# SOIL TEST PIT LOGS AND PERMEABILTY TEST RESULTS



# SOUTH JERSEY ENGINEERS, L.L.C.

# Septic System Design & Engineering

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Sandford Mersky P.F. Vincent Gioffre, NJDEP Licensed Operator (Wastewater) Nicholas Bielecki, P.E., NJDEP Licensed Operator (Wastewater)

March 7, 2023

CLIENT:

Tri State Engineering & Surveying, PC

PROJECT:

Lodge Ave

Block 124 / Lot 2, 5 & 6

Paulsboro Borough, Gloucester County, NJ

REQUIREMENT:

Subsurface Explorations (Test Pits)

ATTENTION:

Joseph Mancini, P.E.

joe@tristatecivil.com

#### **PURPOSE**

The purpose of this report is to present the findings pertaining to the subsurface explorations (test pits) performed at the above referenced project.

## **INVESTIGATION**

A representative from South Jersey Engineers LLC was present on March 1st of 2023 to witness the excavation of (5) five surveyed test pits. The test pits were surveyed and their locations were provided by Tri-State Engineering & Surveying, PC. The objective was to ascertain the following: estimate the seasonal high water-table, record ground water levels if encountered and establish soil profile logs. In addition, soil samples were returned to our office for analytical testing.

## **FINDINGS**

The in-situ soils encountered during the subsurface explorations consisted primarily of fine Sandy Loam / Loamy Sand . Refer to the attached soil profile log for more detailed descriptions.

#### **QUALIFICATIONS**

If any conditions other than what was revealed through the subsurface explorations are encountered, we should be informed immediately of such conditions so that we may modify our findings. This report is based on the subsurface conditions as revealed by the test pits. This investigation as performed by South Jersey Engineers, L.L.C. in no way releases the contractor or subcontractor of full responsibility of meeting contract documents, plans, specifications and standards in the industry. No other warranty is express or implied. No conclusions should be drawn from this report other than those specifically stated. The report does not reflect any variations, which may be encountered during construction. We should be informed immediately of such conditions so that we may modify our findings and conclusions, if necessary.

South Jersey Engineers, LLC will not be responsible for variations in subsurface soils encountered in areas other than those tested.

Respectfully,

Test Pit #5 Depth	Description
0"-9"	Topsoil
9"-64"	strong brown Sandy Loam
64"-100"	yellowish brown fine Loamy Sand
100"-144"	yellowish brown medium to fine Sand
	Groundwater not Encountered
	Estimated Seasonal High Water-table -NE

Test Pit #6 Depth	Description
0"-5"	Topsoil
5"-96"	strong brown Sandy Loam
96"-144"	yellowish brown fine Loamy Sand
	Groundwater not Encountered
	Estimated Seasonal High Water-table -NE
Test Pit #1 Depth	Description
0"-60"	Misc. Fill & Trash Debris
60"-80"	yellowish brown fine Loamy Sand
80"-132"	greenish gray fine Sand / Loamy Sand

Groundwater Encountered @ 90"
Estimated Seasonal High Water-table -90"

Test Pit #2 Depth	Description
0"-6"	Topsoil
6"-53"	strong brown Sandy Loam
53"-93"	strong brown medium to fine Sand- Gravel 10%
93"-132"	greenish gray very fine Sandy Silt Loam
	Groundwater Encountered @ 93"
	Estimated Seasonal High Water-table -93"

Test Pit #3 Depth	Description
0"-3"	Topsoil
3"-72"	yellowish brown fine Loamy Sand
73"-132"	greenish gray fine Sand – Gravel 10%
	Groundwater Encountered @ 90"
	Estimated Seasonal High Water-table -90"

