing drainage features**

- **Note landscaping, existing swales, wet areas**

- **Locate existing / neighbouring wells, cisterns, structures etc.**



When On Site

Site Assessment – the Well?

When On Site

Site Assessment – the Drilled Well?

When On Site

Site Assessment – the Dug Well ?

When On Site

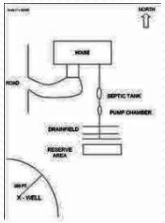
Site Assessment

Drilled, Dug, Sand Point, Shore Wells ?
Where is the well, wells?

When On Site

Site Assessment

- Undertake Transit Level, Total Work Station topographic survey. Establish local benchmark
- Choose location of septic test pits based on site conditions and envisioned septic system design and layout.
- Multiple test pits
- Native soil, fill soil, topsoil layers?

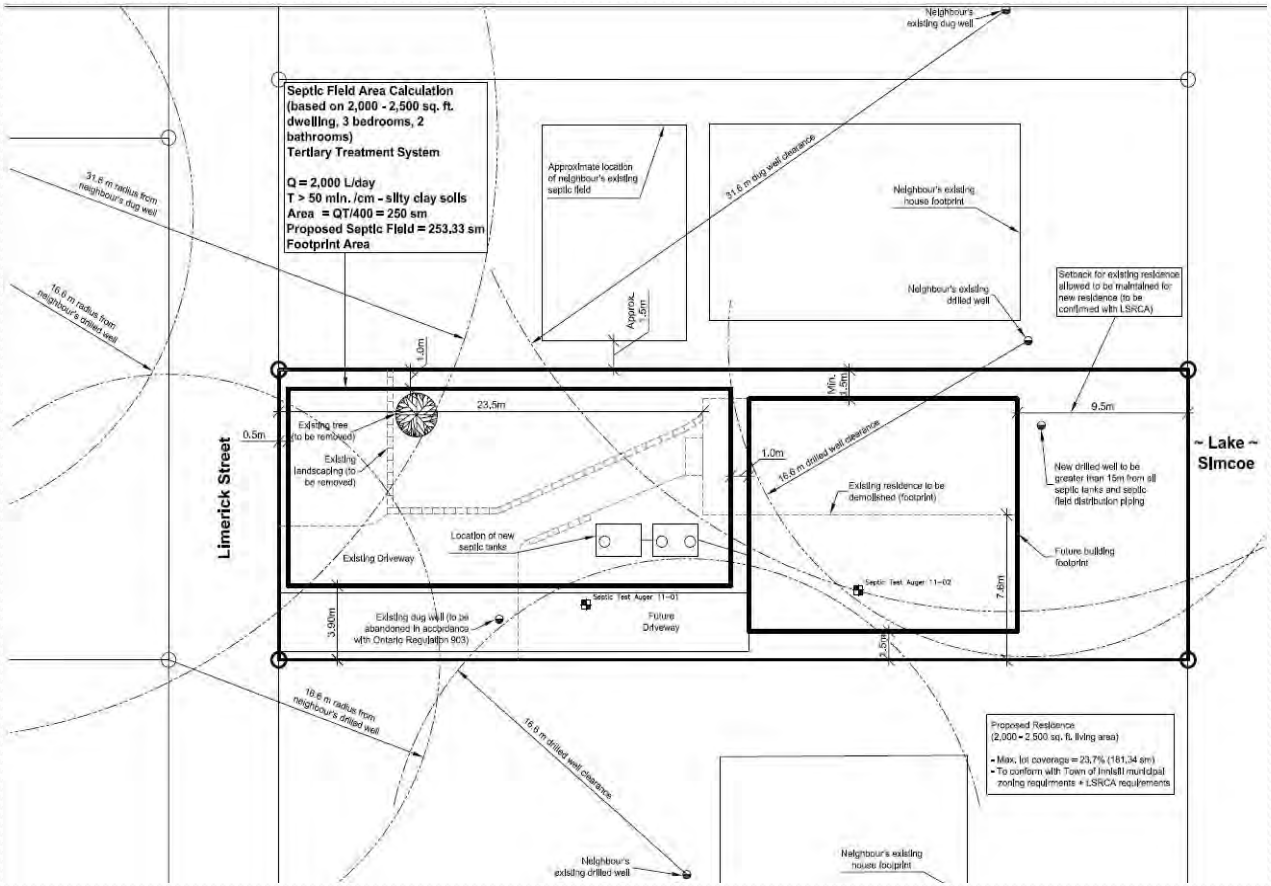


When On Site

Site Assessment – Topo Survey

When On Site

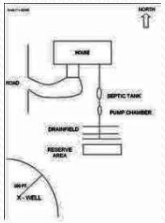
Site Assessment – Well Survey



When On Site

Assessing an Existing Sewage System

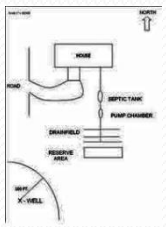
- House / building addition – larger daily flow (Q)
- Locate and assess condition of existing septic system components, for re-use / expansion
  - Septic tank
  - Pump tank
- Clearance distances



