SEPTIC DRAIN FIELD STUDY

1100 NE PEAR STREET

OLYMPIA, WASHINGTON

THURSTON COUNTY
RECEIVED
JAN 3 1 2007
DEVELOPMENT SERVICES

PREPARED FOR

HECTOR AND KAREN CRUZ

BY

GEOTECHNICAL TESTING LABORATORY
OLYMPIA, WASHINGTON

AUGUST 16, 2006

Resource Stewardship & Land Use

GEOTECHNICAL TESTING LABORATORY

CONTACT INFORMATION

PREPARER INFORMATION

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CLIENT INFORMATION

CLIENT:	HECTOR AND KAREN CRUZ
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BILLING ADDRESS:	1204 THURSTON COURT YELM, WASHINGTON 98597-9751
SITE ADDRESS:	1100 NE PEAR COURT OLYMPIA, WASHINGTON, 98506-1212
PARCEL NUMBER:	74400300500
GPS LOCATION:	N47° 03' 18.5" W122° 53' 27.8"

GEOTECHNICAL TESTING LABORATORY

SCOPE OF UNDERSTANDING

HECTOR AND KAREN CRUZ
1204 THURSTON COURT
YELM, WASHINGTON 98597-9751

RE: SEPTIC DRAIN FIELD STUDY
1100 NE PEAR STREET
OLYMPIA, WASHINGTON 98506-1212
PARCEL 74400300500
N47° 03' 18.5" W122° 53' 27.8"

Gentlemen:

As per your request, we have conducted a soils exploration for the above-mentioned parcel. The results of this investigation, together with our recommendations, are to be found in the following report. We have provided three copies for your review and distribution.

During our exploration, three soil samples were collected from the test pits on site and submitted for laboratory testing from the project site. The data has been carefully analyzed to determine soils infiltration rates as well as the grain size distribution. The results of the exploration and analysis indicate that the sub-soils have infiltration rates ranging from a low of 1.1 inches per day in test pit #6 to the high of 4.24 inches per day in test pit 2. Data from the permeameter testing is presented in the Laboratory Analysis section of this report. The sieve analysis (grain size distribution) indicated the sub soils are silty sands and silty sands with gravels.

We appreciate this opportunity to be of service to you and we look forward to working with you in the future. If you have any questions concerning the above items, the procedures used, or if we can be of any further assistance please call us at the phone number listed below.

Respectfully Submitted,
GEOTECHNICAL TESTING LABORATORY

Blaise Jelinek, EIT
Hydrogeological Engineer

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INTRODUCTION

This report summarizes the results of our geotechnical consulting services for the proposed single-family residence to be located at 1100 NE Pear Street in Olympia, Washington. The location of the site is shown relative to the surrounding area on the Vicinity Map, Figure 1.

Our understanding of the project is based on our discussions with you and our explorations and review of the site. We understand that the parcel is to be developed as a single-family residence. The site will be accessed by a driveway from Quince Road. In general, grading will consist of the excavation of the foundation, footings and foundation.

The purpose of our services is to evaluate the subsurface conditions at the site in regards to the proposed infiltration trenches. Geotechnical Testing Laboratory is therefore providing geologic and hydrogeologic services for the project. Specifically, our scope of services for this project will include the following:

1. Review the available geologic, hydrogeologic, and geotechnical data for the site area.
2. Conduct a geologic reconnaissance of the site area and surrounding vicinity.
3. Investigate shallow subsurface conditions at the site by observing the exposed soil and reviewing published well logs.
4. Conduct a grain-size analysis of the soil.
5. Conduct a permeameter test on the subsoil to evaluate the infiltration rates.

SITE CONDITIONS

SITE GEOLOGY

The site is generally situated within the Puget Sound glacial upland. The existing topography, as well as the surficial and shallow subsurface soils in the area, are the result of the most recent Vashon stade (stage) of the Fraser glaciation that occurred between about 9,000 and 11,000 years ago, and weathering and erosion that has occurred since. A description of the surficial soils is included in the "Site Soils" section of this report. In general, the soils are composed of Vashon glacial till material.

SITE SOILS

The *Soil Survey of Thurston County, USDA Soil Conservation Service* (1960) has mapped the eastern site soils as an Alderwood gravelly sandy loam, 0 to 3 percent slopes (1), and the western site soils as Hoogdal silt loam, 30 to 50 percent slopes (44).

The report describes the Alderwood gravelly sandy loam as follows:

> *This moderately deep, moderately well drained soil is on glacial till plains. It formed in ablation till overlying basal till. The native vegetation is mainly conifers and hardwoods. Elevation is 50 to 500 feet.*
>
> *Typically, the surface layer is very dark brown gravelly sandy loam about 6 inches thick. The upper 9 inches of the subsoil is dark brown gravelly sandy loam. The lower 15 inches is dark brown very gravelly sandy loam. A weakly cemented hardpan is at a depth of about 30 inches.*

It is strongly compacted and crushes to very gravelly loamy sand. Depth to the hardpan ranges from 20 to 40 inches.

Included in this unit are small areas of Bellingham, McKenna, and Norma soils in drainageways and Everett and Indianola soils on terraces. Also included are small areas of Alderwood gravelly sandy loam that have slopes of 3 to 15 percent.

Permeability is moderately rapid above the hardpan in the Alderwood soil and very slow in the pan. Available water capacity is low. Effective rooting depth is 20 to 40 inches. A perched seasonal high water table is at a depth of 18 to 36 inches from November to March. Runoff is slow, and the hazard of water erosion is slight.

If this unit is used for homesites, the main limitation is the seasonal wetness. The soil can support large loads. A drainage system should be installed on sites for buildings with basements or crawl spaces.

The main limitations on sites for septic tank absorption fields are the depth to the hardpan and the seasonal wetness. Because of the restrictive layer, onsite sewage disposal systems often fail or do not function properly during periods of heavy rainfall.

The report describes the Hoogdal silt loam as follows:

This moderately deep, moderately well drained soil is on terrace escarpments. It formed in loess and glaciolacustrine sediment. The native vegetation is mainly conifers and hardwoods. Elevation is 100 to 300 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is about 51 degrees F, and the average frost-free period is 160 to 200 days.

Typically, the surface layer is dark grayish brown silt loam about 5 inches thick. The upper 5 inches of the subsoil is yellowish brown silty clay loam, and the lower 15 inches is light yellowish brown, mottled silty clay. The substratum to a depth of 60 inches or more is olive gray, mottled silty clay.

Permeability is very slow in the Hoogdal soil. Available water capacity is high. Effective rooting depth is 15 to 30 inches. A perched seasonal high water table fluctuates between depths of 18 and 24 inches from December to March. Runoff is medium, and the hazard of water erosion is moderate.

The Geologic Map of Washington – Southwest Quadrant (1987) has mapped the site geology as deposits of continental glaciers of the Puget Lobe of the Cordilleran Ice Sheet, the subunit is the Vashon Stade of the Upper Pleistocene Fraser Glaciation (Qgos). The report reads:

Outwash Sand- *Recessional and proglacial, stratified sand; locally contains silt, clay, and gravel. Consists of part of the Vashon Drift.*

OBSERVED CONDITIONS

The observed soil conditions in the upper 12 inches of the soil in the test pits indicate that the soils have been placed on the site. Because of the location of the soils, it appears that the soil was moved during grading activity for the road and the neighbor's garage. Beneath this depth, the soils appear to be native soil.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

Based on the results of our site reconnaissance, subsurface observations, and our experience in the area, it is our opinion that the site soils are suitable for septic infiltration. Testing of the soils from the test pits was performed by conducting a constant head permeameter test in our laboratory. Results of our laboratory testing demonstrate the infiltration rate of the site soils range from a high of approximately 4 inches per day in test pit 2 to a low of 1.3 inches per day in test pit 6. The findings from our investigation should be shared with your septic designer in creating the final plan for this project.