South Jersey Engi	neers LLC	Tri State Engine	ering	Sample Date:	3/7/23
P.O. Box 1406		Lodge Ave		Test Pit #5	
Voorhees, NJ 080	43	Paulsboro Boro	ugh	Horizon 64"-1	00"
MUNICIPALITY	Paulsboro Borough				
Form 3b. Tube Permea	ameter Test Data				
1. Test Number	1 Repl	icate Letter A	Date Collected	3/7/2023	
2. Material Tested	Fill	X Tes	st in Native Soil -	Indicate Depth	72"
3. Type of Sample	Undisturbe	d	Х	Disturbed	
4. Sample Dimensions	Inside Radius of Sample Tube, R, Length of Sample, in inches	in cm 1.905			
Sample Weight (Wt. Sample Volume (L x 2	nination (Disturbed Samples Only): Fube Containing Sample - Wt. Emp 2.54 cm/inch x 3.14R²), cc Wt./Sample Volume), grams/cc	ty Tube 147.68 86.83 1.70			
	x No Yes				
7. Height of water Leve At the Beginning of E At the End of Each T		3.0	5		
8. Rate of Water Level	Drop (Add additional lines if needed	d):			
Time, Start of Test Interval, T1 (min.sec)		est Interval, min)			
0.00		40			
0.00		85			
0.00	5.52 5.6	87			
9. Calculation of Perme	•				
K, $(In/hr) = 60  min/hrk = 60  min/hr$	x r <sup>2</sup> /R <sup>2</sup> x L(in)/T(min) x ln (H1/H2) x x 3/ 5.5	97 × lm/2/2)			
k= 00 111117111	x x 3/ 5.8	87 x ln(3/2)			
x None(Soil/Tube Co	ple (Check appropriate items):  CracksWorm Channels  ntactLarge GravelLarg  _SmeeringCompactation	_Root Channels ge Roots			

P.O. Box 1406 Voorhees, NJ 0804	43	Lodge Ave Paulsboro Borough	Test Pit #5 Horizon 64"-100"
MUNICIPALITY	Paulsboro Borough		
Form 3b. Tube Permea	meter Test Data		
1. Test Number	1 Replicate Lett	er B Date Collecte	d 3/7/2023
2. Material Tested	Fill	X Test in Native Soil	- Indicate Depth 72"
3. Type of Sample	Undisturbed	Х	Disturbed
4. Sample Dimensions	Inside Radius of Sample Tube, R, in cm Length of Sample, in inches	1.905	
Sample Weight (Wt. Sample Volume (L x 2	ination (Disturbed Samples Only): Fube Containing Sample - Wt. Empty Tube 2.54 cm/inch x 3.14R²), cc Wt./Sample Volume), grams/cc	148.35 86.83 1.71	
	x No Yes lius, cm		•
7. Height of water Leve At the Beginning of E At the End of Each T		3.0	
8. Rate of Water Level	Drop (Add additional lines if needed):		
Time, Start of Test Interval, T1 (min.sec) 0.00	Time, Start of Test Length of Test Interval, T1 T, (min) (min.sec)  5.24  Length of Test Interval T, (min)	ral,	
0.00	5.28 5.47 5.47 5.78		
		_	
Calculation of Perme	eability:		
	x r <sup>2</sup> /R <sup>2</sup> x L(in)/T(min) x In (H1/H2) x x 3/ 5.78 12.63	x ln(3/2)	
x None Soil/Tube Co	ple (Check appropriate items): CracksWorm ChannelsRoot Cl ntactLarge GravelLarge Roots _SmeeringCompactation ifv		

Sample Date: 3/7/23

Test Pit #5 Depth	Description
0"-9"	Topsoil
9"-64"	strong brown Sandy Loam
64"-100"	yellowish brown fine Loamy Sand
100"-144"	yellowish brown medium to fine Sand
	Groundwater not Encountered
	Estimated Seasonal High Water-table -NE
Test Pit #4 Depth	Description
0"-5"	Topsoil
5"-96"	strong brown Sandy Loam
96"-144"	yellowish brown fine Loamy Sand
	Groundwater not Encountered
	Estimated Seasonal High Water-table -NE
Test Pit #1 Depth	Description
0"-60"	Misc. Fill & Trash Debris
60"-80"	yellowish brown fine Loamy Sand
80"-132"	greenish gray fine Sand / Loamy Sand

Groundwater Encountered @ 90"

Estimated Seasonal High Water-table -90"

Voorhees, NJ 0804	43		Paulsboro B	Borough	Horizon 5"-96"	1
MUNICIPALITY	Paulsboro Borough					
Form 3b. Tube Permea	meter Test Data					
1. Test Number	1	Replicate Letter	Α	Date Collected	3/7/2023	
2. Material Tested		Fill	X	Test in Native Soil -	Indicate Depth [	72"
3. Type of Sample		Undisturbed		Х	Disturbed	
4. Sample Dimensions	Inside Radius of Samp Length of Sample, in in		1.905			
Sample Weight (Wt. Sample Volume (L x 2	ination (Disturbed Sam Fube Containing Sample 2.54 cm/inch x 3.14R²), Wt./Sample Volume), g	e - Wt. Empty Tube cc	150.42 86.83 1.73			
6. Standpipe Used: Indicate internal Rad	x No dius, cm	Yes		-		
	el above Rim of Test Ba Each Test Interval, H1 est Interval, H2	sin in inches:	3.0			
8. Rate of Water Level	Drop (Add additional lin	nes if needed):				
Time, Start of Test Interval, T1 (min.sec)	Time, Start of Test Interval, T1 (min.sec)	Length of Test Interval T, (min)	,			
0.00	11.14	11.23	]			
0.00	11.20 11.48	11.33	-			
0.00	11.40	11.00	-			
9. Calculation of Perm	eability:		-			
K, $(in/hr) = 60 min/hr$	$x r^2/R^2 x L(in)/T(min) x$	In (H1/H2)				
k= 60 min/hr	x x 3/	11.80	x In(3/2)			
k=	6.18					
10 Defects in the Sam	anla (Chack appropriate	itoms):				
	iple (Check appropriate CracksWorm Ch		innels			
	ntactLarge Grav					
Dry Soil	SmeeringCom					
OtherSpec	cify		_			