When On Site

Assessing an Existing Sewage System

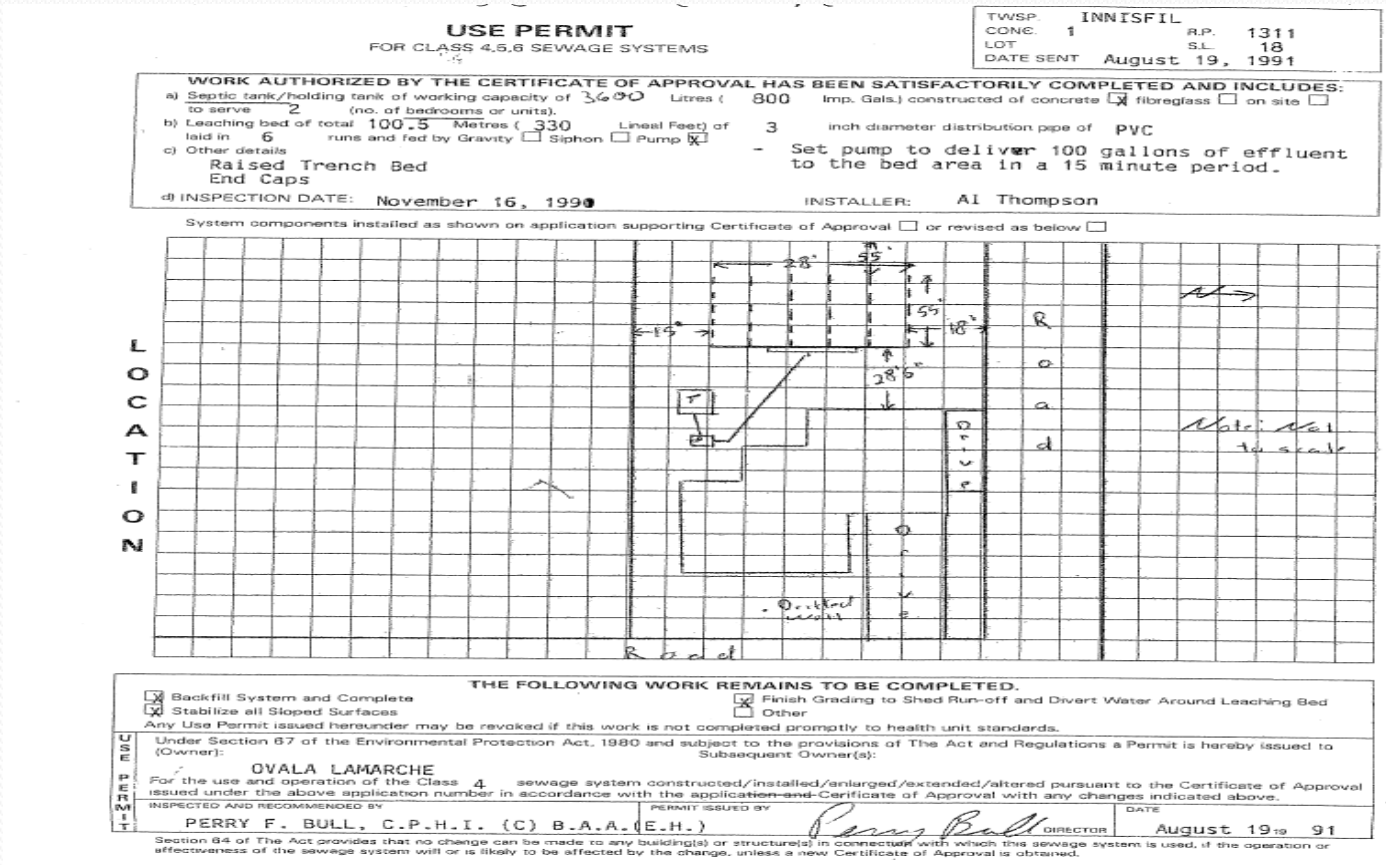
- **Excavate into existing bed or absorption trench field to assess condition / longevity;**
  - ***Original Health Unit permit?***
  - ***Confirm pipe locations with probe / excavator***
  - ***Expose distribution pipes to determine materials, size and condition, biomat formation***
  - ***Excavate test pits beside field and into native soil, to secure soils for assessment***



When On Site

Assessing an Existing Sewage System

-



USE PERMIT
FOR CLASS 4,5,6 SEWAGE SYSTEMS

TWSP. INNISFIL
CONC. 1 R.P. 1311
LOT S.L. 18
DATE SENT August 19, 1991

WORK AUTHORIZED BY THE CERTIFICATE OF APPROVAL HAS BEEN SATISFACTORILY COMPLETED AND INCLUDES:

a) Septic tank/holding tank of working capacity of 3600 Litres (800 Imp. Gals.) constructed of concrete [X] fibreglass [ ] on site [ ]
to serve 2 (no. of bedrooms or units).

b) Leaching bed of total 100.5 Metres (330 Lineal Feet) of 3 inch diameter distribution pipe of PVC
laid in 6 runs and fed by Gravity [ ] Siphon [ ] Pump [X]

c) Other details
Raised Trench Bed
End Caps
- Set pump to deliver 100 gallons of effluent to the bed area in a 15 minute period.

d) INSPECTION DATE: November 16, 1990 INSTALLER: Al Thompson

System components installed as shown on application supporting Certificate of Approval [ ] or revised as below [ ]

LOCATION

28' 55' 55' 15' 10' 28'6" Road Drive Note: Not to scale

THE FOLLOWING WORK REMAINS TO BE COMPLETED.

[X] Backfill System and Complete
[X] Stabilize all Sloped Surfaces
[X] Finish Grading to Shed Run-off and Divert Water Around Leaching Bed
[ ] Other

Any Use Permit issued hereunder may be revoked if this work is not completed promptly to health unit standards.

USE PERMIT

Under Section 67 of the Environmental Protection Act, 1980 and subject to the provisions of The Act and Regulations a Permit is hereby issued to
(Owner): OVALA LAMARCHE
Subsequent Owner(s):
For the use and operation of the Class 4 sewage system constructed/installed/enlarged/extended/altered pursuant to the Certificate of Approval issued under the above application number in accordance with the application and Certificate of Approval with any changes indicated above.

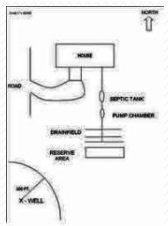
INSPECTED AND RECOMMENDED BY: PERRY F. BULL, C.P.H.I. (C) B.A.A.(E.H.)
PERMIT ISSUED BY: Perry Bull DIRECTOR
DATE: August 19 91

Section 84 of The Act provides that no change can be made to any building(s) or structure(s) in connection with which this sewage system is used, if the operation or effectiveness of the sewage system will or is likely to be affected by the change, unless a new Certificate of Approval is obtained.

When On Site

Assessing an Existing Sewage System

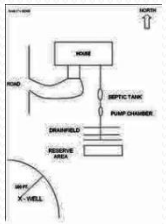
- Additional methods for locating and assessing existing subsurface system components
  - Drain Camera (with transmitter)
  - Metal detector with drain snake or subsurface detection measures
  - Dye or smoke
  - Flushable transmitter



When On Site

Assessing an Existing Sewage System

- Possible re-use of tanks?
- Soil condition? Percolation time?
- Amount of distribution pipe, New ‘Q’ assessment
- Re-use of existing sewage system?
  - New septic tank, enlarge field, add treatment unit
- Meet 2012 OBC requirements
- Replacement sewage system ?