Based upon the infiltration rates from laboratory testing, and assuming the trench to be 75 feet and length with a width of 5 feet the soils encountered in test pit 6 will infiltrate 303 gallons per day. Soil data for test pit 2 will infiltrate 935 gallons per day based on the same dimensions. It is our understanding that for the proposed residence that the design usage is 300 gallons per day. The infiltration rates observed indicate that the soils are suitable for a septic system.

The soils encountered in the upper 2 feet of test pit 3 appear to have been moved. We presume that during the construction of the neighbor's garage some earth moving activity occurred at the site and the material was pushed to the north.

LIMITATIONS

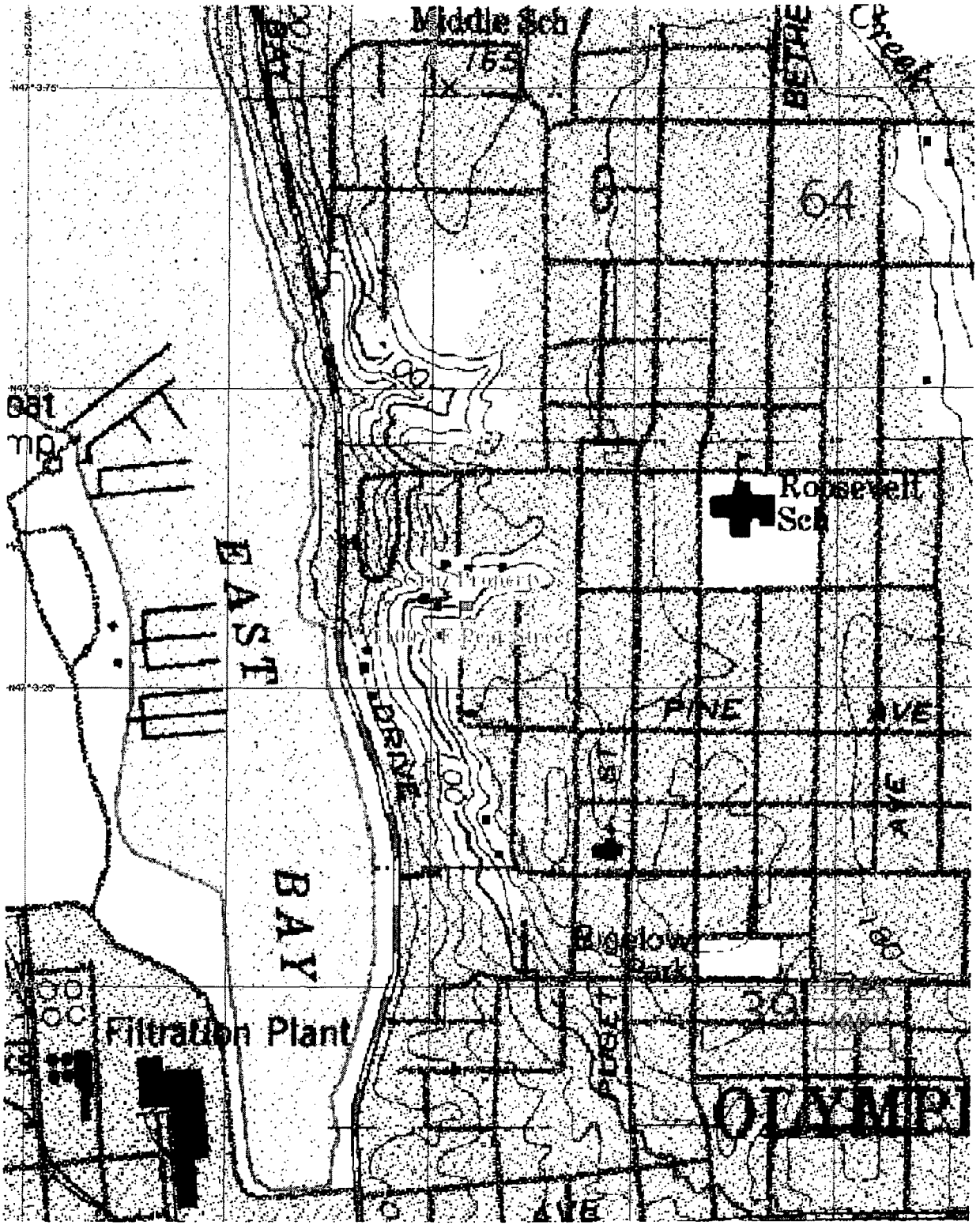
We have prepared this report for the use of Hector and Karen Cruz and members of their design team, to use in the design of a portion of this project. The data used in preparing this report, and this report, should be provided to prospective contractors for their bidding or estimating purposes only. Our report, conclusions and interpretations are based on data from others and our site reconnaissance, and should not be construed as a warranty of the subsurface conditions. This report is quantified as a micro-study and not a macro-study. Geotechnical Testing Laboratory and its personnel cannot be responsible for unforeseen and widespread geologic events (such as earthquakes, large-scale faulting, and mass wasting) beyond the scope of this project.

Variations in subsurface conditions are possible and may occur with time. A contingency for unanticipated conditions should be included in the budget and schedule. Sufficient consultation should be made with your septic design firm during construction to confirm that the conditions encountered are consistent with those indicated by his recommendations and for design changes should the conditions revealed during the work differ from those anticipated activities comply with contract plans.

The scope of our services does not include services related to environmental remediation and construction safety precautions. Our recommendations are not intended to direct the contractor's methods, techniques, sequences or procedures, except as specifically described in our report for consideration in design.

If there are any changes in the loads, grades, locations, configurations or types of facilities to be constructed, the conclusions and recommendations presented in this report may not be fully applicable. If such changes are made, we should be given the opportunity to review our recommendations and provide written modifications or verifications, as appropriate.

