The rate of dissipation indicates the permeability or hydraulic conductivity of the soil – that is, the tendency of the soil to allow or resist the flow of groundwater.

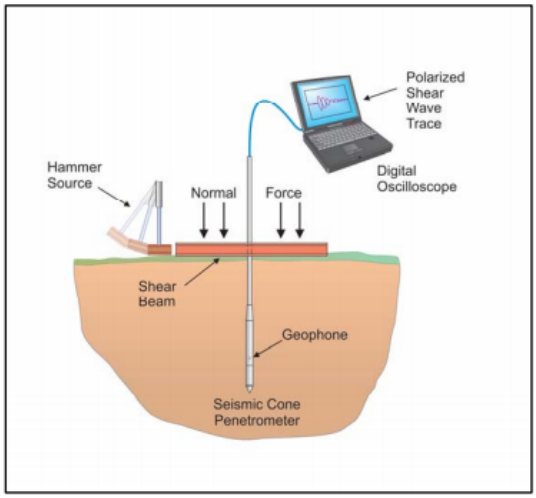
A rapidly dissipating pore pressure indicates the presence of an aquifer (a porous region where groundwater tends to flow), while a slowly dissipating pore pressure indicates an aquitard (a compacted region that resists the flow of groundwater).

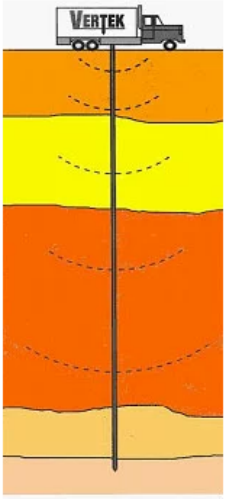
Seismic CPTs

Seismic CPT or SCPT is a method of calculating the *small strain shear modulus* of the soil by measuring shear wave velocity through the soil. The small strain modulus is an important quantity for determining the *dynamic response* of soil during earthquakes, explosive detonations, vibrations from machinery, and during wave loading for offshore structures. The wave speeds and moduli derived from seismic CPT measurements aid in the determination of *soil liquefaction potential* and improve the interpretation of surface seismic surveys by *providing wave speed profiles as a function of depth*.

SCPT Cone: The SCPT cone is a CPT or CPTU cone that is equipped with one or more geophone sensors. These sensors measure the magnitude and arrival time of seismic shear and compression waves.
Wave Generator: Seismic shear waves are generated at the soil surface.
This method uses an electronic wave generator attached to the CPT rig and increases repeatability and reduces physical strain and testing time for the field team.
The CPT test must be paused briefly at the desired intervals to perform the wave generation and data collection.
Data Acquisition System: As seismic waves are registered by the geophone sensors, data is transferred from the cone to the soil surface by wires that run though the push rods. The SCPT data acquisition system logs this data and analyzes it to determine the speed of the waves based on their arrival time and the distance between the wave generator and the sensors.

Calculation of the interval velocities are performed by visually picking a common feature (e.g. the first characteristic peak, trough, or crossover) on all of the recorded wave sets and taking the difference in ray path divided by the time difference between subsequent features. Ray path is defined as the straight-line distance from the seismic source to the geophone, accounting for beam offset, source depth and geophone offset from the cone tip.





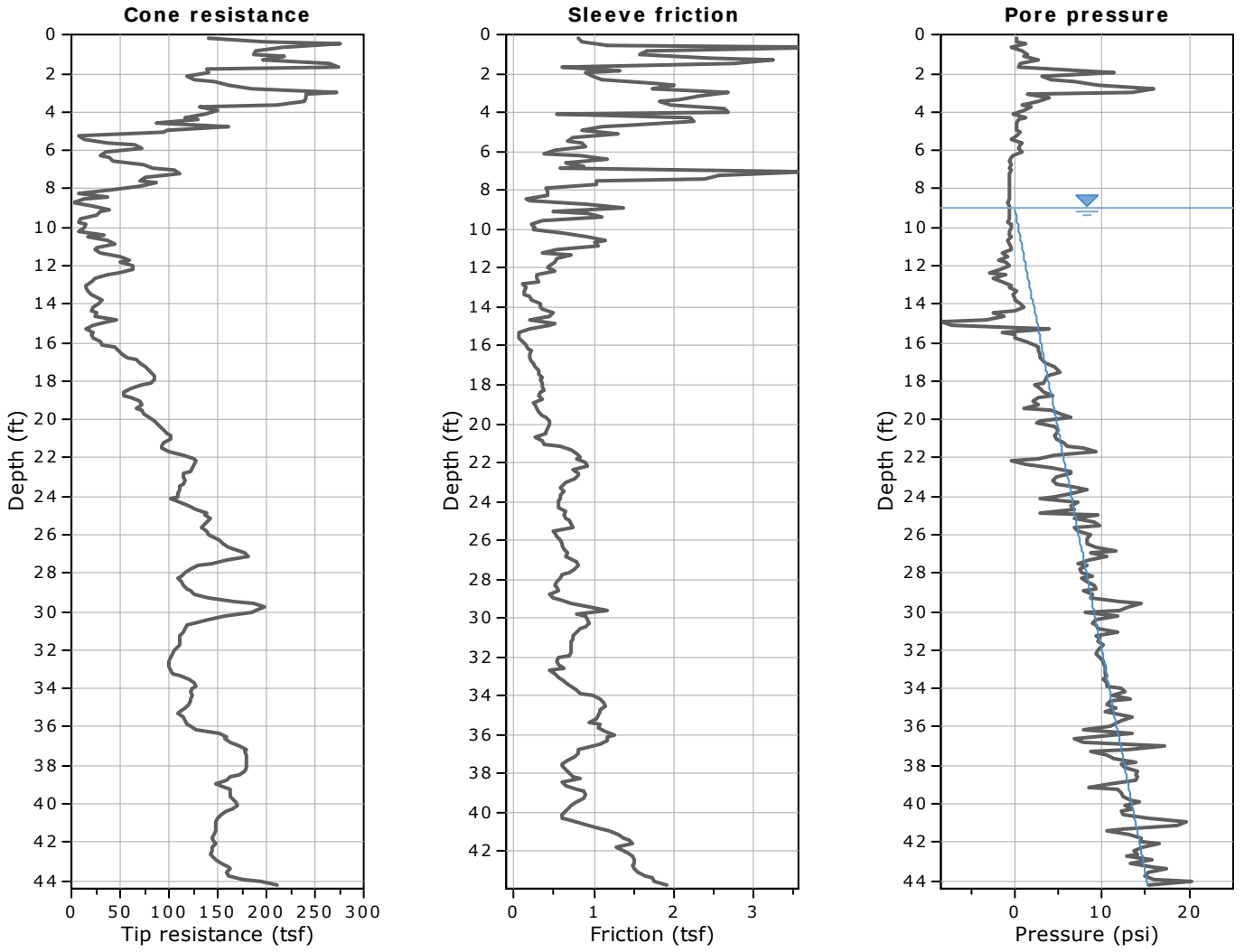
Cone Penetration Test Summary and Cone Penetration Test Plots