When On Site

Assessing an Existing Sewage System

When On Site

Assessing an Existing Sewage System

When On Site

the Septic Test Pit Excavation

- **Consider accessibility to site for digging equipment and arrange with occupants and / or neighbours**
- **All parties on site!**
- **Observe Ministry of Labour safety guidelines for trenches and excavations**
- **Contractor to have spare materials to repair any distribution or header pipes damaged during the investigation**

When On Site

the Septic Test Pit Excavation

- **Septic test pits dug by backhoe to expose the soil profile and help gauge the variability of the soil and the presence of high ground water or restrictive layers**
- **Stepped excavation for access, caution**
- **Excavation depths**
  - **6 ft (1.8m), 3 ft (0.9m)**
  - **Access profile, if fill – excavate min. 3ft / 6 ft**

When On Site

The Septic Test Pit Excavation

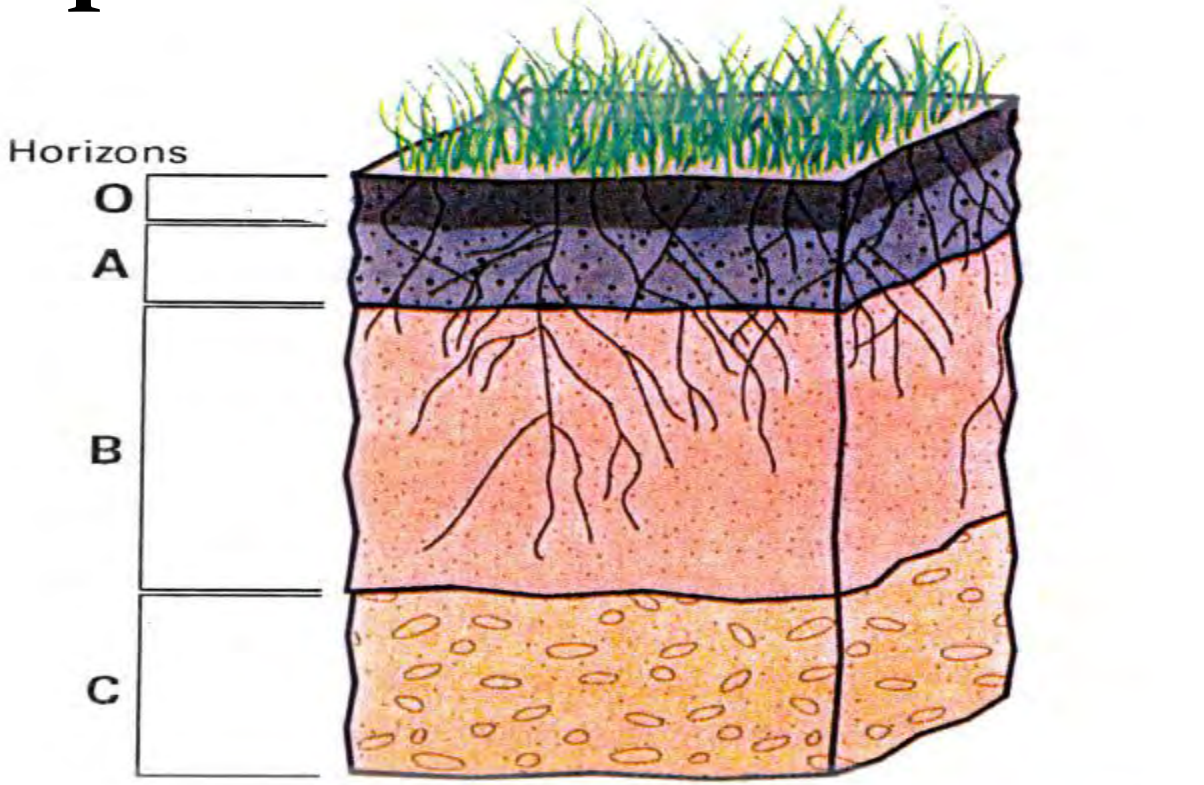
- **Dig 1, 2 or 3 test pits – soil variability, size, location (verify requirements with governing municipality)**
- **Excavate to a minimum depth of 1.8m (6.0 ft) or to a limiting surface condition**
- **Identify, examine, feel, measure and record the nature, structure, colour, compaction and depth of the soil layers – topsoil, fill, topsoil, soil layers**
- **Take photos and prepare a Soil Test Pit log with sketch**

When On Site
the Septic Test Pit Excavation

- **Note and record depth to groundwater or groundwater staining or to bedrock if present**
- **Obtain multiple soil samples at various levels and label them clearly for USCS classification and percolation time (T-time) determination**
- **If test pit is to be left open, take measures to eliminate any fall hazard with clear signage, a sturdy cover or fencing**

When On Site

the Septic Test Pit Excavation



Soil Profile Showing Different Soil Horizons

Soil Percolation Time

8.2.1.2. Site Evaluation Ontario **OBC**

- **(2) The percolation time shall be determined by,**
  (a) Conducting percolation tests

i.e. in-ground / in-situ soil testing,

- **Appendix A 8.2.1.2.(3) Test Procedure**
- **Digging holes, add water, measure time**
- **Percolation Time = Time Interval (min) / Ave drop (cm)**
- **Minimum 3 locations, use highest T-time**

Soil Percolation Time

8.2.1.2. Site Evaluation

(b) classifying the soil according to one of the following methods;

- ***the Unified Soil Classification System as described in MMAH Supplementary Standard SB-6, "Percolation Time and Soil Descriptions",***

Soil Percolation Time

Table 2
Approximate Relationship of Coarse Grained Soil Types to Permeability and Percolation Time

Soil Type (Unified Soil Classification) — Coarse Grained More than 50% Larger than #200	Coefficient of Permeability, K - cm/sec	Percolation Time, T - mins/cm	Comment
G.W. - Well graded gravels, gravel-sand mixtures, little or no fines.	10^{-1}	<1	very permeable unacceptable
G.P. - Poorly graded gravels, gravel-sand mixtures, little or no fines.	10^{-1}	<1	very permeable unacceptable
G.M. - Silty gravels, gravel-sand-silt mixtures.	10^{-2} - 10^{-4}	4 - 12	Permeable to medium permeable depending on amount of silt.
G.C. - Clayey gravels, gravel-sand-clay mixtures.	10^{-4} - 10^{-6}	12 - 50	Important to estimate amount of silt and clay
S.W. - Well graded sands, gravelly sands little or no fines.	10^{-1} - 10^{-4}	2 - 12	medium permeability
S.P. - Poorly graded sands, gravelly sand, little or no fines.	10^{-1} - 10^{-3}	2 - 8	medium permeability
S.M. - Silty sands, sand-silt mixtures.	10^{-3} - 10^{-5}	8 - 20	medium to low permeability
S.C. - Clayey sands, sand-clay mixtures.	10^{-4} - 10^{-6}	12 - 50	medium to low permeability depending on amount of clay
Column 1	2	3	4

Soil Percolation Time

Table 3
Approximate Relationship of Coarse Grained Soil Types to Permeability and Percolation Time