Lodge Ave

Sample Date: 3/7/23

Test Pit #4

South Jersey Engineers LLC

Voorhees, NJ 0804	43		Paulsboro E	Borough	Horizon 5"-96"	
MUNICIPALITY	Paulsboro Borough					
Form 3b. Tube Permea	meter Test Data					
1. Test Number	1	Replicate Letter	В	Date Collected	3/7/2023	
2. Material Tested		]Fill	X	Test in Native Soil -	Indicate Depth	72"
3. Type of Sample		Undisturbed		X	Disturbed	
4. Sample Dimensions	Inside Radius of Samp Length of Sample, in ir		1.905	]		
Sample Volume (L x 2	ination (Disturbed Sam Fube Containing Sampl 2.54 cm/inch x 3.14R²), Wt./Sample Volume),	e - Wt. Empty Tube	146.94 86.83 1.69			
6. Standpipe Used: Indicate internal Rad	x No dius, cm	Yes		-		
7. Height of water Leve At the Beginning of E At the End of Each T	est Interval, H1		3.0	]		
8. Rate of Water Level						
Time, Start of Test		Length of Test Interval	,			
Interval, T1 (min.sec)	Interval, T1 (min.sec)	T, (min)				
0.00	11.32	11.54	7			
0.00	11.44	11.73	1			
0.00	11.45	11.74	-			
			-			
Calculation of Perme	l eability:	I.	7			
$K_{\cdot}$ (in/hr) = 60 min/hr	$x r^2/R^2 x L(in)/T(min) x$	In (H1/H2)				
k= 60 min/hr	x x 3/		x In(3/2)	1		
	6.22	]	(0,2)	_		
xNone Soil/Tube Co	_SmeeringCom	nannelsRoot Cha relLarge Roots	nnels			

Lodge Ave

Sample Date: 3/7/23

Test Pit #4

South Jersey Engineers LLC

Voorhees, NJ 0804	43		Paulsboro B	orough	Horizon 60"-80"	
MUNICIPALITY	Paulsboro Borough					
Form 3b. Tube Permea	meter Test Data					
1. Test Number	1	Replicate Letter	A	Date Collected	3/7/2023	
2. Material Tested		]Fill	X	Test in Native Soil -	Indicate Depth	66"
3. Type of Sample		Undisturbed	[	X	Disturbed	
4. Sample Dimensions	Inside Radius of Samp Length of Sample, in ir		1.905			
Sample Volume (L x 2	ination (Disturbed Sam Γube Containing Sampl 2.54 cm/inch x 3.14R²), Wt./Sample Volume),	e - Wt. Empty Tube cc	151.74 86.83 1.75			
6. Standpipe Used: Indicate internal Rad	x No lius, cm	Yes				
7. Height of water Leve At the Beginning of E At the End of Each T		isin in inches:	3.0			
8. Rate of Water Level	Drop (Add additional lin	nes if needed):				
Time, Start of Test Interval, T1 (min.sec)  0.00  0.00  0.00	Time, Start of Test Interval, T1 (min.sec) 5.18 5.42 5.45	Length of Test Interval T, (min)  5.30 5.71 5.74	i,			
	$x r^2/R^2 x L(in)/T(min) x$					
k= 60 min/hr k=	x x 3/ 12.71	5.74	x In(3/2)			
x None Soil/Tube Co	_SmeeringCom	nannelsRoot Cha relLarge Roots	annels			