Sounding ID	Depth (ft)	Seismic Tests	Pre-Drill Depth (ft)
SCPT-GZ-01	44.23	15	
SCPT-GZ-05	29.10	9	
SCPT-GZ-20	35.17	12	
SCPT-GZ-37	33.86		
SCPT-GZ-38	22.51	8	

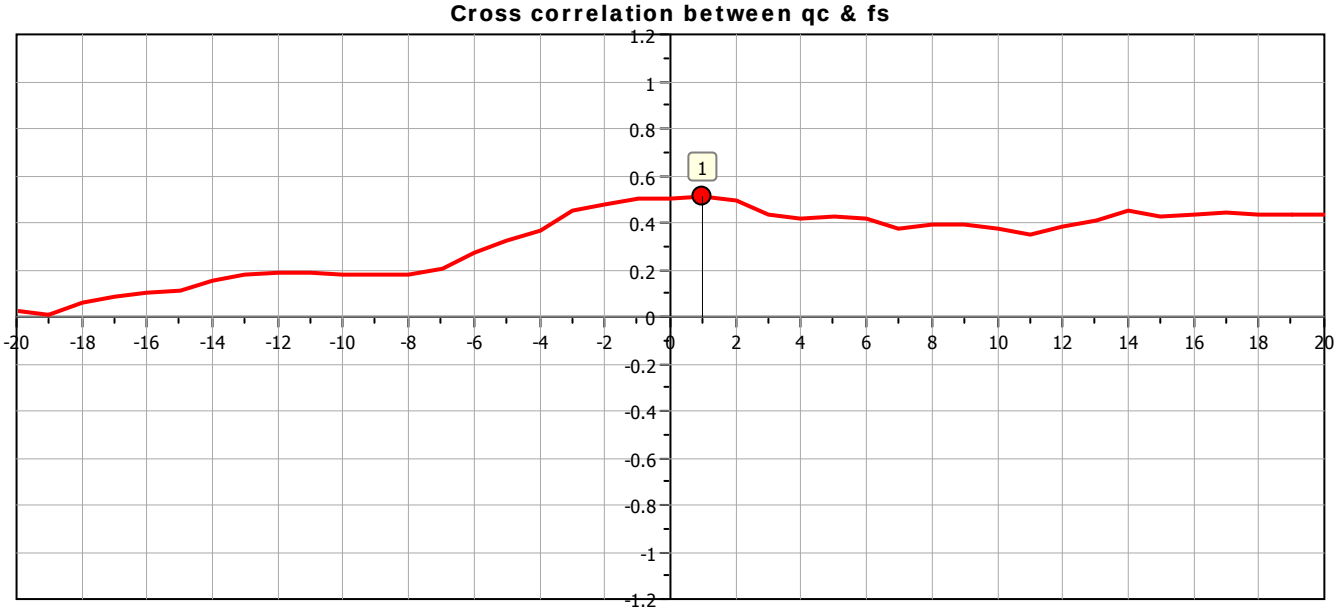
Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: **GZA**
Location: **Astoria Yard - Queens NY**

SCPT-GZ-01
Total depth: 44.23 ft



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).