Soil Type (Unified Soil Classification)	Coefficient of Permeability, K - cm/sec	Percolation Time, T - mins/cm	Comment
Fine Grained More than 50% Passing #200			
M.L. - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, clayey silts with slight plasticity	10^{-5} - 10^{-6}	20 - 50	medium to low permeability
C.L. - Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	10^{-6} and less	over 50	unacceptable
O.L. - Organic silts, organic silty clays of low plasticity; liquid limit less than 50	10^{-5} and less	20 - over 50	acceptable depends on clay content
M.H. - Inorganic silts, micareaous or diatomageous fine sandy or silty soils, elastic silts	10^{-6} and less	over 50	unacceptable
C.H. - Inorganic clays of medium to high plasticity, organic silts	10^{-7} and less	over 50	unacceptable
O.H. - Organic clays of medium to high plasticity organic silt; liquid limit over 50	10^{-6} and less	over 50	unacceptable
Column 1	2	3	4

Soil Percolation Time

Table 2-8 Soil Hydraulic Loading Rates for Residential Strength Wastewater

SOIL CHARACTERISTICS[1]			PERCOLATION RATES (MIN/2.54 CM)	FIELD SATURATED HYDRAULIC CONDUCTIVITY (KFS) MM/DAY	WASTEWATER LOADING RATES IMPERIAL GALLONS/FT²/DAY (LITRES/M²/DAY)		
TEXTURE (USDA)	STRUCTURE				TYPE 1	TYPE 2	TYPE 3
	SHAPE	GRADE					
Gravelly sand	—	Single grain	< 2	>3,500	0.7 (34)	1.4 (68)	2.1 (103)
Coarse to medium sand/loamy sand	—	Single grain	2 – 5	1,500 – 3,500	0.6 (29)	1.2 (59)	1.8 (88)
Fine sand/fine loamy sand	—	Single grain	5 – 15	250 – 1,500	0.5 (25)	1.0 (49)	1.5 (75)
Sandy loam	Massive	structureless	20 – 30	125 – 250	0.3 (15)	0.45 (22)	0.6 (29)
	Platy	weak			0.3 (15)	0.45 (22)	0.6 (29)
		moderate, strong			not recommended	not recommended	not recommended
	prismatic, blocky, granular	weak	10 – 20	250 – 500	0.4 (20)	0.7 (34)	1.0 (49)
		moderate, strong			0.5 (25)	1.0 (49)	1.5 (74)
Loam	massive	structureless	30 – 40	60 – 125	0.2 (10)	0.3 (15)	0.4 (20)
	Platy	weak			0.2 (10)	0.3 (15)	0.4 (20)
		moderate, strong			not recommended	not recommended	not recommended
	prismatic, blocky, granular	weak	20 – 30	125 – 250	0.3 (15)	0.5 (24)	0.7 (34)
		moderate, strong			0.4 (20)	0.8 (39)	1.2 (59)
Silt loam, silt	massive	structureless	40 – 60	30 – 60	0.2 (10)	0.3 (15)	0.4 (20)
	platy	weak			0.2 (10)	0.3 (15)	0.4 (20)
		moderate, strong			not recommended	not recommended	not recommended
	prismatic, blocky, granular	weak	20 – 40	60 – 250	0.3 (15)	0.5 (24)	0.7 (34)
		moderate, strong			0.4 (20)	0.8 (39)	1.2 (59)
Clay loam, sandy clay loam, silty clay loam	massive	structureless	60 – 90	15 – 30	not suitable	not suitable	not suitable
	platy	weak			not suitable	not recommended	not recommended
		moderate, strong			not suitable	not suitable	not suitable
	prismatic, blocky, granular	weak	40 – 60	30 – 60	0.2 (10)	0.3 (15)	0.4 (20)
		moderate, strong			0.3 (15)	0.45 (22)	0.6 (29)
Sandy clay, silty clay, clay	massive	structureless	90 – > 120	< 5.0 – 60	not suitable	not suitable	not suitable
	platy	weak				not recommended	not recommended
		moderate, strong				not suitable	not suitable
	prismatic, blocky, granular	weak				0.15 (7)	0.18 (9)
		moderate, strong				0.2 (10)	0.25 (13)

Soil Percolation Time

8.2.1.2. Site Evaluation

(b) classifying the soil according to one of the following methods;

- ***the Soil Texture Classification as described in Chapter 3 of USDA, "Soil Survey Manual".***