Lodge Ave

Sample Date: 3/7/23

Test Pit #1

South Jersey Engineers LLC

Voorhees, NJ 0804	13		Paulsboro B	orough	Horizon 60"-8	0"
MUNICIPALITY [	Paulsboro Borough					
Form 3b. Tube Permea	meter Test Data					
1. Test Number	1	Replicate Letter	В	Date Collected	3/7/2023	
2. Material Tested		]Fill	X	Test in Native Soil -	Indicate Depth [	66"
3. Type of Sample		Undisturbed		Х	Disturbed	
4. Sample Dimensions	Inside Radius of Samp Length of Sample, in ir		1.905	]		
Sample Volume (L x 2	ination (Disturbed Sam Γube Containing Sampl 2.54 cm/inch x 3.14R²), Wt./Sample Volume), γ	e - Wt. Empty Tube cc	147.59 86.83 1.70			
6. Standpipe Used: Indicate internal Rad	x No lius, cm			-		
7. Height of water Leve At the Beginning of E At the End of Each T	ach Test Interval, H1	sin in inches:	3.0	]		
8. Rate of Water Level	Drop (Add additional lin	nes if needed):				
Time, Start of Test Interval, T1 (min.sec)	Time, Start of Test Interval, T1 (min.sec)	Length of Test Interval T, (min)	Ι,			
0.00	5.18	5.29				
0.00	5.27 5.42	5.46 5.70	-			
			-			
9. Calculation of Permo			-			
K, $(in/hr) = 60  min/hrk = 60  min/hr$	x r <sup>2</sup> /R <sup>2</sup> x L(in)/T(min) x x x 3/		x In(3/2)	7		
	12.81	3.70	X III(3/2)	_		
x None Soil/Tube Co	SmeeringCom	nannelsRoot Cha relLarge Roots	ınnels			

Lodge Ave

Sample Date: 3/7/23

Test Pit #1

South Jersey Engineers LLC

P.O. Box 1406 Voorhees, NJ 0804	43		Lodge Ave Paulsboro E	Borough	Test Pit #2 Horizon 53"-93"	
MUNICIPALITY	Paulsboro Borough					
Form 3b. Tube Permea	meter Test Data					
1. Test Number	1	Replicate Letter	Α	Date Collected	3/7/2023	
2. Material Tested		]Fill	X	Test in Native Soil -	Indicate Depth	69"
3. Type of Sample		Undisturbed		Х	Disturbed	
4. Sample Dimensions	Inside Radius of Samp Length of Sample, in ir		1.905	]		
Sample Volume (L x 2	ination (Disturbed Sam Fube Containing Sampl 2.54 cm/inch x 3.14R²), Wt./Sample Volume),	e - Wt. Empty Tube	146.90 86.83 1.69			
6. Standpipe Used: Indicate internal Rad	x No dius, cm	Yes		-		
7. Height of water Leve At the Beginning of E At the End of Each T		sin in inches:	3.0	]		
8. Rate of Water Level	Drop (Add additional lin	nes if needed):				
Time, Start of Test Interval, T1 (min.sec)	Time, Start of Test Interval, T1 (min.sec) 3.54	Length of Test Interva T, (min)	ı, T			
0.00	3.56	3.94				
0.00	4.01	4.02	-			
9. Calculation of Perme	eability:					
K, (in/hr) = 60 min/hr	$x r^2/R^2 x L(in)/T(min) x$	In (H1/H2)				
k= 60 min/hr	x x 3/		x In(3/2)			
k=	18.16	]				
x None Soil/Tube Co	ple (Check appropriate CracksWorm Ch ntactLarge Grav _SmeeringCom ify	annelsRoot Cha elLarge Roots	annels			

Sample Date: 3/7/23

P.O. Box 1406 Voorhees, NJ 080	43	4	Lodge Ave Paulsboro Borough	Test Pit #2 Horizon 53"-93	11		
MUNICIPALITY	Paulsboro Borough						
Form 3b. Tube Permea	ameter Test Data						
1. Test Number	1	Replicate Lette	r B Dat	e Collected 3/7/2023			
2. Material Tested		]Fill	X Test in N	ative Soil - Indicate Depth	69"		
3. Type of Sample		Undisturbed		x Disturbed			
4. Sample Dimensions	Inside Radius of Sam Length of Sample, in i		1.905				
Sample Volume (L x 2	nination (Disturbed San Tube Containing Samp 2.54 cm/inch x 3.14R²) Wt./Sample Volume),	le - Wt. Empty Tube , cc	150.23 86.83 1.73				
Standpipe Used:     Indicate internal Rac	x No						
7. Height of water Leve At the Beginning of E At the End of Each T	ach Test Interval, H1	asin in inches:	3.0				
8. Rate of Water Level	Drop (Add additional I	ines if needed):					
Time, Start of Test Interval, T1 (min.sec)	Time, Start of Test Interval, T1 (min.sec)	Length of Test Interva T, (min)	I,				
0.00	3.46	3.76					
0.00	3.46	3.77					
0.00	3.57	3.96	_				
9. Calculation of Permo	eability:		_				
K (in/hr) = 60 min/hr	x r²/R² x L(in)/T(min) x	In (H1/H2)					
k= 60 min/hr	x x 3		x ln(3/2)				
k=	18.45		XIII(O/Z)				
10 Defects in the Com	unla (Chaok annun-i-t-	itama).					
10. Defects in the Sam			annels				
xNoneCracksWorm ChannelsRoot ChannelsSoil/Tube ContactLarge GravelLarge Roots							
	_SmeeringCom						
OtherSpecify							

