

SOIL TEST PIT LOGS AND PERMEABILTY TEST RESULTS

Prepared by



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SOUTH JERSEY ENGINEERS, L.L.C.

Septic System Design & Engineering

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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 2023¹⁰ 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,

South Jersey Engineers, L.L.C.

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"

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P.O. Box 1406
Voorhees, NJ 08043

Tri State Engineering
Lodge Ave
Paulsboro Borough

Sample Date: 3/7/23
Test Pit #5
Horizon 64"-100"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines 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	5.24	5.40
0.00	5.51	5.85
0.00	5.52	5.87

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

k = 60 min/hr	x	-----/-----	x 3/	5.87	x ln(3/2)
k =	12.44				

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compactation
 Other---Specify _____

South Jersey Engineers LLC
 P.O. Box 1406
 Voorhees, NJ 08043

Tri State Engineering
 Lodge Ave
 Paulsboro Borough

Sample Date: 3/7/23
 Test Pit #5
 Horizon 64"-100"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
 Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
 Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
 Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
 Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: No Yes
 Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
 At the Beginning of Each Test Interval, H1
 At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines 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	5.24	5.40
0.00	5.28	5.47
0.00	5.47	5.78

9. Calculation of Permeability:

$$K, (\text{in/hr}) = 60 \text{ min/hr} \times r^2/R^2 \times L(\text{in})/T(\text{min}) \times \ln(H1/H2)$$

k= 60 min/hr	x	-----/-----	x 3/	5.78	x ln(3/2)
k=	12.63				

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other---Specify _____

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"

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Tri State Engineering

Lodge Ave
Paulsboro Borough

Sample Date: 3/7/23

Test Pit #4
Horizon 5"-96"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines 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	11.33
0.00	11.48	11.80

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(\text{min}) \times \ln(H1/H2)$$

k= 60 min/hr	x	-----/-----	x 3/	11.80	x ln(3/2)
k= 6.18					

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other---Specify _____

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Lodge Ave
Paulsboro Borough

Sample Date: 3/7/23
Test Pit #4
Horizon 5"-96"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines 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	11.32	11.54
0.00	11.44	11.73
0.00	11.45	11.74

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

k = 60 min/hr	x	-----/-----	x 3/	11.74	x ln(3/2)
k = 6.22					

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other---Specify _____

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Lodge Ave
Paulsboro Borough

Sample Date: 3/7/23

Test Pit #1
Horizon 60"-80"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: Yes No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines 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	5.18	5.30
0.00	5.42	5.71
0.00	5.45	5.74

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

k= 60 min/hr	x	-----/-----	x 3/	5.74	x ln(3/2)
k= 12.71					

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compactation
 Other---Specify _____

South Jersey Engineers LLC

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Lodge Ave
Paulsboro Borough

Sample Date: 3/7/23

Test Pit #1
Horizon 60"-80"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines 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	5.18	5.29
0.00	5.27	5.46
0.00	5.42	5.70

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

k= 60 min/hr	x	-----/-----	x 3/	5.70	x ln(3/2)
k= 12.81					

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other---Specify _____

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Sample Date: 3/7/23

Test Pit #2
Horizon 53"-93"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines 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	3.54	3.91
0.00	3.56	3.94
0.00	4.01	4.02

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

k= 60 min/hr	x	-----/-----	x 3/	4.02	x ln(3/2)
k= 18.16					

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compactation
 Other---Specify _____

South Jersey Engineers LLC

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Tri State Engineering

Lodge Ave
Paulsboro Borough

Sample Date: 3/7/23

Test Pit #2
Horizon 53"-93"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines 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	3.46	3.76
0.00	3.46	3.77
0.00	3.57	3.96

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

k= 60 min/hr	x	-----/-----	x 3/	3.96	x ln(3/2)
k= 18.45					

10. Defects in the Sample (Check appropriate items):

None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compactation
 Other---Specify _____

South Jersey Engineers LLC

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Tri State Engineering
Lodge Ave
Paulsboro Borough

Sample Date: 3/7/23
Test Pit #3
Horizon 3"-72"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines 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	4.23	4.38
0.00	4.51	4.85
0.00	5.08	5.13

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(min) \times \ln(H1/H2)$$

k= 60 min/hr	x	-----/----- x 3/	5.13	x ln(3/2)
k= 14.22				

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other---Specify _____

South Jersey Engineers LLC

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Tri State Engineering

Lodge Ave
Paulsboro Borough

Sample Date: 3/7/23

Test Pit #3
Horizon 3"-72"

MUNICIPALITY

Form 3b. Tube Permeameter Test Data

1. Test Number Replicate Letter Date Collected

2. Material Tested Fill Test in Native Soil - Indicate Depth

3. Type of Sample Undisturbed Disturbed

4. Sample Dimensions Inside Radius of Sample Tube, R, in cm
Length of Sample, in inches

5. Bulk Density Determination (Disturbed Samples Only):
Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube)
Sample Volume (L x 2.54 cm/inch x 3.14R²), cc
Bulk Density (Sample Wt./Sample Volume), grams/cc

6. Standpipe Used: x No Yes
Indicate internal Radius, cm _____

7. Height of water Level above Rim of Test Basin in inches:
At the Beginning of Each Test Interval, H1
At the End of Each Test Interval, H2

8. Rate of Water Level Drop (Add additional lines 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	4.24	4.40
0.00	4.41	4.69
0.00	5.09	5.15

9. Calculation of Permeability:

$$K, (in/hr) = 60 \text{ min/hr} \times r^2/R^2 \times L(in)/T(\text{min}) \times \ln(H1/H2)$$

$$k = 60 \text{ min/hr} \times \frac{\text{---}}{\text{---}} \times \frac{3}{5.15} \times \ln(3/2)$$

$$k = 14.18$$

10. Defects in the Sample (Check appropriate items):
 None Cracks Worm Channels Root Channels
 Soil/Tube Contact Large Gravel Large Roots
 Dry Soil Smearing Compaction
 Other---Specify _____