Soil Percolation Time

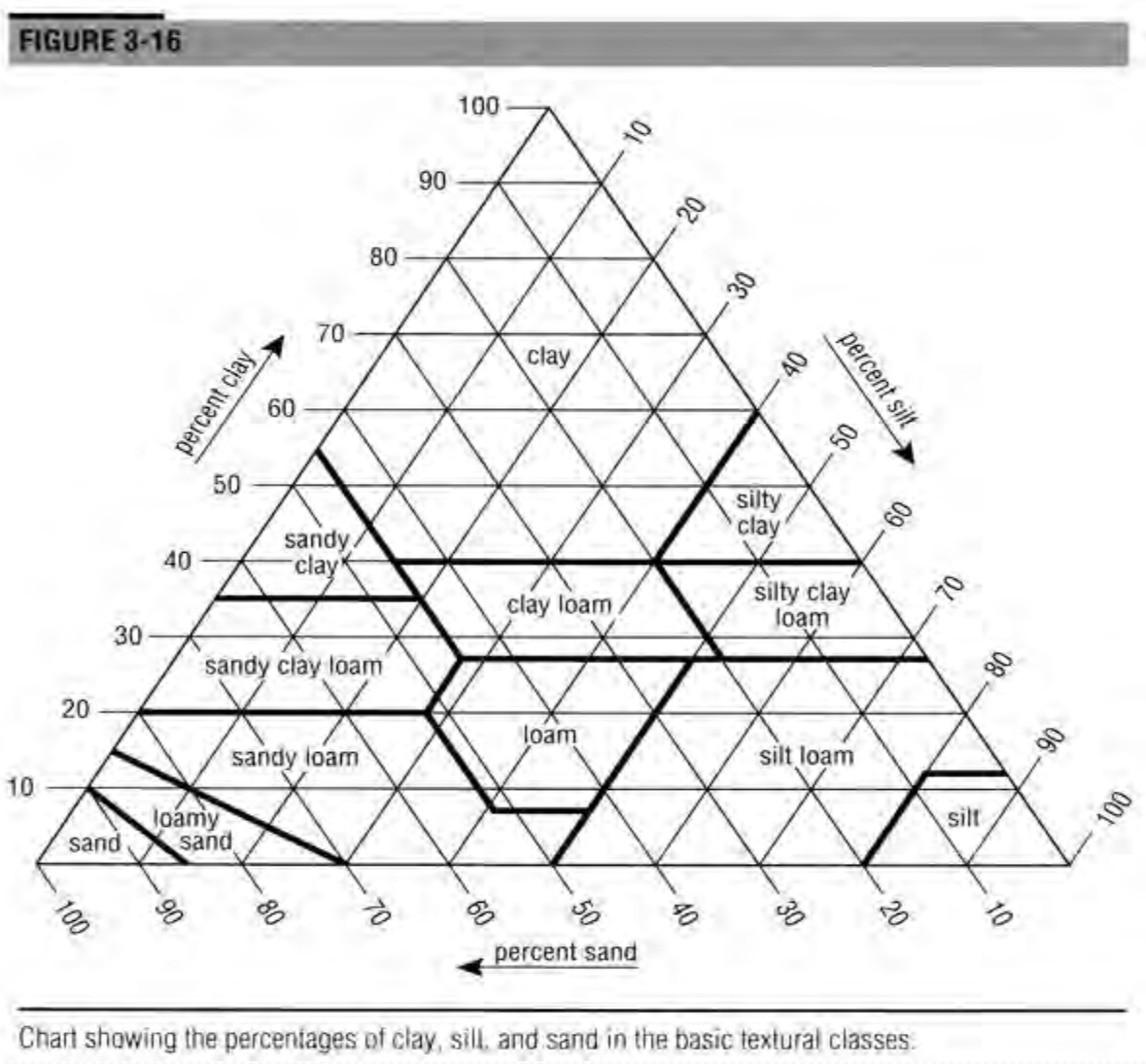


Chart showing the percentages of clay, silt, and sand in the basic textural classes.

Soil Percolation Time

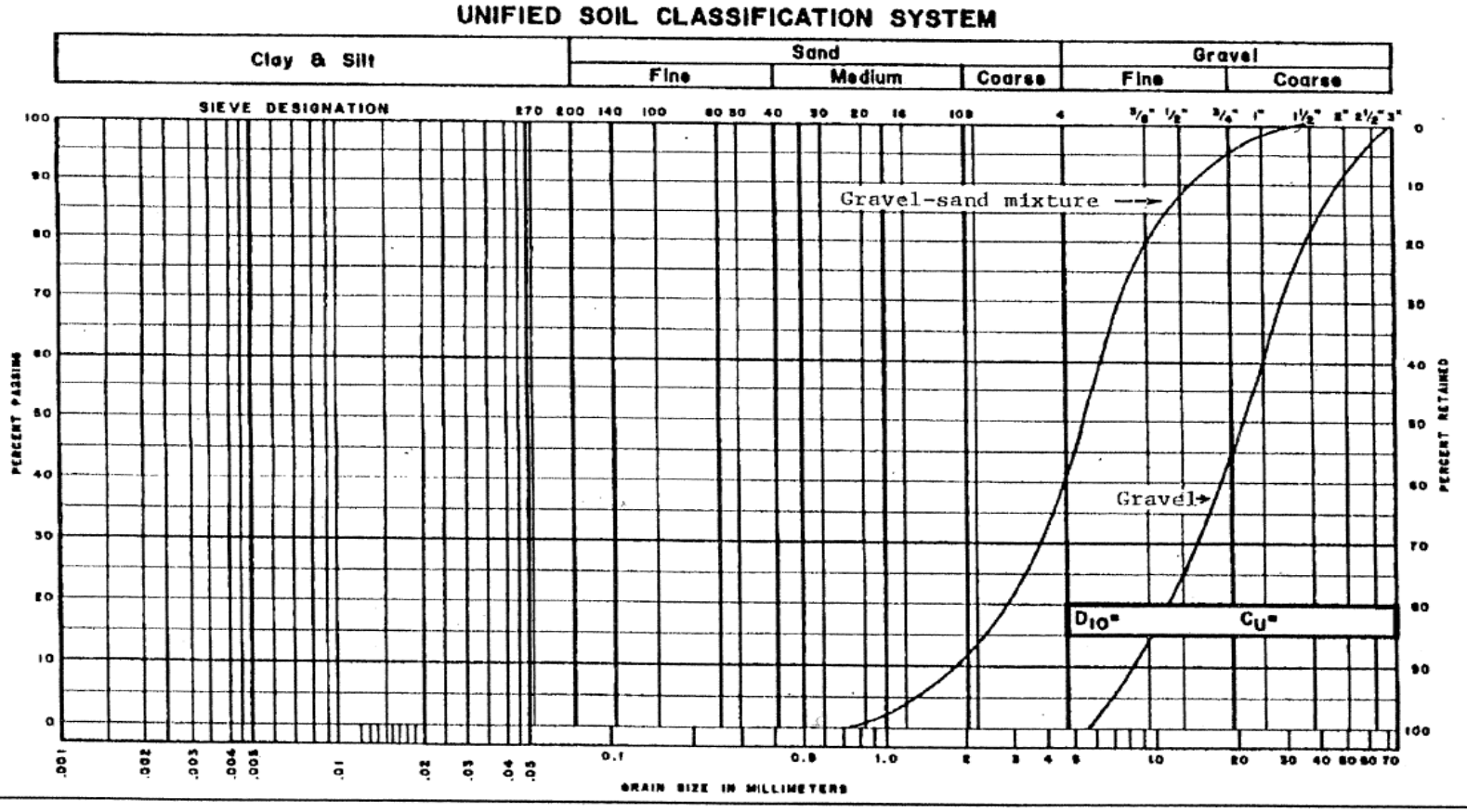


Chart 2 - GP
- Poorly-graded gravels, gravel-sand mixtures
- Less than 5% finer than 0.074 mm
- Uniformity coefficient less than 4

Soil Percolation Time

Selection of 'T' Time

- ***Select range from Soil Unified Soil Classification System***
- **Review laboratory grain sieve analysis curve**
- **Review soil identifiers and soil characteristics**
- **Assess soil structure, density, colour, organic content, clay content (fines)**
- **Determine appropriate design 'T' Time**