FIGURE 1 VICINITY MAP



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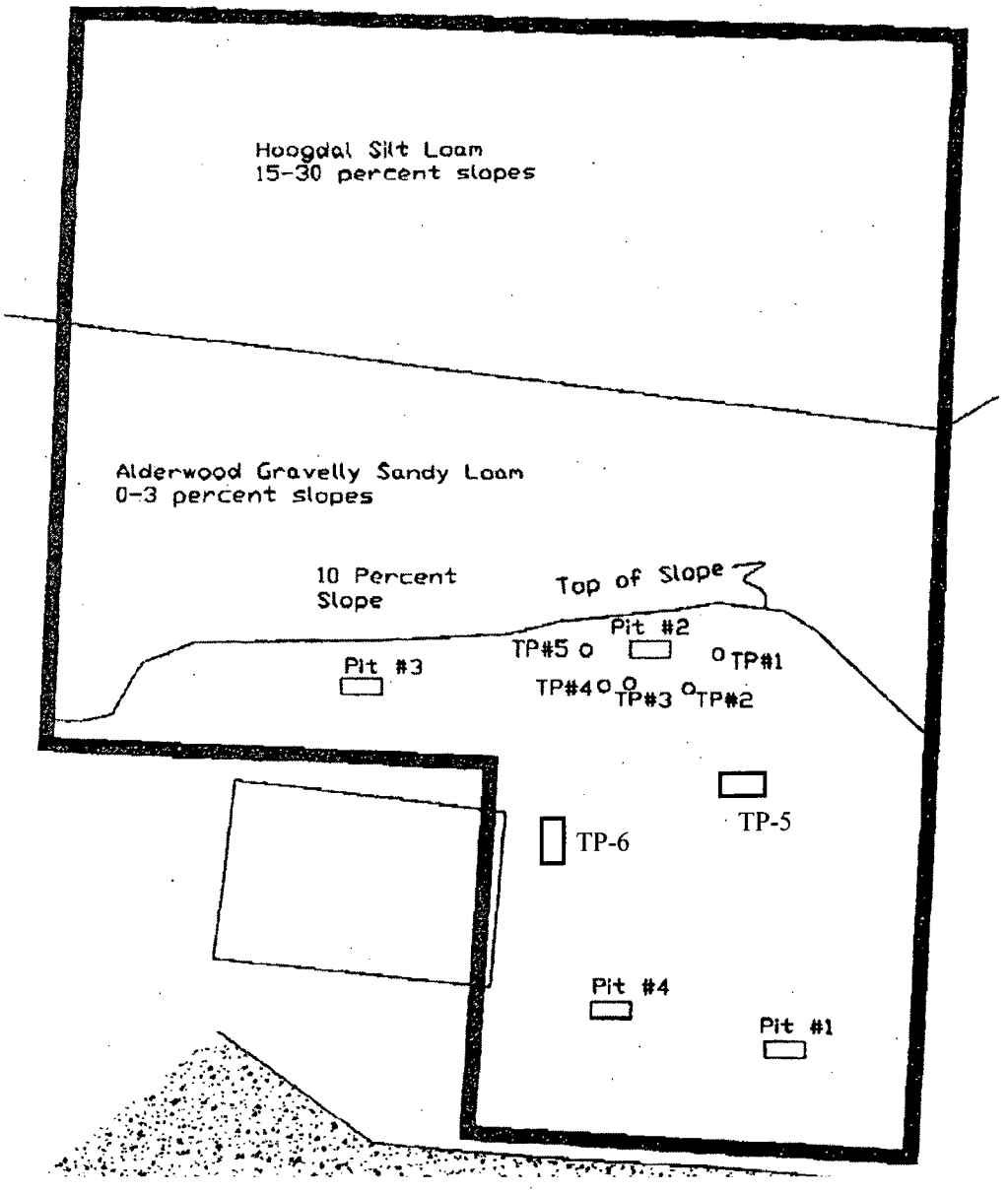
SITE MAP


Hoogdal Silt Loam
15-30 percent slopes
Alderwood Gravelly Sandy Loam
0-3 percent slopes
10 Percent
Slope
Top of Slope
Pit #2
TP#5
TP#1
Pit #3
TP#4
TP#3
TP#2
TP-5
TP-6
Pit #4
Pit #1

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FIELD DATA

TEST PIT 1

Date: 1/18/2007 **File #:**
Field Test Pit: 1 **Client:** Karen Cruz
Type of hole: Backhoe **Depth Excavated:** 42 Inches

Depth (in)	Field Description	Change in Soils	horiz	high water level	roots	color	tex-ture	struc-ture	mott-ling	cemen-tation	Soil Textural Classification
1	Duff			NP	cf	Brown	Lm	Gr	No	No	
2	Sandy Loam		A	NP	cf	Gray	Lm	Gr	No	No	
3				NP	cf		Lm	Gr	No	No	
4				NP	cf		Lm	Gr	No	No	
5	Gravelly Sandy Loam		B	NP	cf		Lm	Gr	No	No	
6				NP	cf		Lm	Gr	No	No	
7				NP	ff		Sa	Blky	No	Wk	
8				NP	ff		Sa	Blky	No	Wk	
9				NP	ff		Sa	Blky	No	Wk	
10				NP	ff		Sa	Blky	No	Wk	
11				NP	ff		Sa	Blky	No	Wk	
12				NP	ff		Sa	Blky	No	Wk	
13				NP	ff		Sa	Blky	No	Wk	
14				NP	ff		Sa	Blky	No	Wk	
15				NP	ff		Sa	Blky	No	Wk	
16				NP	ff		Sa	Blky	No	Wk	
17	Shotty Sand			NP	ff	Tan	Lm	Pl	No	Wk	
18				NP	fc		Lm	Pl	No	Wk	
19				NP	fc		Lm	Pl	No	Wk	
20	Gravelly Sand			NP	NP	Gray	Gr	Blky	No	Mod	
21				NP	NP		Gr	Blky	No	Mod	
22				NP	NP		Gr	Blky	No	Mod	
23				NP	NP		Gr	Blky	No	Mod	
24				NP	NP		Gr	Blky	No	Mod	
25	Fine Grained Sand			NP	NP	Lt Brown	Sa	SG	No	Mod	
26	w/gravels. Gravels upto			NP	NP		Sa	SG	No	Mod	
27	2" in diameter.			NP	NP		Sa	SG	No	Mod	
28				NP	NP		Sa	SG	No	Mod	
39				NP	NP		Sa	SG	No	Mod	
30				NP	NP		Sa	SG	No	Mod	
31				NP	NP		Sa	SG	No	Mod	
32				NP	NP		Sa	SG	No	Mod	
33				NP	NP		Sa	SG	No	Mod	
34				NP	NP		Sa	SG	No	Mod	
35				NP	NP		Sa	SG	No	Mod	
36				NP	NP		Sa	SG	No	Mod	
37				NP	NP		Sa	SG	No	Mod	
33				NP	NP		Sa	SG	No	Mod	
34				NP	NP		Sa	SG	No	Mod	
35				NP	NP		Sa	SG	No	Mod	
36				NP	NP		Sa	SG	No	Mod	
37				NP	NP		Sa	SG	No	Mod	
38				NP	NP		Sa	SG	No	Mod	
39				NP	NP		Sa	SG	No	Mod	
40				NP	NP		Sa	SG	No	Mod	
41				NP	NP		Sa	SG	No	Mod	
42				NP	NP		Sa	SG	No	Mod	

Groundwater Not Encountered.

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TEST PIT 2

Date: 10/2/2006 **File #:**
Field Test Pit: 2 **Client:** Karen Cruz
Type of hole: Backhoe **Depth Excavated:** 30 Inches

Depth (in)	Field Description	Change in Soils	horiz	high water level	roots	color	tex-ture	struc-ture	mott-ling	cemen-tation	Soil Textural Classification
1	Duff			NP	cf	Brown	Lm	Gr	No	No	
2				NP	cf		Lm	Gr	No	No	
3	Gray silt			NP	cf	Gray	Si	Blky	No	Wk	
4				NP	cf		Si	Blky	No	Wk	
5				NP	cf		Si	Blky	No	Wk	
6				NP	cf		Si	Blky	No	Wk	
7				NP	cf		Si	Blky	No	Wk	
8				NP	cf		Si	Blky	No	Wk	
9				NP	cf		Si	Blky	No	Wk	
10				NP	cf		Si	Blky	No	Wk	
11				NP	cf		Si	Blky	No	Wk	
12				NP	cf		Si	Blky	No	Wk	
13				NP	cf		Si	Blky	No	Wk	
14				NP	cf		Si	Blky	No	Wk	
15				NP	cf		Si	Blky	No	Wk	
16				NP	cf		Si	Blky	No	Wk	
17				NP	cf		Si	Blky	No	Wk	
18				NP	cf		Si	Blky	No	Wk	
19				NP	cf		Si	Blky	No	Wk	
20				NP	cf		Si	Blky	No	Wk	
21				NP	cf		Si	Blky	No	Wk	
22				NP	cf		Si	Blky	No	Wk	
23				NP	cf		Si	Blky	No	Wk	
24				NP	cf		Si	Blky	No	Wk	
25				NP	cf		Si	Blky	No	Wk	
26				NP	cf		Si	Blky	No	Wk	
27				NP	cf		Si	Blky	No	Wk	
28				NP	cf		Si	Blky	No	Wk	
29				NP	cf		Si	Blky	No	Wk	
30				NP	cf		Si	Blky	No	Wk	

Groundwater Not Encountered.