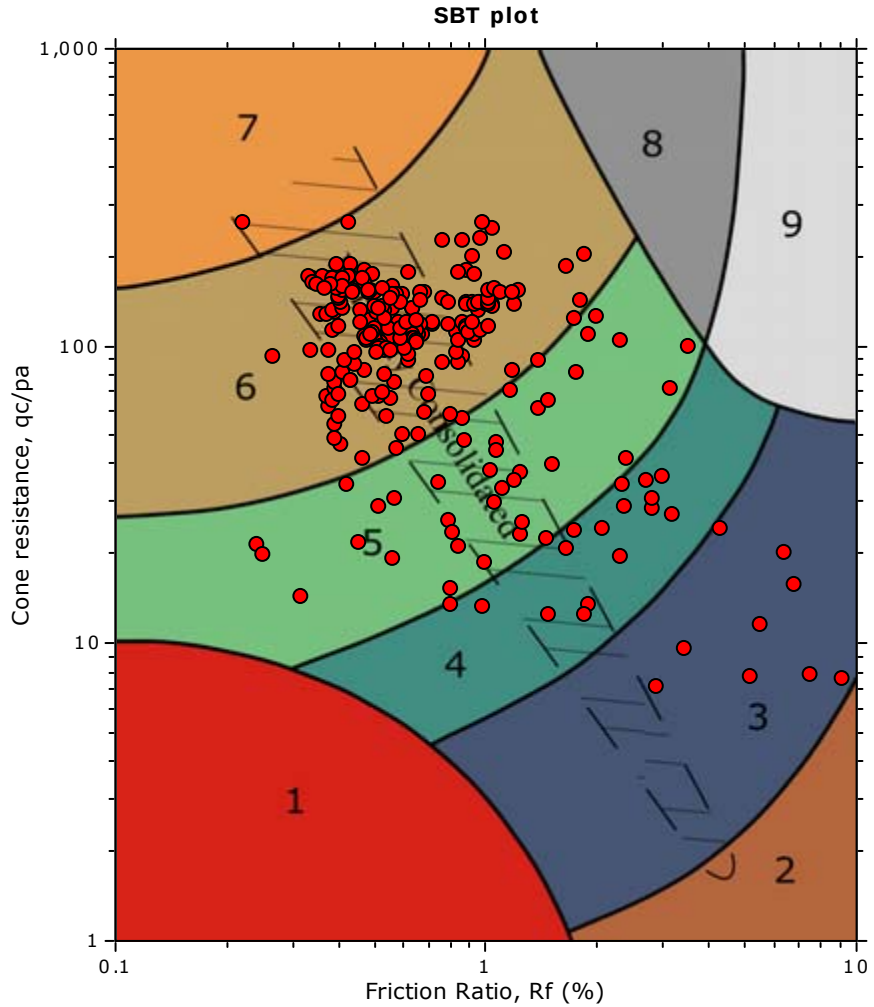


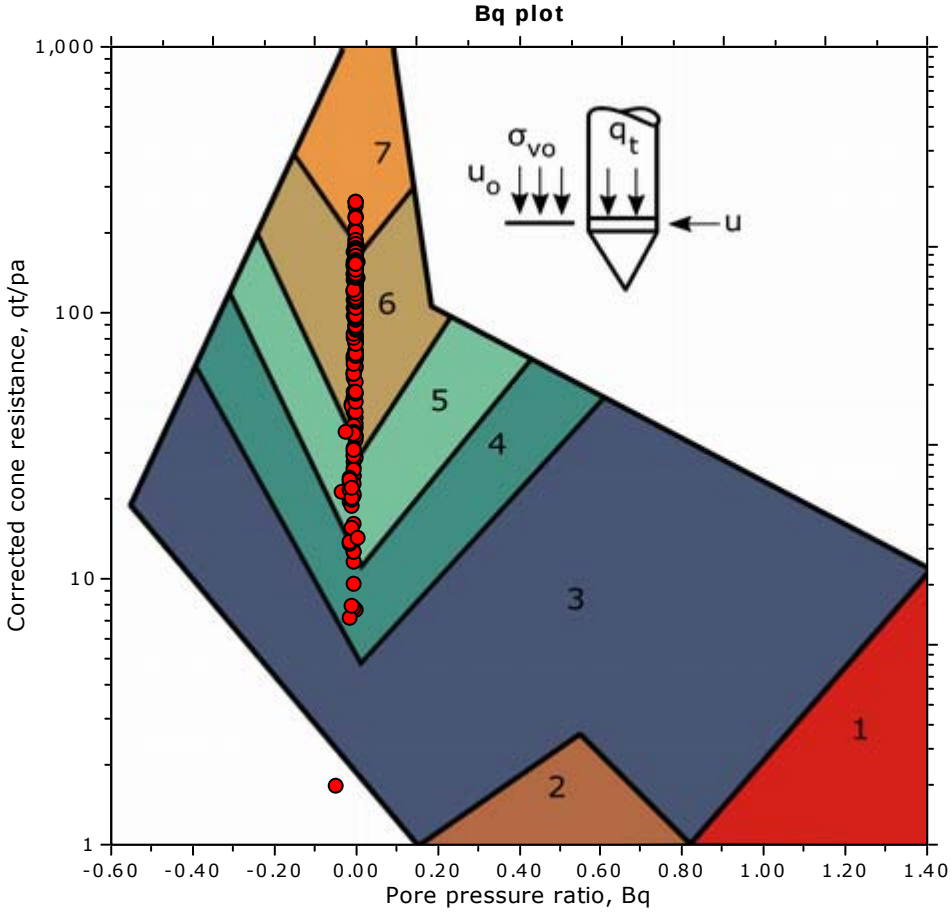
Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: **GZA**
Location: **Astoria Yard - Queens NY**

SCPT-GZ-01
Total depth: 44.23 ft

SBT - Bq plots





SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravelly sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