Sample Date: 3/7/23

P.O. Box 1406 Voorhees, NJ 0804	13	Lodge Ave Paulsboro Borough	Test Pit #3 Horizon 3"-72"
MUNICIPALITY [	Paulsboro Borough		
Form 3b. Tube Permea	meter Test Data		
1. Test Number [	1 Replicate Lette	r A Date Collected	3/7/2023
2. Material Tested	Fill	X Test in Native Soil	Indicate Depth 66"
3. Type of Sample	Undisturbed	Х	Disturbed
	Inside Radius of Sample Tube, R, in cm Length of Sample, in inches	1.905	
Sample Weight (Wt. 7 Sample Volume (L x 2	ination (Disturbed Samples Only): Γube Containing Sample - Wt. Empty Tube 2.54 cm/inch x 3.14R²), cc Wt./Sample Volume), grams/cc	148.63 86.83 1.71	
	x No Yes lius, cm		
7. Height of water Leve At the Beginning of E At the End of Each T		3.0	
8. Rate of Water Level	Drop (Add additional lines if needed):		
Time, Start of Test Interval, T1 (min.sec) 0.00 0.00	Time, Start of Test Interval, T1 (min.sec)  4.23 4.38 4.51 4.85 5.08 5.13	al,	
9. Calculation of Permo K, (in/hr) = 60 min/hr k= 60 min/hr k=	eability: x r²/R² x L(in)/T(min) x ln (H1/H2) x x 3/ 5.13 14.22	x ln(3/2)	
x None Soil/Tube Co	nple (Check appropriate items): CracksWorm ChannelsRoot Ch IntactLarge GravelLarge Roots _SmeeringCompactation Sify	annels	

Sample Date: 3/7/23

P.O. Box 1406 Voorhees, NJ 08043			Lodge Ave Paulsboro Borough		Test Pit #3 Horizon 3"-72"	
MUNICIPALITY [	Paulsboro Borough					
Form 3b. Tube Permea	meter Test Data					
1. Test Number [	1	Replicate Letter[	В	Date Collected	3/7/2023	
2. Material Tested [	Fill		X Test	in Native Soil -	Indicate Depth	66"
3. Type of Sample [	Undi	sturbed		Х	Disturbed	
4. Sample Dimensions	Inside Radius of Sample Tu Length of Sample, in inches	be, R, in cm	1.905			
Sample Weight (Wt. 7 Sample Volume (L x 2	ination (Disturbed Samples of Tube Containing Sample - W 2.54 cm/inch x 3.14R²), cc Wt./Sample Volume), gram	t. Empty Tube	152.21 86.83 1.75			
	No lius, cm	_ Yes				
7. Height of water Leve At the Beginning of E At the End of Each T		n inches:	3.0			
8. Rate of Water Level	Drop (Add additional lines if	f needed):				
Time, Start of Test Interval, T1 (min.sec)	Time, Start of Test Leng Interval, T1 (min.sec)	gth of Test Interval T, (min)	,			
0.00	4.24	4.40				
0.00	4.41	4.69				
0.00	5.09	5.15	-			
			-			
			_			
9. Calculation of Perm	eability:					
$K \left( \frac{\ln \ln r}{r} \right) = 60 \frac{min}{r}$	$x r^2/R^2 x L(in)/T(min) x ln (H)$	H1/H2)				
k= 60 min/hr	x x 3/	5.15	x ln(3/2)			
k=	14.18					
x None	nple (Check appropriate item CracksWorm Channontact Large Gravel	elsRoot Cha	nnels			

South Jersey Engineers LLC

Dry Soil \_\_\_\_Smeering \_\_\_\_Compactation

Other---Specify\_

Tri State Engineering

Sample Date: 3/7/23