GEOTECHNICAL TESTING LABORATORY

TEST PIT 3

Date: 1/18/2007 **File #:**
Field Test Pit: 3 **Client:** Karen Cruz
Type of hole: Backhoe **Depth Excavated:** 51 Inches

Depth (in)	Field Description	Change in Soils	horiz	high water level	roots	color	tex-ture	struc-ture	mott-ling	cemen-tation	Soil Textural Classification
1	Gravelly Sand			NP	cf	Dk Brown	Lm	Mas	No	Wk	
2				NP	cf		Lm	Mas	No	Wk	
3				NP	cf		Sa-Gr	Mas	No	Wk	
4				NP	cf		Sa-Gr	Mas	No	Wk	
5				NP	cf		Sa-Gr	Mas	No	Wk	
6				NP	cf		Sa-Gr	Mas	No	Wk	
7				NP	cf		Sa-Gr	Mas	No	Wk	
8				NP	cf		Sa-Gr	Mas	No	Wk	
9				NP	cf		Sa-Gr	Mas	No	Wk	
10				NP	cf		Sa-Gr	Mas	No	Wk	
11				NP	cf		Sa-Gr	Mas	No	Wk	
12				NP	cf		Sa-Gr	Mas	No	Wk	
13				NP	cf		Sa-Gr	Mas	No	Wk	
14				NP	cf		Sa-Gr	Mas	No	Wk	
15				NP	cf		Sa-Gr	Mas	No	Wk	
16				NP	cf		Sa-Gr	Mas	No	Wk	Shells in soil
17				NP	cf		Sa-Gr	Mas	No	Wk	Shells in soil
18				NP	cf		Sa-Gr	Mas	No	Wk	Shells in soil
19				NP	cf		Sa-Gr	Mas	No	Wk	Shells in soil
20	Gravelly Sand			NP	cf	Dark Gray	Sa-Gr	Mas	No	Wk	Shells in soil
21				NP	cf		Sa-Gr	Mas	No	Wk	Shells in soil
22				NP	cf		Sa-Gr	Mas	No	Wk	Shells in soil
23				NP	cf		Sa-Gr	Mas	No	Wk	Shells in soil
24				NP	cf		Sa-Gr	Mas	No	Wk	Shells in soil
25				NP	cf		Sa-Gr	Mas	No	Wk	Shells in soil
26				NP	cf		Sa-Gr	Mas	No	Wk	Shells in soil
27				NP	cf		Sa-Gr	Mas	No	Wk	Shells in soil
28				NP	cf		Sa-Gr	Mas	No	Wk	Shells in soil
29				NP	cf		Sa-Gr	Mas	No	Wk	Shells in soil
30				NP	cf		Sa-Gr	Mas	No	Wk	Shells in soil
31				NP	cf		Sa-Gr	Mas	No	Wk	Shells in soil
32				NP	cf		Sa-Gr	Mas	No	Wk	Shells in soil
33				NP	cf		Sa-Gr	Mas	No	Wk	Shells in soil
34	Fine Grained Sand			NP	cf		Sa	SG	No	Wk	Shells in soil
35				NP	cf		Sa	SG	No	Wk	
36				NP	cf		Sa	SG	No	Wk	
37				NP	cf		Sa	SG	No	Wk	
38	Gravelly Sand			NP	cf	Gray	Sa-Gr	SG	No	Wk	
39				NP	cf		Sa-Gr	SG	No	Wk	
40				NP	cf		Sa-Gr	SG	No	Wk	
41				NP	cf		Sa-Gr	SG	No	Wk	
42				NP	cf		Sa-Gr	SG	No	Wk	
43				NP	cf		Sa-Gr	SG	No	Wk	
44				NP	cf		Sa-Gr	SG	No	Wk	
45				NP	cf		Sa-Gr	SG	No	Wk	
46				NP	cf		Sa-Gr	SG	No	Wk	
47				NP	cf		Sa-Gr	SG	No	Wk	
48				NP	cf		Sa-Gr	SG	No	Wk	
49				NP	cf		Sa-Gr	SG	No	Wk	
50				NP	cf		Sa-Gr	SG	No	Wk	
51				NP	cf		Sa-Gr	SG	No	Wk	

Groundwater Not Encountered.

GEOTECHNICAL TESTING LABORATORY

TEST PIT 5

Date: 10/2/2006 **File #:**
Field Test Pit: 5 **Client:** Karen Cruz
Type of hole: Backhoe **Depth Excavated:** 36 Inches

Depth (in)	Field Description	Change in Soils	horiz	high water level	roots	color	tex-ture	struc-ture	mott-ling	cemen-tation	Soil Textural Classification
1	Duff			NP	cf	Brown	Lm	Gr	No	No	
2				NP	cf		Lm	Gr	No	No	
3	Gravelly Sand			NP	cf	Gray	Lm	Gr	No	No	
4				NP	cf		Lm	Gr	No	No	
5				NP	cf		Lm	Gr	No	No	
6				NP	cf		Lm	Gr	No	No	
7				NP	ff		Sa	Blky	No	Mod	
8				NP	ff		Sa	Blky	No	Mod	
9				NP	ff		Sa	Blky	No	Mod	
10				NP	ff		Sa	Blky	No	Mod	
11				NP	ff		Sa	Blky	No	Mod	
12				NP	ff		Sa	Blky	No	Mod	
13				NP	ff		Sa	Blky	No	Mod	
14				NP	ff		Sa	Blky	No	Mod	
15				NP	ff		Sa	Blky	No	Mod	
16				NP	ff		Lm	Pl	No	Wk	
17				NP	ff		Lm	Pl	No	Wk	
18				NP	fc		Lm	Pl	No	Wk	
19				NP	fc		Lm	Pl	No	Wk	
20				NP	NP		Gr	Blky	No	Mod	
21				NP	NP		Gr	Blky	No	Mod	
22				NP	NP		Gr	Blky	No	Mod	
23	Gravelly Sand			NP	NP	Brown	Gr	Blky	No	Mod	
24				NP	NP		Gr	Blky	No	Mod	
25				NP	NP		Gr	Blky	No	Mod	
26				NP	NP		Gr	Blky	No	Mod	
27				NP	NP		Gr	Blky	No	Mod	
28				NP	NP		Gr	Blky	No	Mod	
29				NP	NP		Gr	Blky	No	Mod	
30				NP	NP		Gr	Blky	No	Mod	
31	Gravelly Sand			NP	NP	Gray	Gr	Blky	F2F	Mod	
32				NP	NP		Gr	Blky	F2F	Mod	
33				NP	NP		Gr	Blky	F2F	Mod	
34				NP	NP		Gr	Blky	F2F	Mod	
35				NP	NP		Gr	Blky	F2F	Mod	
36				NP	NP		Gr	Blky	F2F	Mod	
37				NP	NP		Gr	Blky	F2F	Mod	
38				NP	NP		Gr	Blky	F2F	Mod	

Groundwater Not Encountered.