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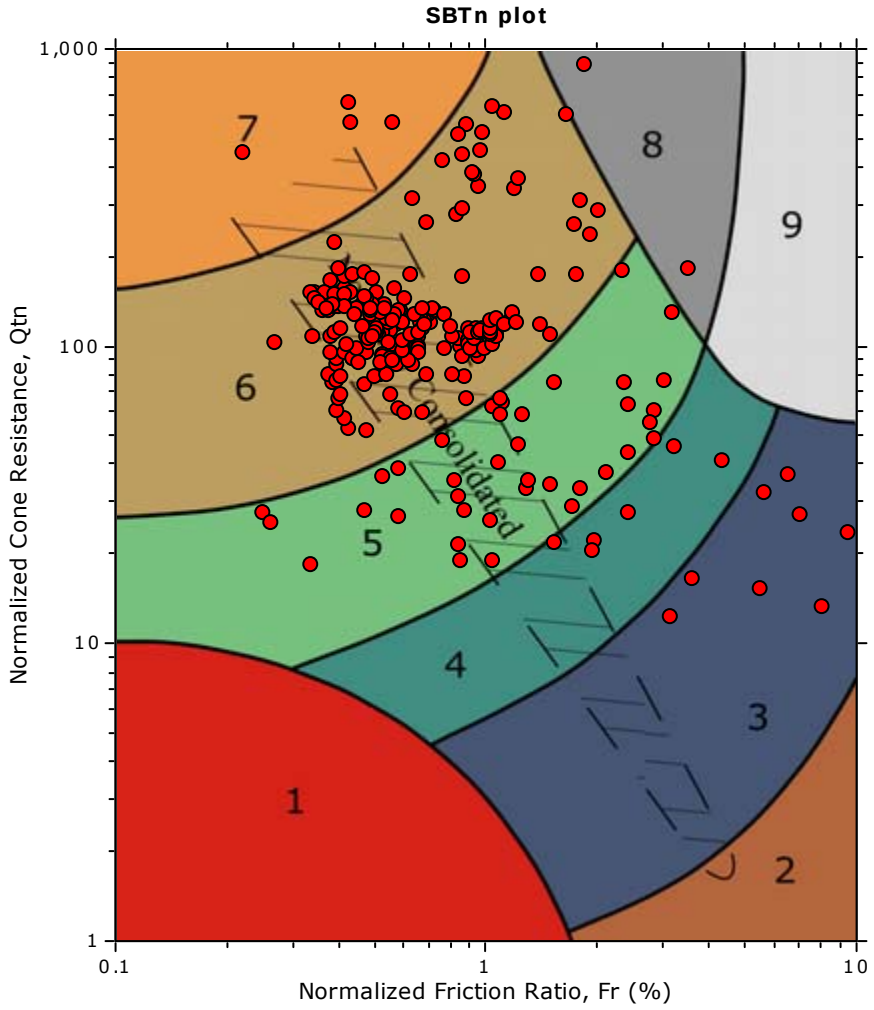
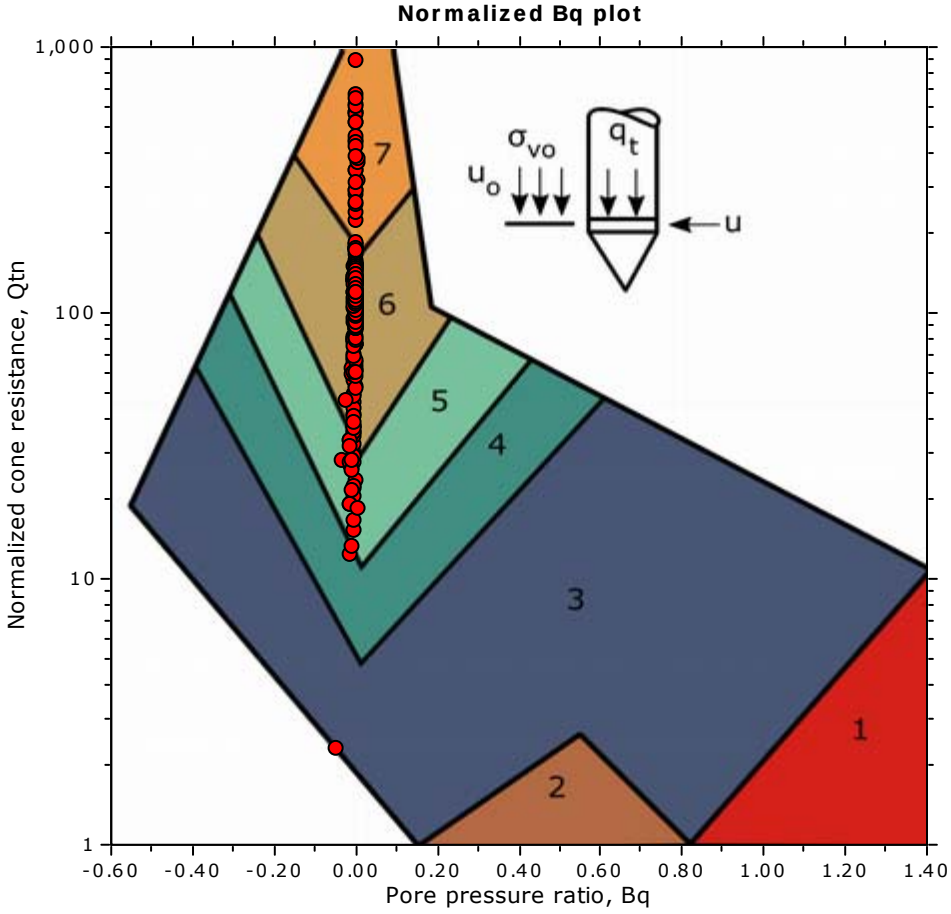
SCPT-GZ-01
Total depth: 44.23 ft

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravelly sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