Soil Percolation Time

Soil Structure / Compaction

Soil Percolation Time

Soil Structure / Compaction

Soil Percolation Time

Soil Structure / Compaction

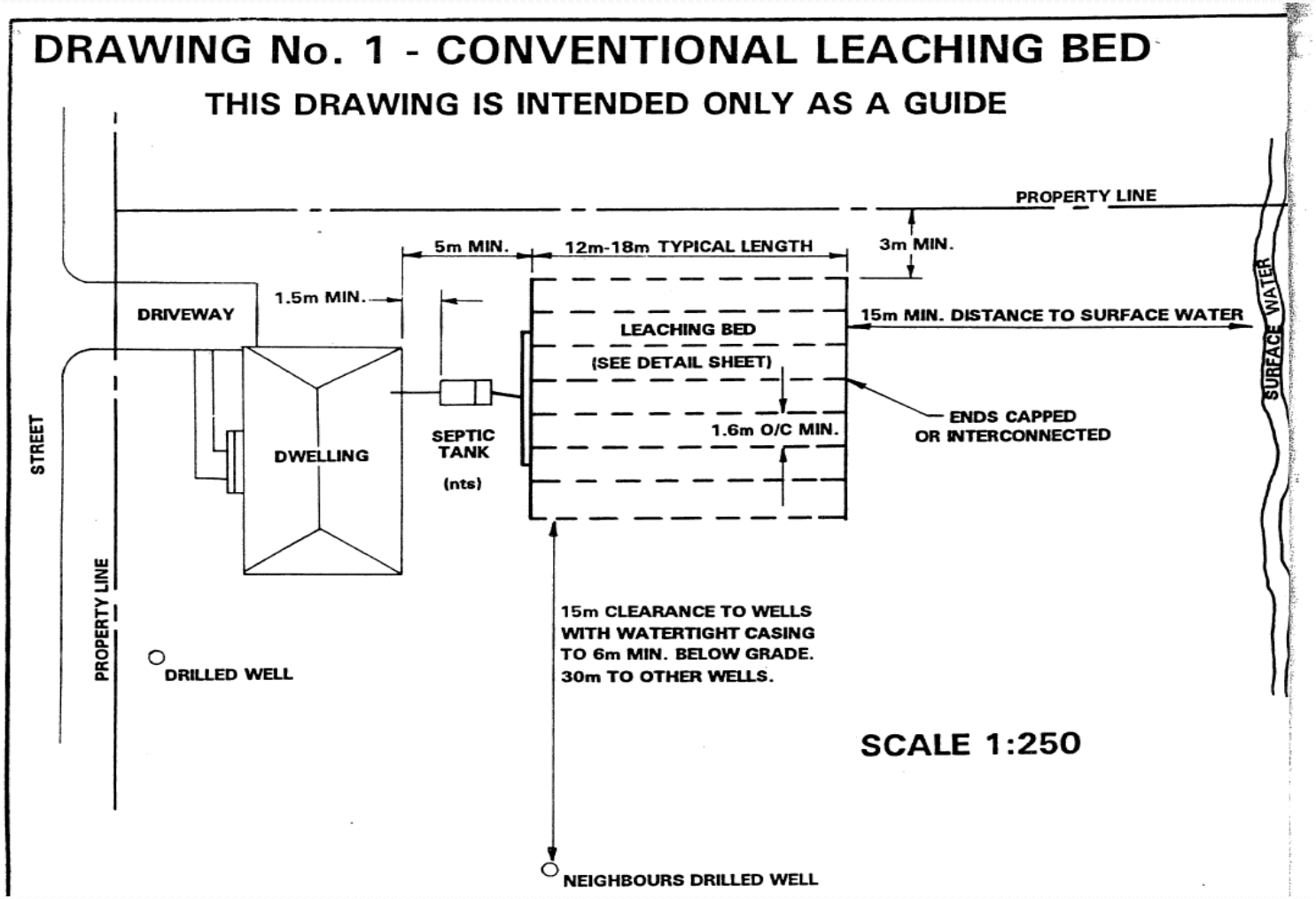
Soil Percolation Time

Soil Structure / Compaction