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TEST PIT 6

Date: 10/2/2006 **File #:**
Field Test Pit: 6 **Client:** Karen Cruz
Type of hole: Backhoe **Depth Excavated:** 36 Inches

Depth (in)	Field Description	Change in Soils	horiz	high water level	roots	color	tex-ture	struc-ture	mott-ling	cemen-tation	Soil Textural Classification
1	Gravelly Sandy Silt			NP	cf	Gray	Sa-Gr	Mas	No	Wk	
2				NP	cf		Sa-Gr	Mas	No	Wk	
3				NP	cf		Sa-Gr	Mas	No	Wk	
4				NP	cf		Sa-Gr	Mas	No	Wk	
5				NP	cf		Sa-Gr	Mas	No	Wk	
6				NP	cf		Sa-Gr	Mas	No	Wk	
7				NP	cf		Sa-Gr	Mas	No	Wk	
8				NP	cf		Sa-Gr	Mas	No	Wk	
9				NP	cf		Sa-Gr	Mas	No	Wk	
10				NP	cf		Sa-Gr	Mas	No	Wk	
11				NP	cf		Sa-Gr	Mas	No	Wk	
12	Sandy Silt			NP	cf	Brown	Si	Mas	No	Wk	
13				NP	cf		Si	Mas	No	Wk	
14	Gravelly Sandy Silt			NP	cf	Gray	Si	Mas	No	Wk	
15				NP	cf		Si	Mas	No	Wk	
16				NP	cf		Si	Mas	No	Wk	
17				NP	cf		Si	Mas	No	Wk	
18				NP	cf		Si	Mas	No	Wk	
19				NP	cf		Si	Mas	No	Wk	
20				NP	NP		Si	Mas	No	Wk	
21				NP	NP		Si	Mas	No	Wk	
22				NP	NP		Si	Mas	No	Wk	
23				NP	NP		Si	Mas	No	Wk	
24				NP	NP		Si	Mas	No	Wk	
25				NP	NP		Si	Mas	No	Wk	
26				NP	NP		Si	Mas	No	Wk	
27				NP	NP		Si	Mas	No	Wk	
28				NP	NP		Si	Mas	No	Wk	
29				NP	NP		Si	Mas	No	Wk	
30				NP	NP		Si	Mas	No	Wk	
31				NP	NP		Si	Mas	No	Wk	
32				NP	NP		Si	Mas	No	Wk	
33				NP	NP		Si	Mas	No	Wk	
34				NP	NP		Si	Mas	No	Wk	
35				NP	NP		Si	Mas	No	Wk	
36				NP	NP		Si	Mas	No	Wk	
37				NP	NP		Si	Mas	No	Wk	
38				NP	NP		Si	Mas	No	Wk	

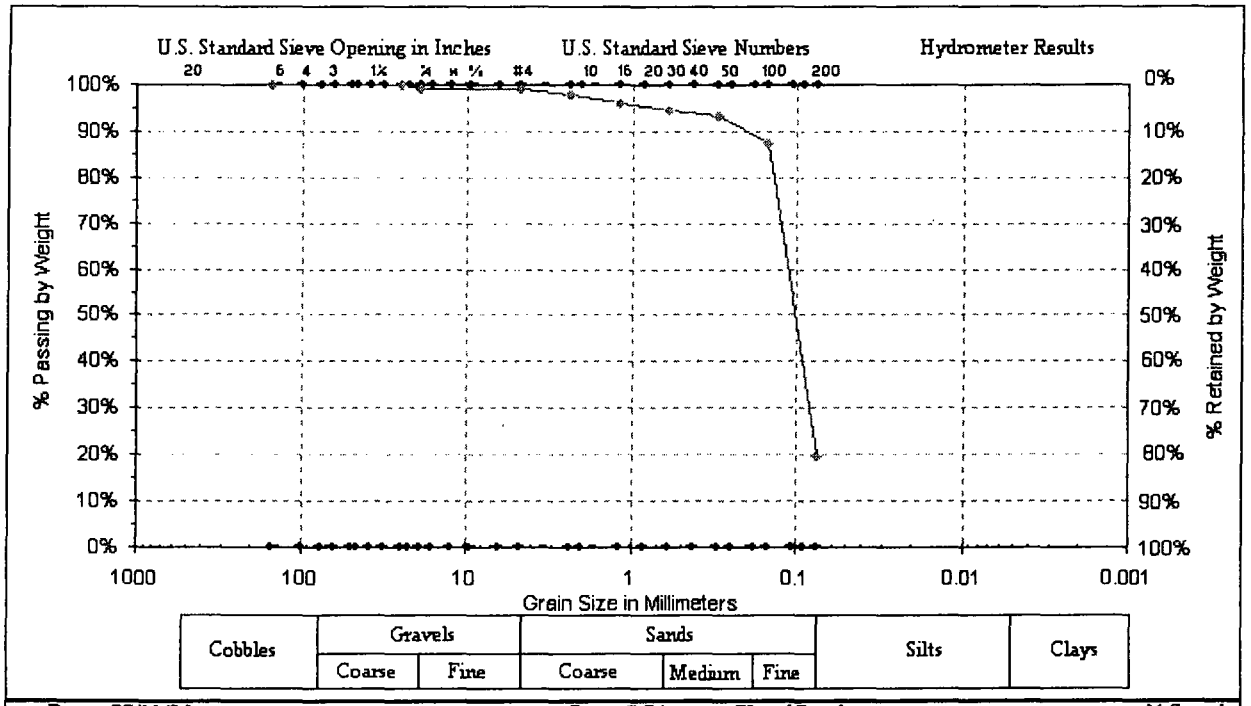
Groundwater Not Encountered.

Resource Stewardship & Land Use

GEOTECHNICAL TESTING LABORATORY

LABORATORY ANALYSIS

SIEVE ANALYSIS TEST PIT 2



Date : 08/11/06	D_{10} = 0.04	**Classification**		% Gravel
Sample #: 746	D_{30} = 0.09	SM, Silty Sand		0.96%
Sample ID:	D_{60} = 0.12	**Specifications**		% Sand
Source: Native Material	C_c = 1.64	No Specs		79.26%
Project: Pear Street	C_u = 3.15	% Moisture 8.7%		% Silt & Clay
Client: Karen Cruz	Liquid Limit= 0.00	Dust Ratio=		19.78%
Boring #: TP-2	Plastic Limit= 0.00	Fineness Modulus		Sample Meets Specs
Depth: 18-30"	Plasticity Index= 0.00	0.33		**Yes**

Coarse Section Sieve Size US	Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min	**Fines Section** Sieve Size US	Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
6.00"	150.00		100.0%			#4	4.750	99.0%	99.0%		
4.00"	100.00		100.0%			#8	2.360	98.0%	98.0%		
3.00"	75.00		100.0%			#10	2.000		97.4%		
2.50"	63.00		100.0%			#16	1.180	96.1%	96.1%		
2.00"	50.00		100.0%			#20	0.850		95.3%		
1.75"	45.00		100.0%			#30	0.600	94.6%	94.6%		
1.50"	37.50		100.0%			#40	0.425		94.0%		
1.25"	31.50		100.0%			#50	0.300	93.5%	93.5%		
1.00"	25.00	100.0%	100.0%			#60	0.250		91.5%		
7/8"	22.40		99.6%			#80	0.180		88.8%		
3/4"	19.00	99.1%	99.1%			#100	0.150	87.6%	87.6%		
5/8"	16.00		99.0%			#140	0.106		47.8%		
1/2"	12.50		99.0%			#170	0.090		33.3%		
3/8"	9.50		99.0%			#200	0.075	19.8%	19.8%		
1/4"	6.30		99.0%			#270	0.053				