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Mays Landing, NJ

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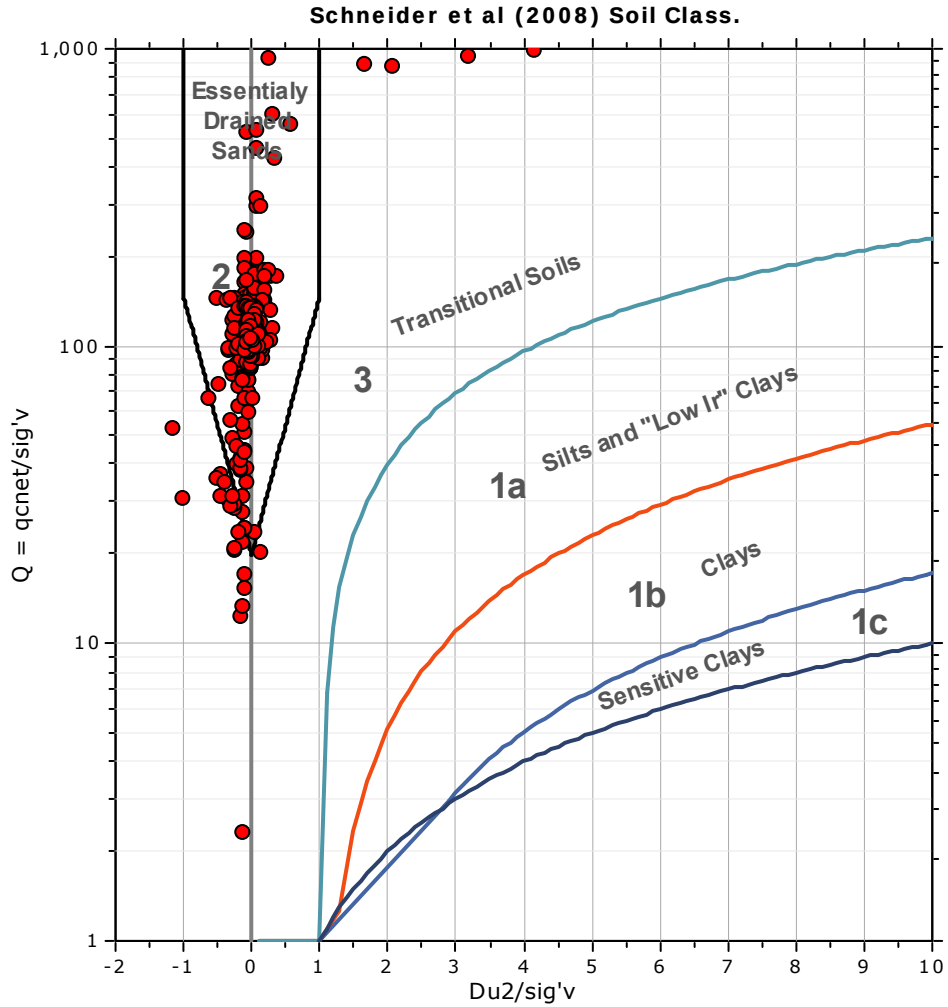
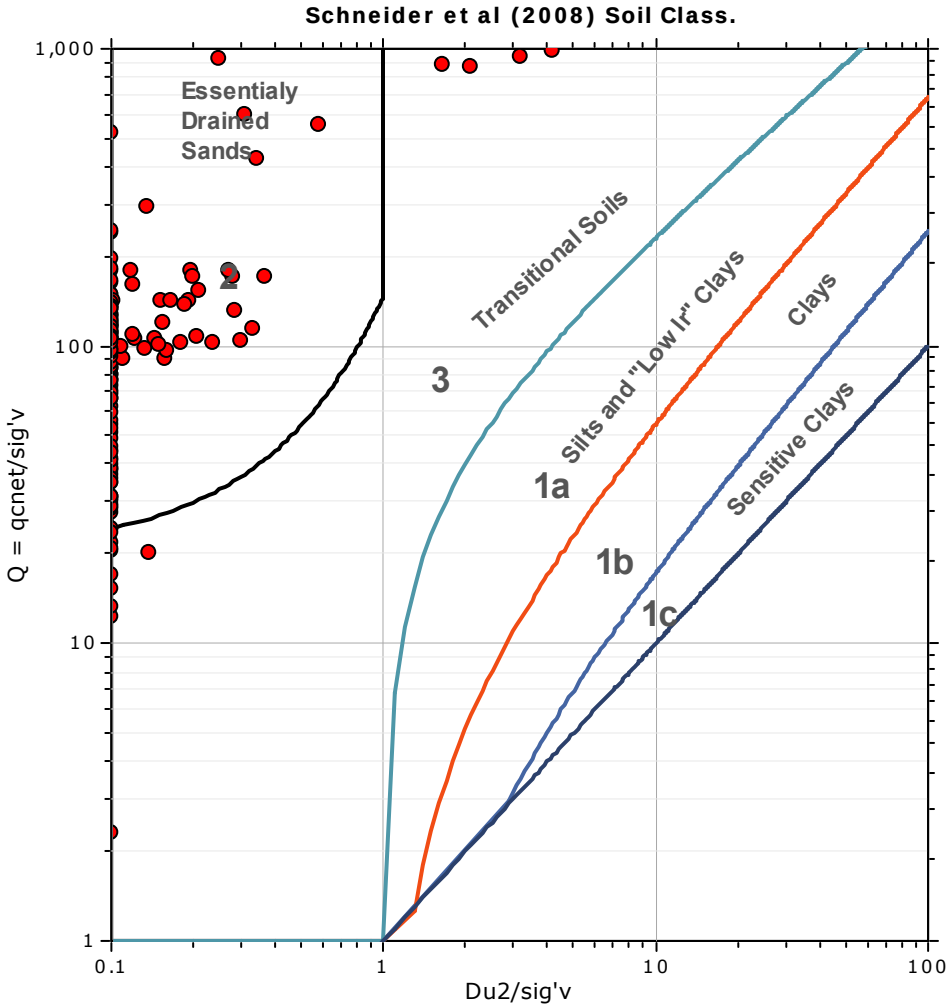
SCPT-GZ-01
Total depth: 44.23 ft

Bq plots (Schneider)





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SCPT-GZ-01
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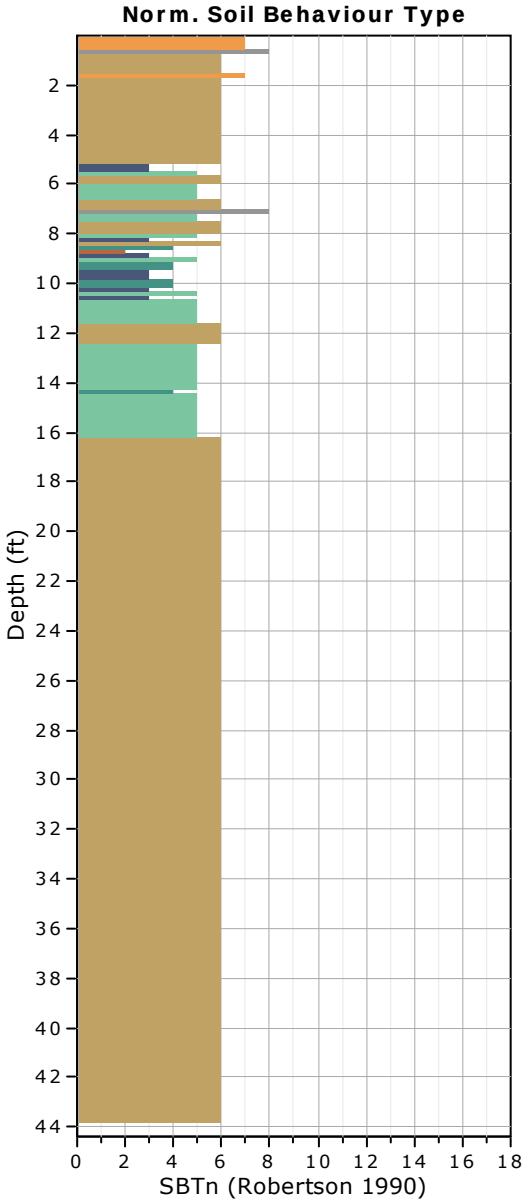

