SUBSURFACE ENGINEERING, INC.
SOIL MECHANICS AND FOUNDATION ENGINEERING CONSULTANTS
SOILS LABORATORY
2624 STEPHENSON DR., WILMINGTON, DEL. 19808

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TELEPHONE 998-3862

November 18, 1968

New Castle County Engineering Dept.
County Engineering Building
Robert Kirkwood Highway
Wilmington, Del. 19808

Attn: Mr. Uldis Karins

SUBJECT: Soil Laboratory Work Associated with County Land Fill (Tybounts Co.)

Subsurface Engineering, Inc. was authorized by Mr. Karins to perform suitable soil tests on samples obtained from the above mentioned site to assist in site selection for garbage land fill.

The samples furnished were jar samples recovered from split spoon sampler. Permeability tests were remoulded from the samples. The need to establish positive classification for permeability coefficients was mandatory. The soil classification was established by Atterburg Limits and % of material finer than No. 200 sieve (0.074 mm). When these tests have been made on soils, generalization can be made concerning the coefficient of permeability.

All samples tested were classified by the uniform classification system and all other samples were visually classified.

Constant head permeability tests were run on a sufficient number of samples to show reasonably consistent results and to allow a basis for comparision with the soil classification. Permeability tests were made from remoulded, compacted, split spoon, jar samples.

All samples in holes BH 8 and BH 11 contained small pockets of sand and it is felt that the permeability of an undisturbed sample would be slightly higher (allow more water to pass) than

the remoulded samples because the sand pockets were mixed with clay during compaction.

Permeability of the soil is classified as follows:

1. Low permeability with "k" is between 10^{-3} and 10^{-5} in soil such as very fine sand.
2. Very low permeability with "k" between 10^{-5} and 10^{-7} in soils such as dense silts, clayey silts and clay.
3. Impervious with "k" is less than 10^{-7} in soils such as clay.

Attached is Table I which shows the individual classification and permeability tests performed. A soil classification of samples furnished is also attached.

The coefficients of permeability reported here are very low and it is not expected that a significant flow could develop through this material.

If any information contained in this report needs further clarification, please call us.

Thank you for asking our organization to assist in your work.

Sincerely yours,

Clarence D. Turner

Clarence D. Turner, P.E.

CDT:act

Attachments.

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Co. Report

Submitted with application from N CC Dept. Pub Wks.

REPORT OF
SOILS LABORATORY WORK

for

New Castle County
Sanitary Land Fill

Laboratory Work By:
SUBSURFACE ENGINEERING, INC.
2624 Stephenson Drive
Wilmington, Del. 19808

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TABLE I

Hole No. Depth in ft.	Atterburg Limit LL %	PL %	PI %	% Finer than No. 200	Permeability (k) cm/sec (20° C)
BH 11					
3-5					2.1×10^{-7}
5-7	32	22	10	65	5.2×10^{-7}
7-9	36	25	11	70	
9-11				73	1.7×10^{-8}
BH 8					
3-5	36	21	15	88	
5-7.5	22	15	7	57	1.9×10^{-8}
7-9					
9-11.5					1.4×10^{-8}
11-13	24	18	6	69	
13-15	36	23	13	83	5.3×10^{-8}
15-16.5					1.2×10^{-7}
20-21.5					5.7×10^{-8}
BH 10A					
3-5				24	0.8×10^{-7}
5-7.5	NL	NP	NP	13	
7-9				8	2.8×10^{-4}

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SOIL CLASSIFICATION

Hole No. & Depth in feet	Unified Soil Classification (+indicates visual classification)
BH 11	
3-5 (+)	Reddish brown silty clay with poorly graded gravel.
5-7	ML brown inorganic silts and very fine sand, clayey silts with slight plasticity.
7-9	ML gray inorganic silts and very fine sand, clayey silts with slight plasticity.
9-11 (+)	Gray silty clay.
BH 8	
3-5	CL brown inorganic clay with fine sand of low to medium plasticity.
5-7.5	CL brown inorganic clay with fine sand of low to medium plasticity.
7-9 (+)	Brown and gray silty clay with fine sand.
9-11 (+)	Gray silty clay with fine sand.
11-13	CL-ML gray inorganic silts with fine sand, clayey silts with slight plasticity.
13-15	CL grey inorganic clay with fine sand of medium plasticity.
15-16.5 (+)	Brown and gray silty clay with fine sand.
20-21.5 (+)	Gray silty clay with fine sand.
BH 10A	
3-5	SM-SC yellow silty and clayey fine sand.
5-7.5	SM-SC yellow silty and clayey fine sand.
7-9	SM-SC yellow silty and clayey fine sand.

(ML, CL, SM, SC indicate symbol classification.)

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