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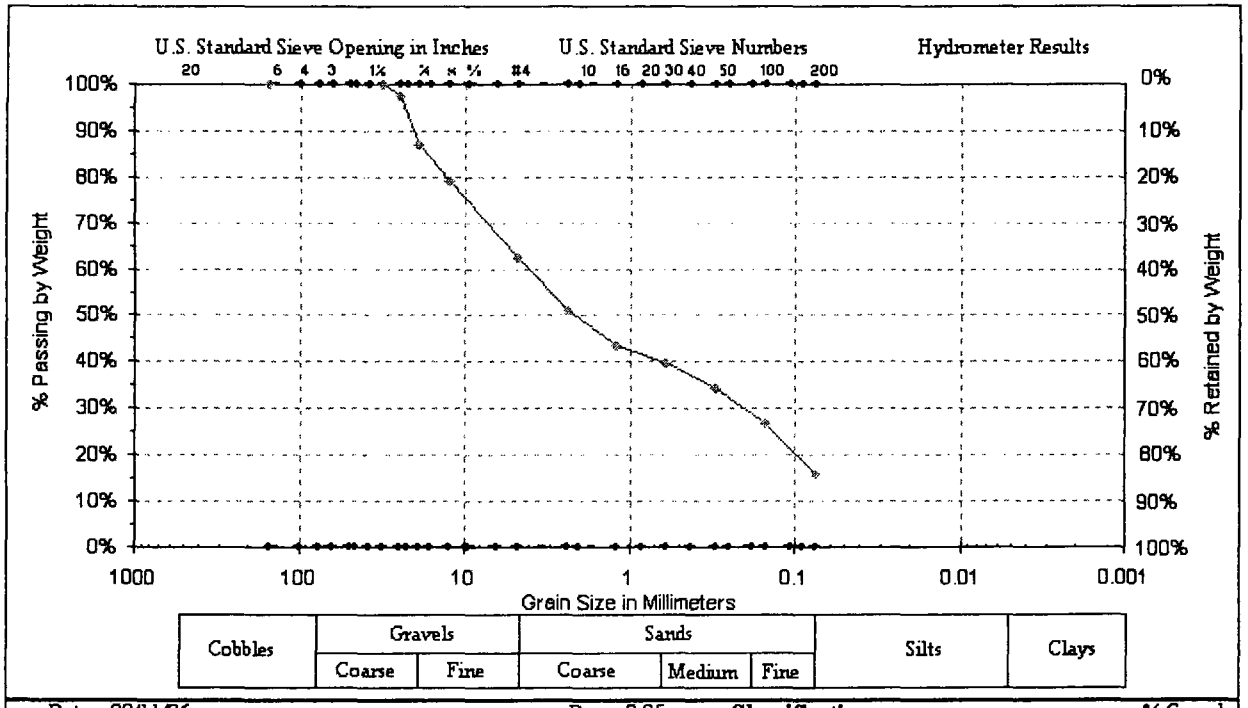
GEOTECHNICAL TESTING LABORATORY

SIEVE ANALYSIS TEST PIT 3



Date : 08/11/06	D_{10} = 0.05	**Classification**	% Gravel
Sample #: 747	D_{30} = 0.22	SM, Silty Sand with Gravel	37.77%
Sample ID:	D_{60} = 4.27	**Specifications**	% Sand
Source: Native Material	C_c = 0.23	No Specs	46.21%
Project: Pear Street	C_u = 91.12	% Moisture 10.8%	% Silt & Clay
Client: Karen Cruz	Liquid Limit= 0.00	Dust Ratio=	16.01%
Boring #: TP-3	Plastic Limit= 0.00	Fineness Modulus	Sample Meets Specs
Depth: 24-32"	Plasticity Index= 0.00	3.82	**Yes**

Coarse Section Sieve Size US	Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
6.00"	150.00		100.0%		
4.00"	100.00		100.0%		
3.00"	75.00		100.0%		
2.50"	63.00		100.0%		
2.00"	50.00		100.0%		
1.75"	45.00		100.0%		
1.50"	37.50		100.0%		
1.25"	31.50	100.0%	100.0%		
1.00"	25.00	97.3%	97.3%		
7/8"	22.40		92.9%		
3/4"	19.00	87.2%	87.2%		
5/8"	16.00		83.5%		
1/2"	12.50	79.1%	79.1%		
3/8"	9.50		72.6%		
1/4"	6.30		65.6%		

Fines Section Sieve Size US	Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
#4	4.750	62.2%	62.2%		
#8	2.360	51.2%	51.2%		
#10	2.000		48.9%		
#16	1.180	43.7%	43.7%		
#20	0.850		41.4%		
#30	0.600	39.7%	39.7%		
#40	0.425		36.5%		
#50	0.300	34.1%	34.1%		
#60	0.250		31.7%		
#80	0.180		28.3%		
#100	0.150	26.8%	26.8%		
#140	0.106		20.5%		
#170	0.090		18.2%		
#200	0.075	16.0%	16.0%		
#270	0.053				

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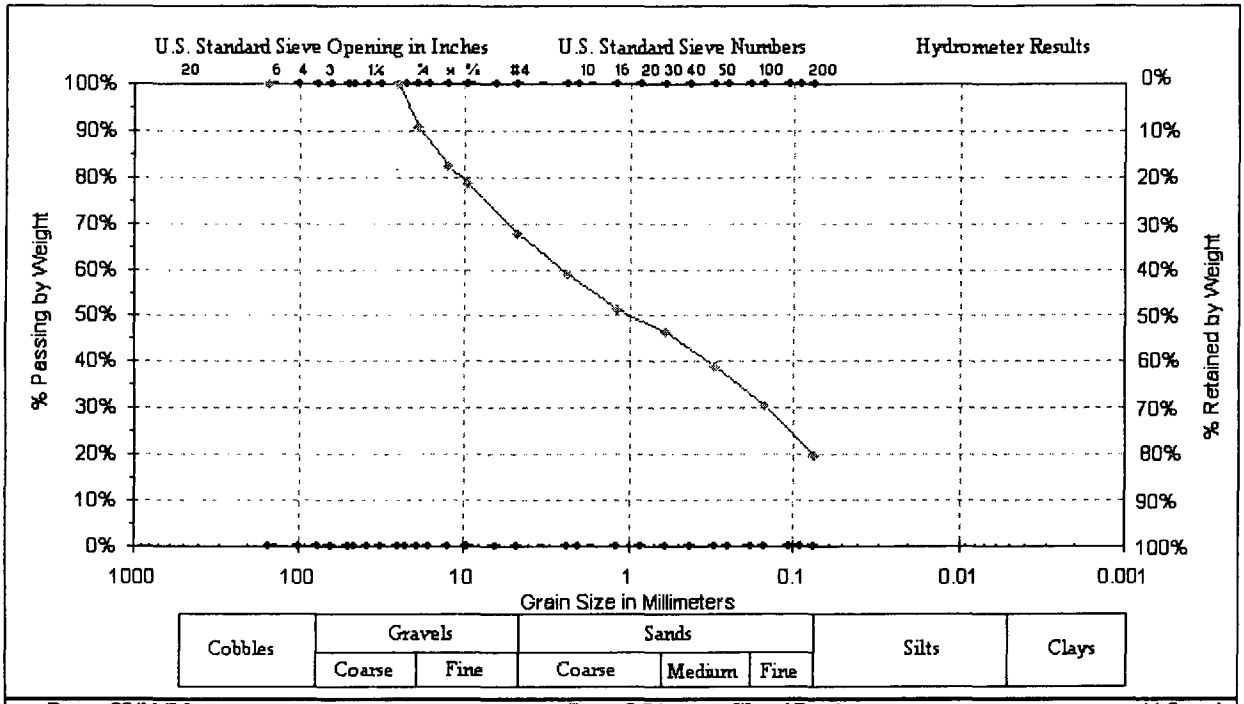
GEOTECHNICAL TESTING LABORATORY