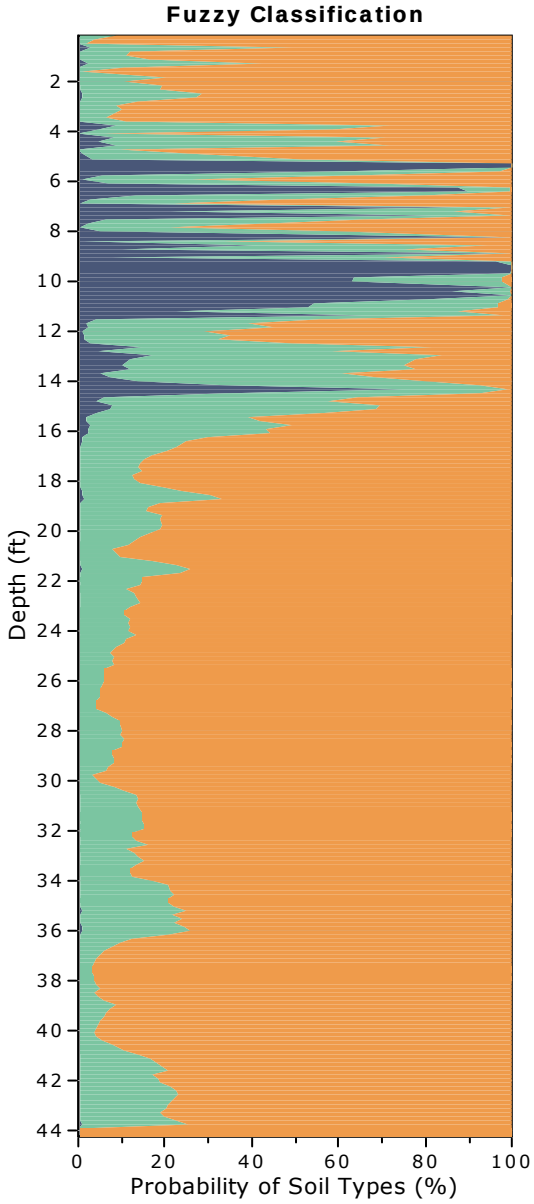

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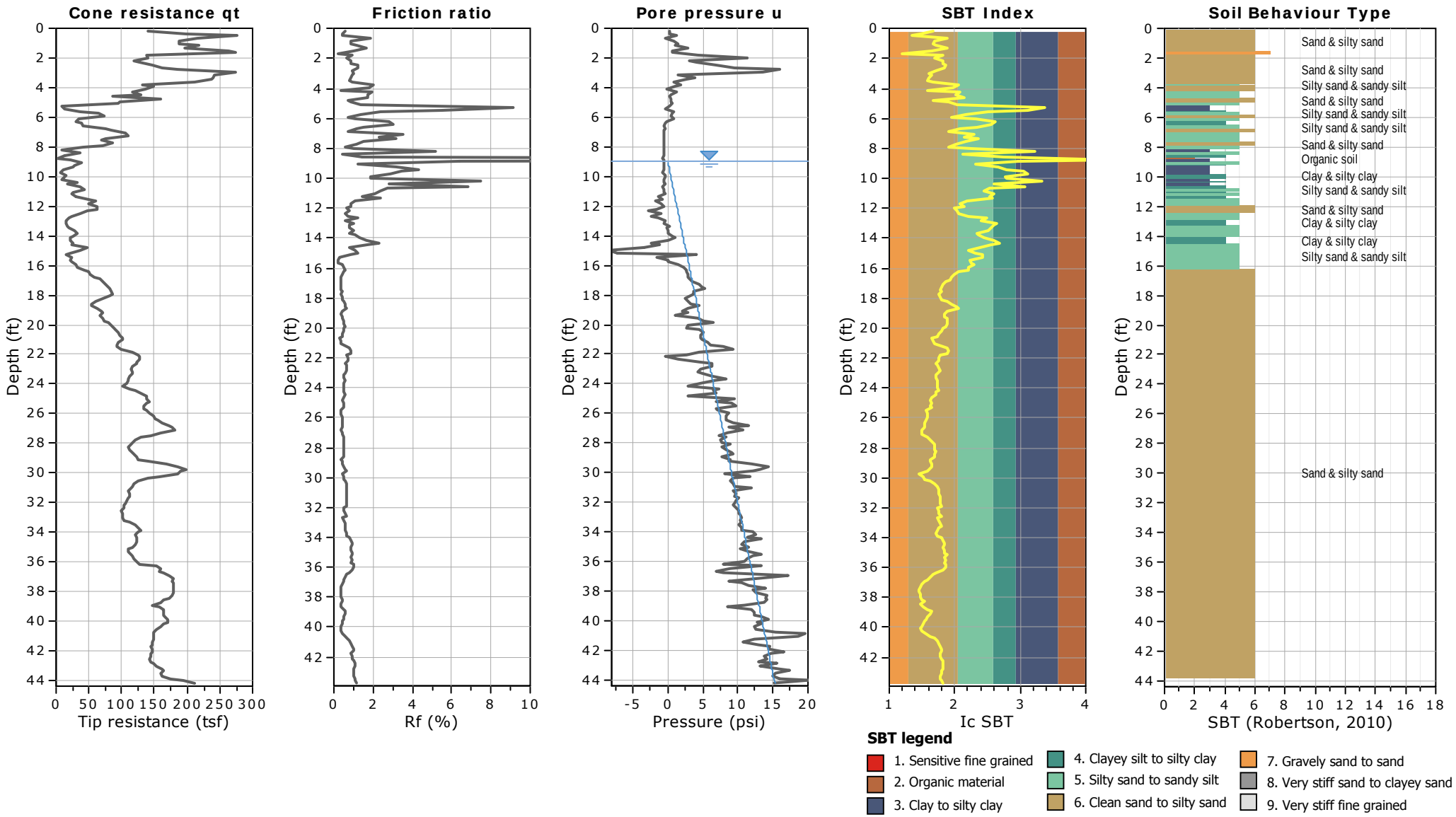