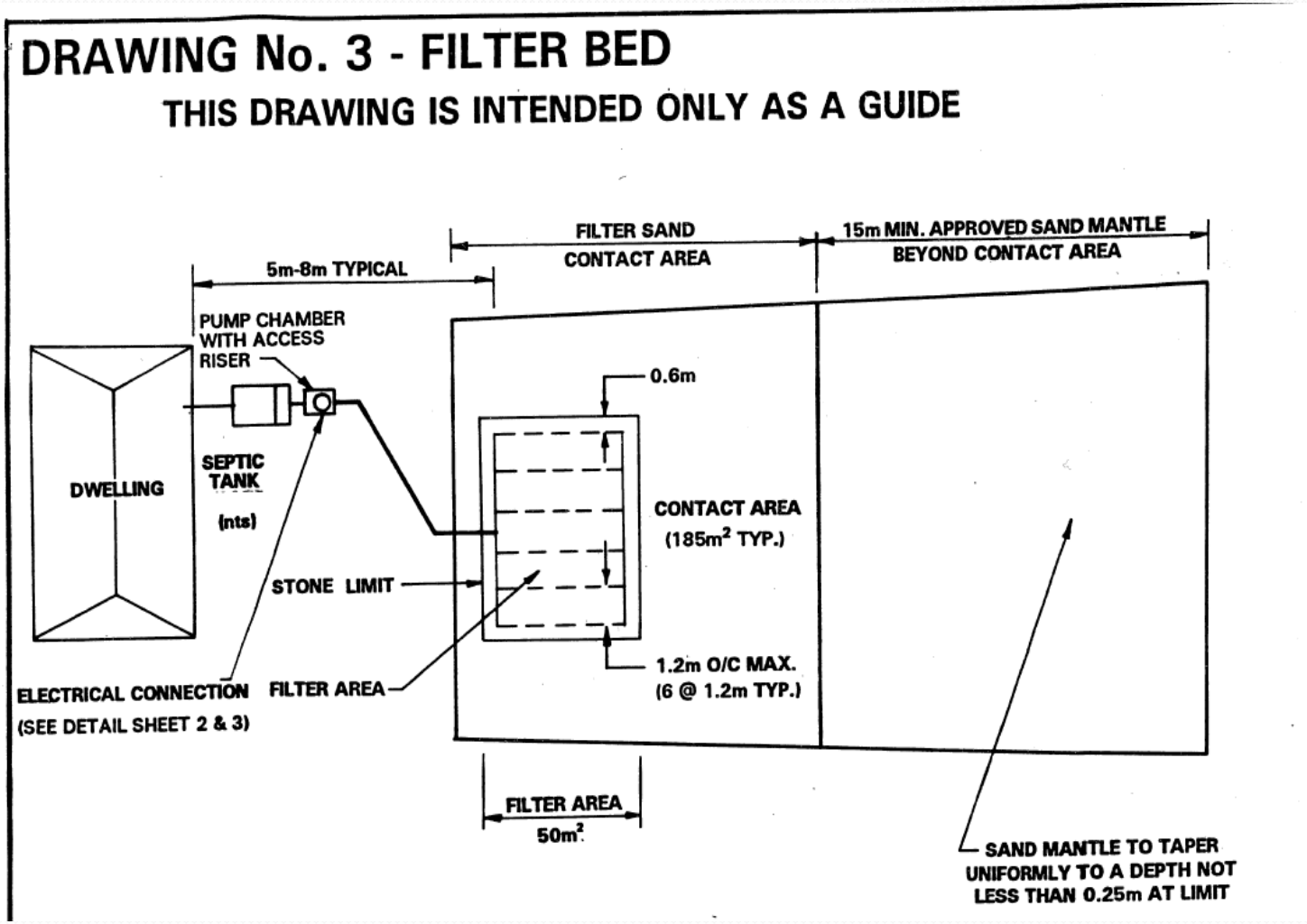
Soil Percolation Time

Soil Structure / Compaction

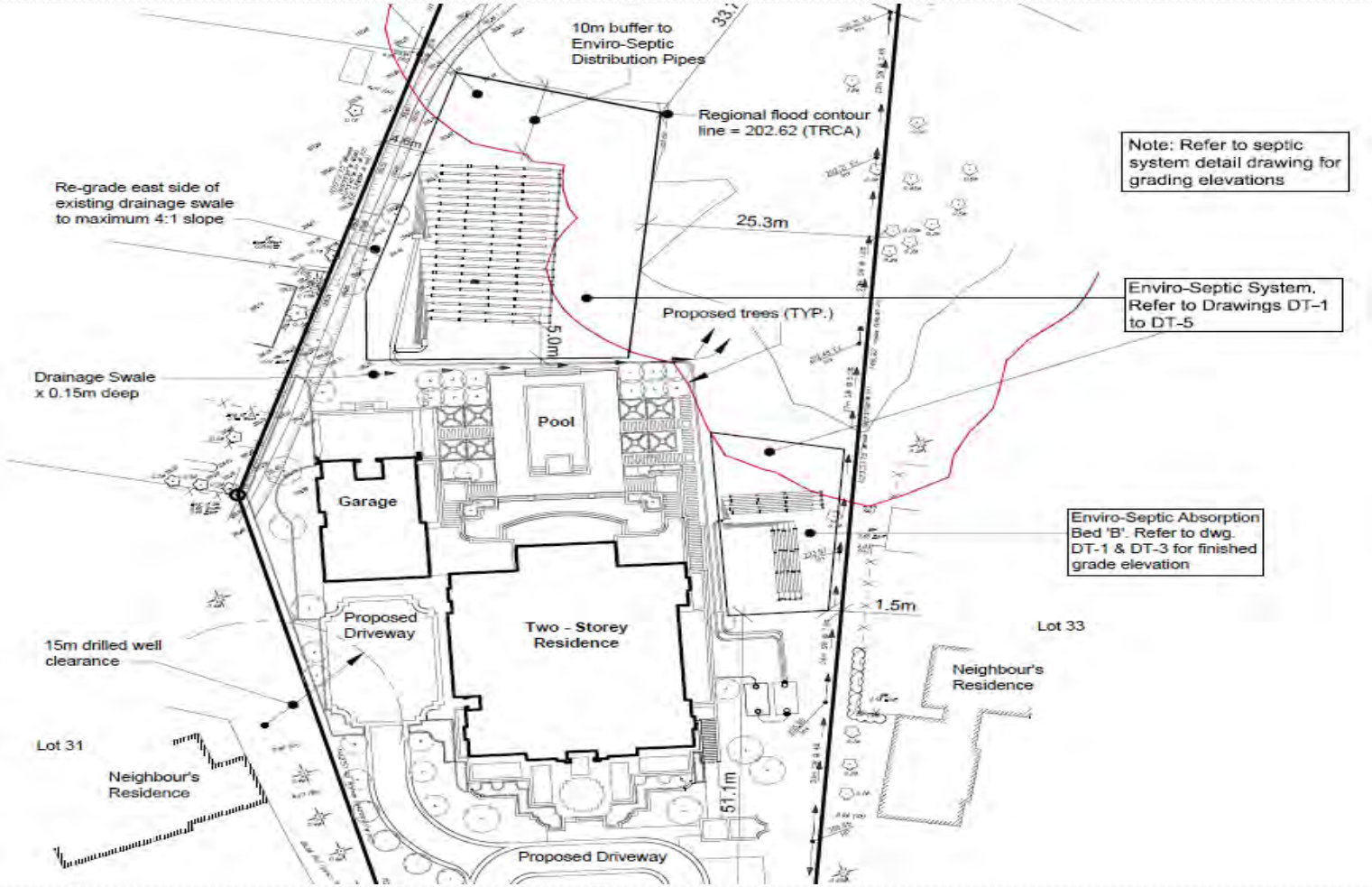
Sewage System Design Drawings



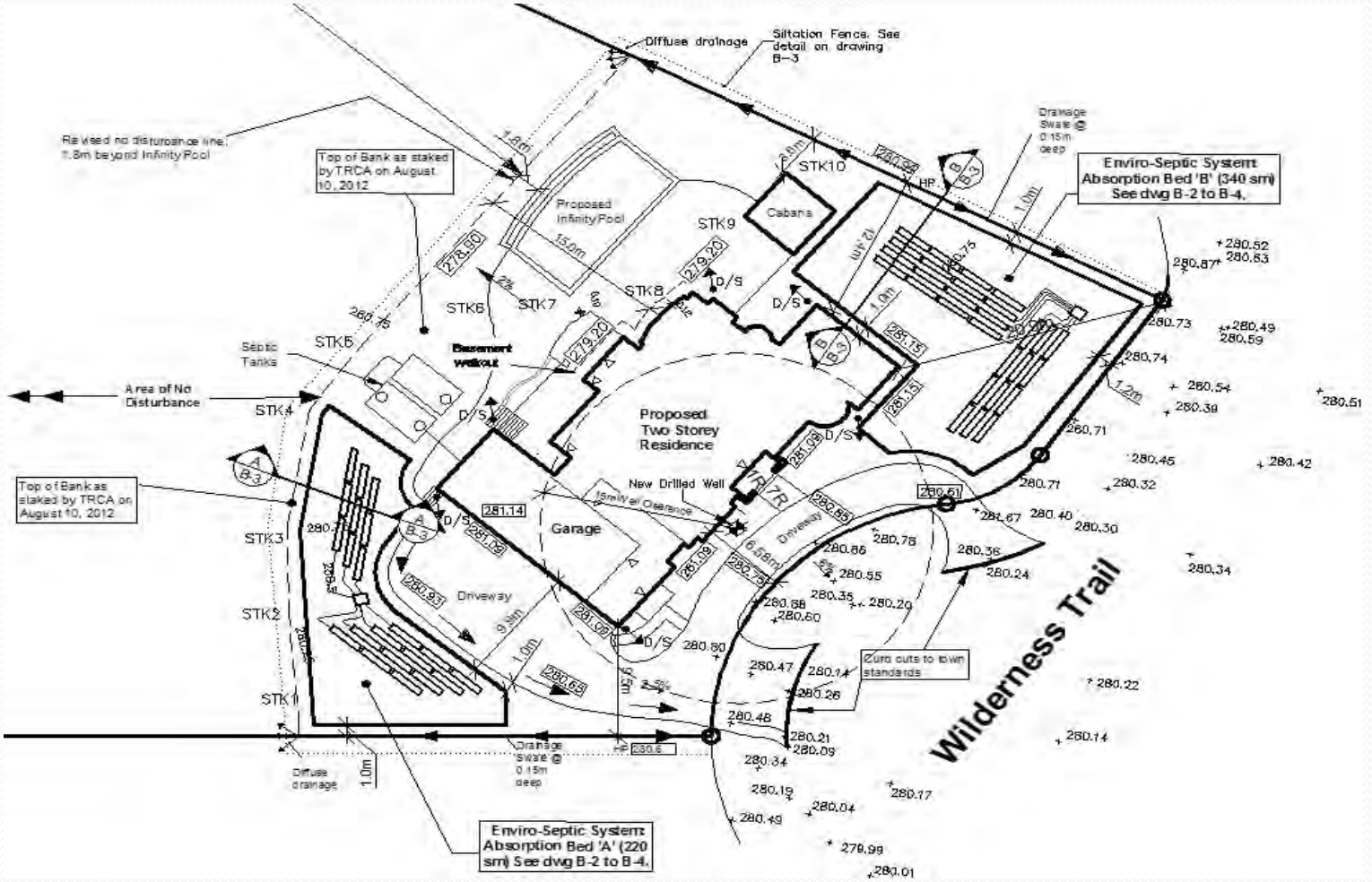
Sewage System Design Drawings



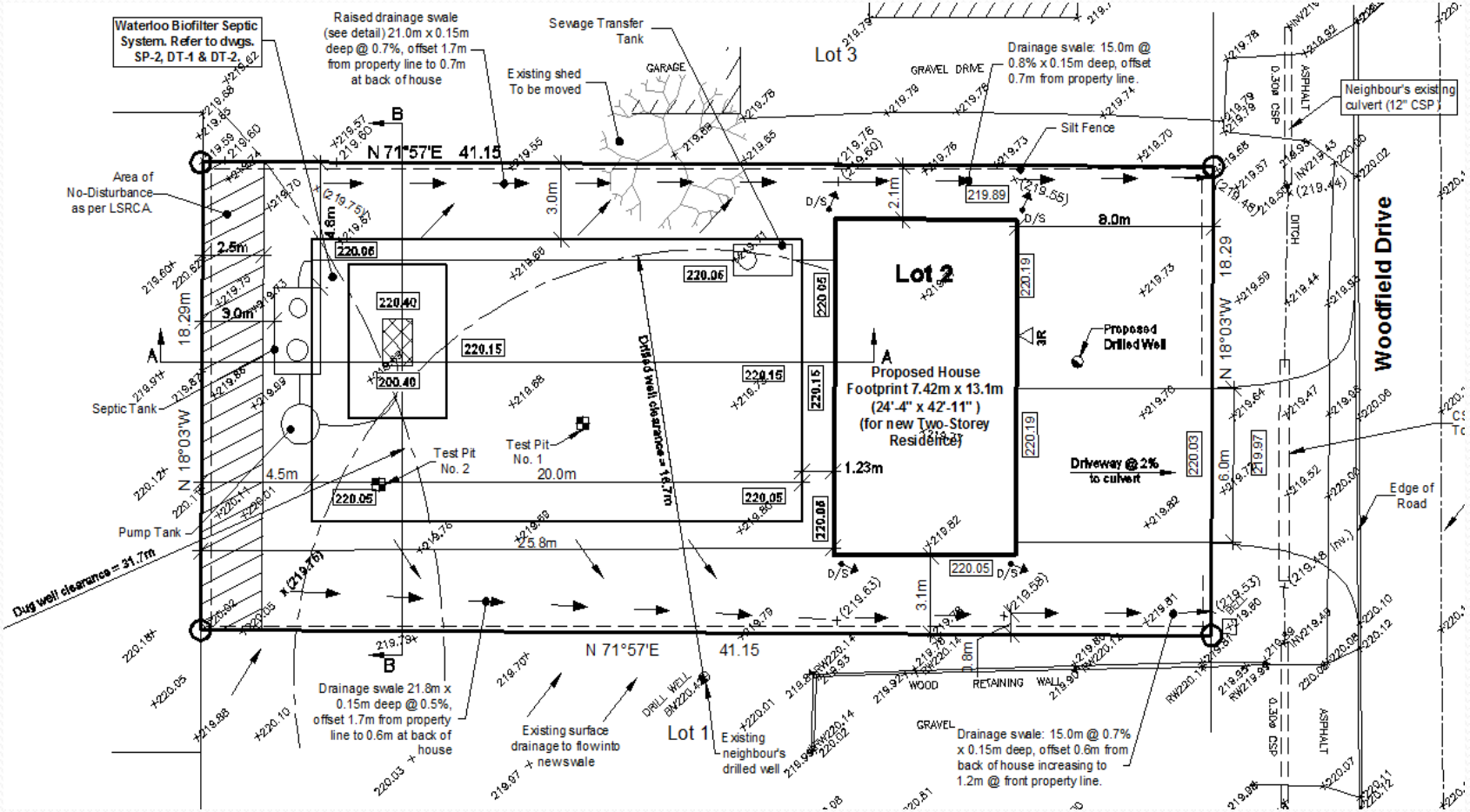
Sewage System Design Drawings



Sewage System Design Drawings



Sewage System Design Drawings



Thank you - Questions ??

Eric@SepticDesign.ca
905-868-9400

OntarioOnsite WastewaterAssociation

SepticDesign.ca
Gunnell Engineering Ltd.