SIEVE ANALYSIS TEST PIT 6



Date : 08/11/06	D_{10} = 0.04	**Classification**		% Gravel
Sample #: 748	D_{30} = 0.15	SM, Silty Sand with Gravel		32.23%
Sample ID:	D_{60} = 2.66	**Specifications**		% Sand
Source: Native Material	C_c = 0.21	No Specs		48.30%
Project: Pear Street	C_u = 69.13	% Moisture 11.3%		% Silt & Clay
Client: Karen Cruz	Liquid Limit= 0.00	Dust Ratio=		19.47%
Boring #: TP-6	Plastic Limit= 0.00	Fineness Modulus		Sample Meets Specs
Depth: 18-28"	Plasticity Index= 0.00	3.36		**Yes**

Coarse Section Sieve Size US	Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min	**Fines Section** Sieve Size US	Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
6.00"	150.00		100.0%			#4	4.750	67.8%	67.8%		
4.00"	100.00		100.0%			#8	2.360	58.9%	58.9%		
3.00"	75.00		100.0%			#10	2.000		56.7%		
2.50"	63.00		100.0%			#16	1.180	51.6%	51.6%		
2.00"	50.00		100.0%			#20	0.850		48.7%		
1.75"	45.00		100.0%			#30	0.600	46.5%	46.5%		
1.50"	37.50		100.0%			#40	0.425		42.1%		
1.25"	31.50		100.0%			#50	0.300	38.9%	38.9%		
1.00"	25.00	100.0%	100.0%			#60	0.250		36.1%		
7/8"	22.40		96.1%			#80	0.180		32.2%		
3/4"	19.00	90.9%	90.9%			#100	0.150	30.6%	30.6%		
5/8"	16.00		87.1%			#140	0.106		24.1%		
1/2"	12.50	82.6%	82.6%			#170	0.090		21.7%		
3/8"	9.50	78.8%	78.8%			#200	0.075	19.5%	19.5%		
1/4"	6.30		71.4%			#270	0.053				

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PERMEAMETER TEST TP-2

Soil from Test Pit 2

Darcy's Law k=QL/Ath

k= coefficient of permeability
Q= quantity of water discharged
L= distance between manometers
A= cross-sectional area of specimen
t= total time of discharge
h= difference in head on manometers

Trial 1	english	units	metric	units
Q			57.39	cm^3
L	5.75	inches	14.605	cm
A	12.57143	inches^2	81.1	cm^2
t	1	minutes	1	minutes
h	56	inches	142.2	cm

k= 0.072680404 cm/minute

60

0.00121134 cm/sec

0.003076804 in/min
60
0.184608227 in/hr
4.430597456 in/day

Trial 2	english	units	metric	units
Q			51.03	cm^3
L	5.75	inches	14.605	cm
A	12.57143	inches^2	81.1	cm^2
t	1	minutes	1	minutes
h	56	inches	142.2	cm

k= 0.064625911 cm/minute

60

0.001077099 cm/sec

0.00273583 in/min
60
0.164149814 in/hr
3.939595542 in/day

Trial 3	english	units	metric	units
Q			51.67	cm^3
L	5.75	inches	14.605	cm
A	12.57143	inches^2	81.1	cm^2
t	1	minutes	1	minutes
h	56	inches	142.2	cm

k= 0.065436426 cm/minute

60

0.001090607 cm/sec

0.002770142 in/min
60
0.166208522 in/hr
3.98900454 in/day

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Resource Stewardship & Land Use

Continued

Trial 4		english	units	metric	units
	Q			50.96	cm^3
	L	5.75	inches	14.605	cm
	A	103.908825	inches^2	81.1	cm^2
	t	1	minutes	1	minutes
	h	56	inches	142.2	cm
	k=	0.064537261	cm/minute		
		60			
		0.001075621	cm/sec		

0.002732077 in/min
60
0.163924643 in/hr
3.934191433 in/day

Trial 5		english	units	metric	units
	Q			51.03	cm^3
	L	5.75	inches	14.605	cm
	A	103.908825	inches^2	81.1	cm^2
	t	1	minutes	1	minutes
	h	56	inches	142.2	cm
	k=	0.064625911	cm/minute		
		60			
		0.001077099	cm/sec		

0.00273583 in/min
60
0.164149814 in/hr
3.939595542 in/day

Trial 6		english	units	metric	units
	Q			50.33	cm^3
	L	5.75	inches	14.605	cm
	A	103.908825	inches^2	81.1	cm^2
	t	1	minutes	1	minutes
	h	56	inches	142.2	cm
	k=	0.06373941	cm/minute		
		60			
		0.001062324	cm/sec		

0.002698302 in/min
60
0.161898102 in/hr
3.885554451 in/day

Test Pit 2 Continued

Trial 7		english	units	metric	units	
	Q			61.11	cm^3	
	L	5.75	inches	14.605	cm	
	A	103.908825	inches^2	81.1	cm^2	
	t	1	minutes	1	minutes	
	h	56	inches	142.2	cm	
	k=	0.077391523	cm/minute			0.003276241 in/min
						60
		60				0.196574469 in/hr
						4.717787254 in/day
		0.001289859	cm/sec			

Trial 8		english	units	metric	units	
	Q			59.85	cm^3	
	L	5.75	inches	14.605	cm	
	A	103.908825	inches^2	81.1	cm^2	
	t	1	minutes	1	minutes	
	h	56	inches	142.2	cm	
	k=	0.075795822	cm/minute			0.00320869 in/min
						60
		60				0.192521387 in/hr
						4.62051329 in/day
		0.001263264	cm/sec			

Trial 9		english	units	metric	units	
	Q			61.46	cm^3	
	L	5.75	inches	14.605	cm	
	A	103.908825	inches^2	81.1	cm^2	
	t	1	minutes	1	minutes	
	h	56	inches	142.2	cm	
	k=	0.077834774	cm/minute			0.003295005 in/min
						60
		60				0.197700325 in/hr
						4.7448078 in/day
		0.001297246	cm/sec			

PERMEAMETER TEST TP-3

Soil from Test Pit 3

Darcy's Law k=QL/Ath

k= coefficient of permeability
Q= quantity of water discharged
L= distance between manometers
A= cross-sectional area of specimen
t= total time of discharge
h= difference in head on manometers

Trial 1		english	units	metric	units	
	Q			31.38	cm^3	
	L	5.75	inches	14.605	cm	
	A	12.57143	inches^2	81.1	cm^2	
	t	1	minutes	1	minutes	
	h	55	inches	139.7	cm	
	k=	0.040451743	cm/minute			0.001712457 in/min
						60
		60				0.102747427 in/hr
						2.465938258 in/day
		0.000674196	cm/sec			