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SCPT-GZ-01
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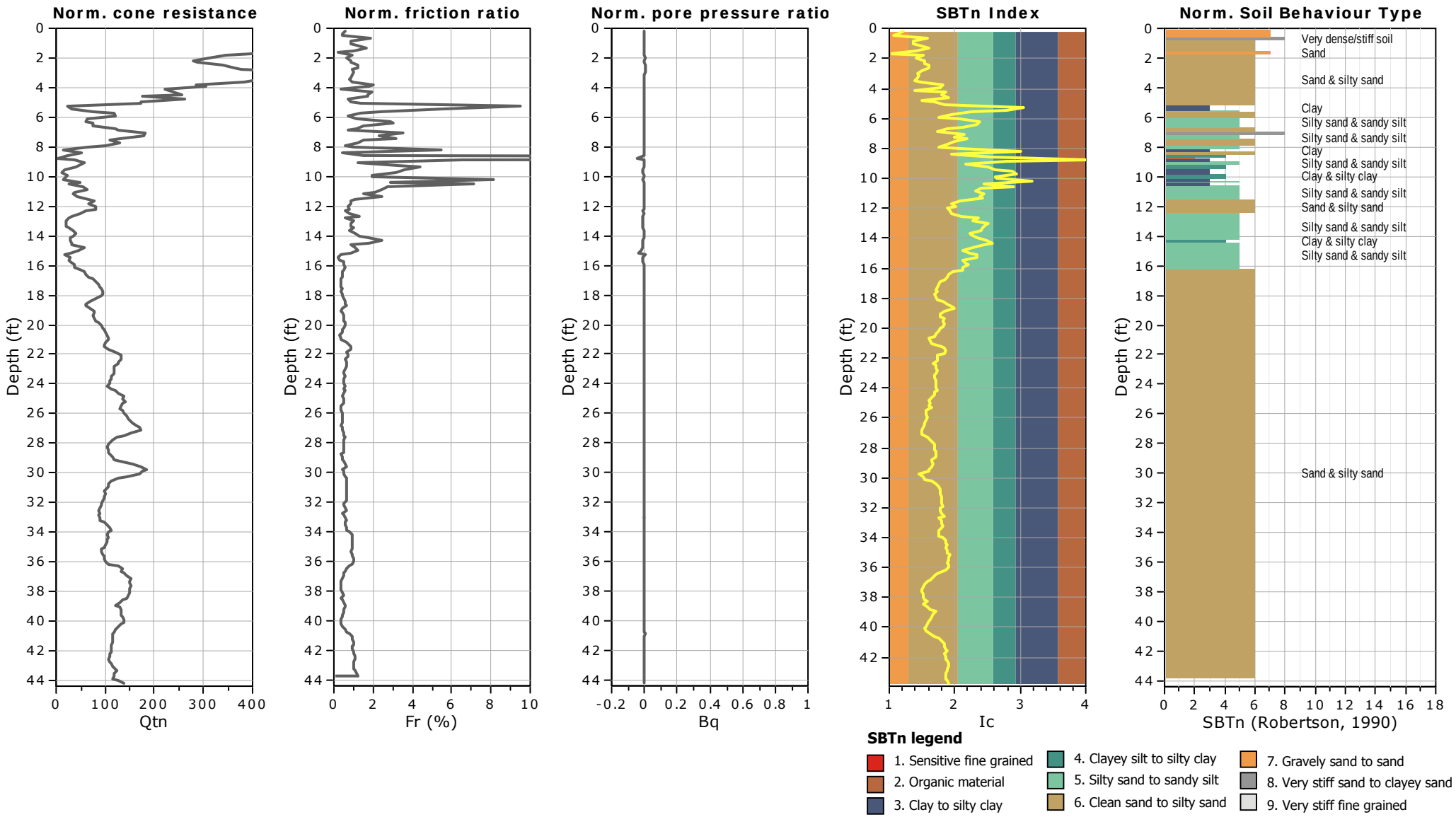

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SCPT-GZ-01
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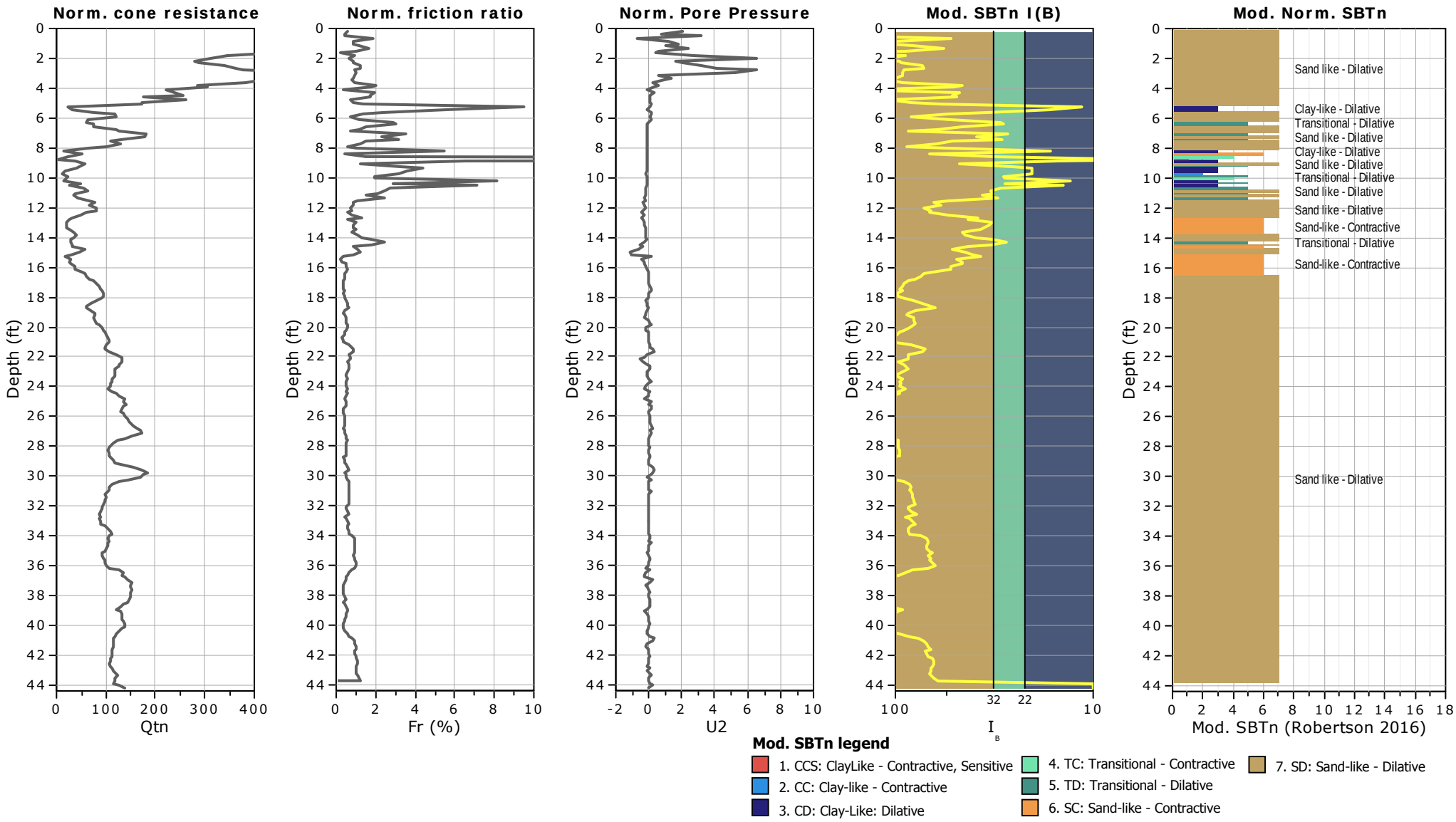