Trial 2		english	units	metric	units	
	Q			30.15	cm^3	
	L	5.75	inches	14.605	cm	
	A	12.57143	inches^2	81.1	cm^2	
	t	1	minutes	1	minutes	
	h	55	inches	139.7	cm	
	k=	0.038866159	cm/minute			0.001645334 in/min
						60
		60				0.098720043 in/hr
						2.369281022 in/day
		0.000647769	cm/sec			

Trial 3		english	units	metric	units	
	Q			30.14	cm^3	
	L	5.75	inches	14.605	cm	
	A	12.57143	inches^2	81.1	cm^2	
	t	1	minutes	1	minutes	
	h	55	inches	139.7	cm	
	k=	0.038853268	cm/minute			0.001644788 in/min
						60
		60				0.0986873 in/hr
						2.368495191 in/day
		0.000647554	cm/sec			

Test Pit 3

Continued

Trial 4		english	units	metric	units	
	Q			30.02	cm^3	
	L	5.75	inches	14.605	cm	
	A	103.908825	inches^2	81.1	cm^2	
	t	1	minutes	1	minutes	
	h	55	inches	139.7	cm	
	k=	0.038698576	cm/minute			0.00163824 in/min
						60
		60				0.098294384 in/hr
						2.359065217 in/day
		0.000644976	cm/sec			

Trial 5		english	units	metric	units	
	Q			29.14	cm^3	
	L	5.75	inches	14.605	cm	
	A	103.908825	inches^2	81.1	cm^2	
	t	1	minutes	1	minutes	
	h	55	inches	139.7	cm	
	k=	0.037564174	cm/minute			0.001590217 in/min
						60
		60				0.095413003 in/hr
						2.289912073 in/day
		0.00062607	cm/sec			

Trial 6		english	units	metric	units	
	Q			28.62	cm^3	
	L	5.75	inches	14.605	cm	
	A	103.908825	inches^2	81.1	cm^2	
	t	1	minutes	1	minutes	
	h	55	inches	139.7	cm	
	k=	0.036893846	cm/minute			0.001561839 in/min
						60
		60				0.093710369 in/hr
						2.249048851 in/day
		0.000614897	cm/sec			

Test Pit 3 Continued

Trial 7		english	units	metric	units		
	Q			28.73	cm^3		
	L	5.75	inches	14.605	cm		
	A	103.908825	inches^2	81.1	cm^2		
	t	1	minutes	1	minutes		
	h	55	inches	139.7	cm		
	k=	0.037035646	cm/minute			0.001567842	in/min
						60	
		60				0.094070541	in/hr
						2.257692994	in/day
		0.000617261	cm/sec				

Trial 8		english	units	metric	units		
	Q			29.77	cm^3		
	L	5.75	inches	14.605	cm		
	A	103.908825	inches^2	81.1	cm^2		
	t	1	minutes	1	minutes		
	h	55	inches	139.7	cm		
	k=	0.038376303	cm/minute			0.001624597	in/min
						60	
		60				0.09747581	in/hr
						2.339419437	in/day
		0.000639605	cm/sec				

Trial 9		english	units	metric	units		
	Q			28.39	cm^3		
	L	5.75	inches	14.605	cm		
	A	103.908825	inches^2	81.1	cm^2		
	t	1	minutes	1	minutes		
	h	55	inches	139.7	cm		
	k=	0.036597355	cm/minute			0.001549288	in/min
						60	
		60				0.092957281	in/hr
						2.230974734	in/day
		0.000609956	cm/sec				

PERMEAMETER TEST TP-6

Soils from Test Pit #6

Darcy's Law k=QL/Ath

k=	coefficient of permeability
Q=	quantity of water discharged
L=	distance between manometers
A=	cross-sectional area of specimen
t=	total time of discharge
h=	difference in head on manometers

Trial 1		english	units	metric	units	
	Q			14.36	cm^3	
	L	5.75	inches	14.605	cm	
	A	12.57143	inches^2	81.1	cm^2	
	t	1	minutes	1	minutes	
	h	54.5	inches	138.4	cm	
	k=	0.018685256	cm/minute			0.000791009 in/min
						60
		60				0.047460551 in/hr
						1.139053218 in/day
		0.000311421	cm/sec			

Trial 2		english	units	metric	units	
	Q			14.22	cm^3	
	L	5.75	inches	14.605	cm	
	A	12.57143	inches^2	81.1	cm^2	
	t	1	minutes	1	minutes	
	h	55	inches	138.4	cm	
	k=	0.018503088	cm/minute			0.000783297 in/min
						60
		60				0.046997843 in/hr
						1.127948242 in/day
		0.000308385	cm/sec			

Trial 3		english	units	metric	units	
	Q			13.79	cm^3	
	L	5.75	inches	14.605	cm	
	A	12.57143	inches^2	81.1	cm^2	
	t	1	minutes	1	minutes	
	h	55	inches	138.4	cm	
	k=	0.017943571	cm/minute			0.000759611 in/min
						60
		60				0.045576671 in/hr
						1.093840102 in/day
		0.00029906	cm/sec			

Test Pit 6

Continued

Trial 4		english	units	metric	units		
	Q			13.52	cm^3		
	L	5.75	inches	14.605	cm		
	A	103.908825	inches^2	81.1	cm^2		
	t	1	minutes	1	minutes		
	h	55	inches	138.4	cm		
	k=	0.017592247	cm/minute			0.000744738	in/min
						60	
		60				0.044684307	in/hr
						1.072423364	in/day
		0.000293204	cm/sec				

Trial 5		english	units	metric	units		
	Q			14.13	cm^3		
	L	5.75	inches	14.605	cm		
	A	103.908825	inches^2	81.1	cm^2		
	t	1	minutes	1	minutes		
	h	55	inches	138.4	cm		
	k=	0.01838598	cm/minute			0.00077834	in/min
						60	
		60				0.046700389	in/hr
						1.120809329	in/day
		0.000306433	cm/sec				

Trial 6		english	units	metric	units		
	Q			14.01	cm^3		
	L	5.75	inches	14.605	cm		
	A	103.908825	inches^2	81.1	cm^2		
	t	1	minutes	1	minutes		
	h	55	inches	138.4	cm		
	k=	0.018229836	cm/minute			0.00077173	in/min
						60	
		60				0.046303782	in/hr
						1.111290779	in/day
		0.000303831	cm/sec				

Test Pit 6 Continued

Trial 7		english	units	metric	units		
	Q			13.95	cm^3		
	L	5.75	inches	14.605	cm		
	A	103.908825	inches^2	81.1	cm^2		
	t	1	minutes	1	minutes		
	h	55	inches	138.4	cm		
	k=	0.018151764	cm/minute			0.000768425	in/min
						60	
		60				0.046105479	in/hr
						1.106531503	in/day
		0.000302529	cm/sec				

Trial 8		english	units	metric	units		
	Q			14.02	cm^3		
	L	5.75	inches	14.605	cm		
	A	103.908825	inches^2	81.1	cm^2		
	t	1	minutes	1	minutes		
	h	55	inches	138.4	cm		
	k=	0.018242848	cm/minute			0.000772281	in/min
						60	
		60				0.046336833	in/hr
						1.112083991	in/day
		0.000304047	cm/sec				

Trial 9		english	units	metric	units		
	Q			13.74	cm^3		
	L	5.75	inches	14.605	cm		
	A	103.908825	inches^2	81.1	cm^2		
	t	1	minutes	1	minutes		
	h	55	inches	138.4	cm		
	k=	0.017878511	cm/minute			0.000756857	in/min
						60	
		60				0.045411418	in/hr
						1.08987404	in/day
		0.000297975	cm/sec				