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Mays Landing, NJ

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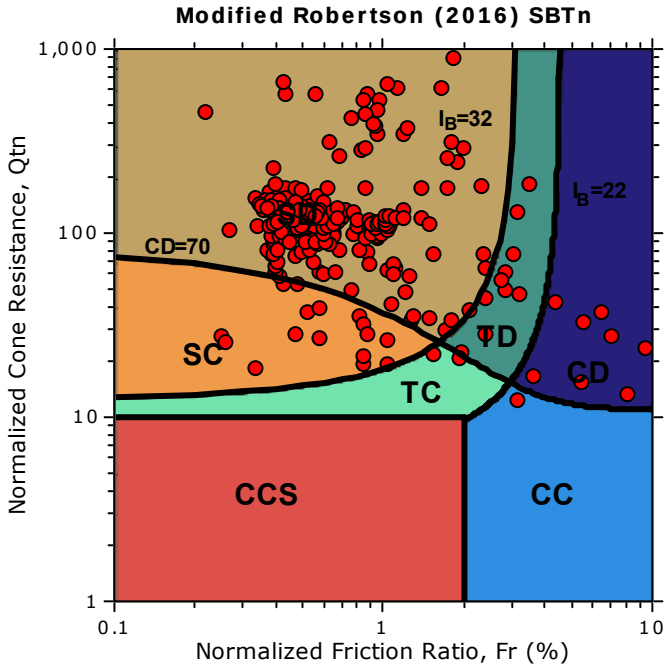
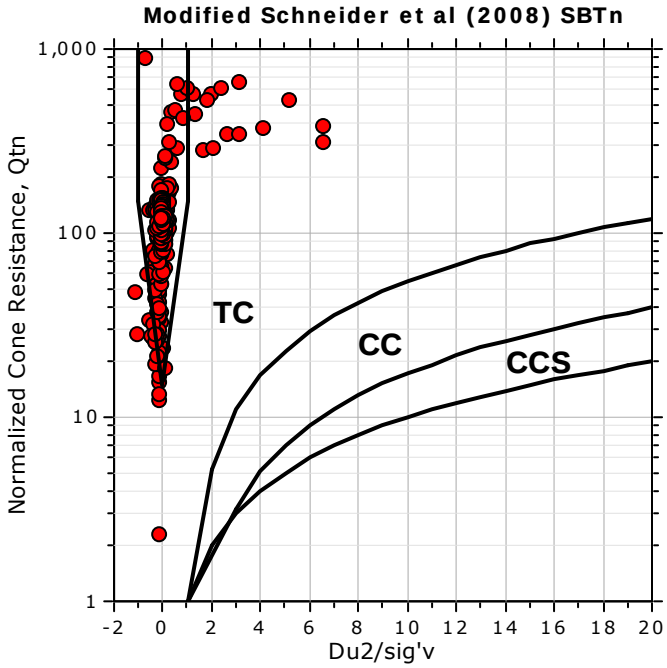
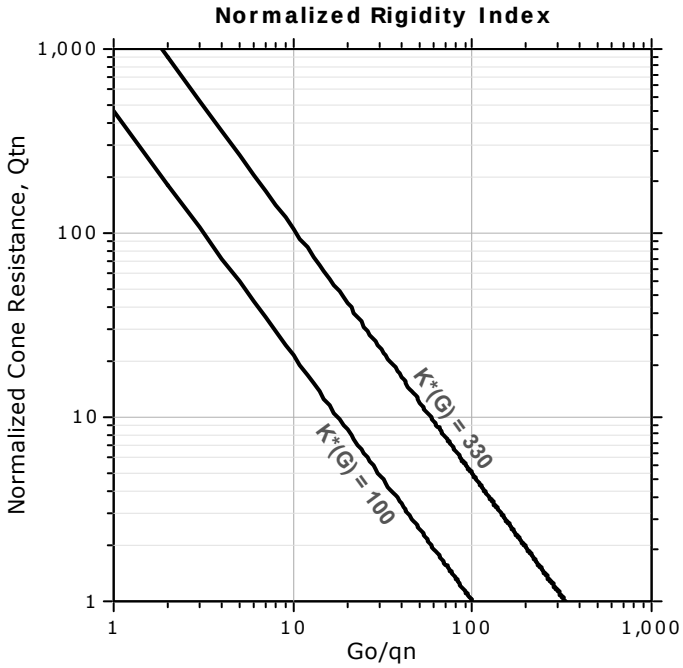
Location: **Astoria Yard - Queens NY**

SCPT-GZ-01
Total depth: 44.23 ft

Updated SBTn plots







CCS: Clay-like - Contractive - Sensitive
CC: Clay-like - Contractive
CD: Clay-like - Dilative
TC: Transitional - Contractive
TD: Transitional - Dilative
SC: Sand-like - Contractive
SD: Sand-like - Dilative

K(G) > 330: Soils with significant microstructure (e.g. age/cementation)

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5230 Atlantic Ave
Mays Landing, NJ

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SCPT-GZ-01
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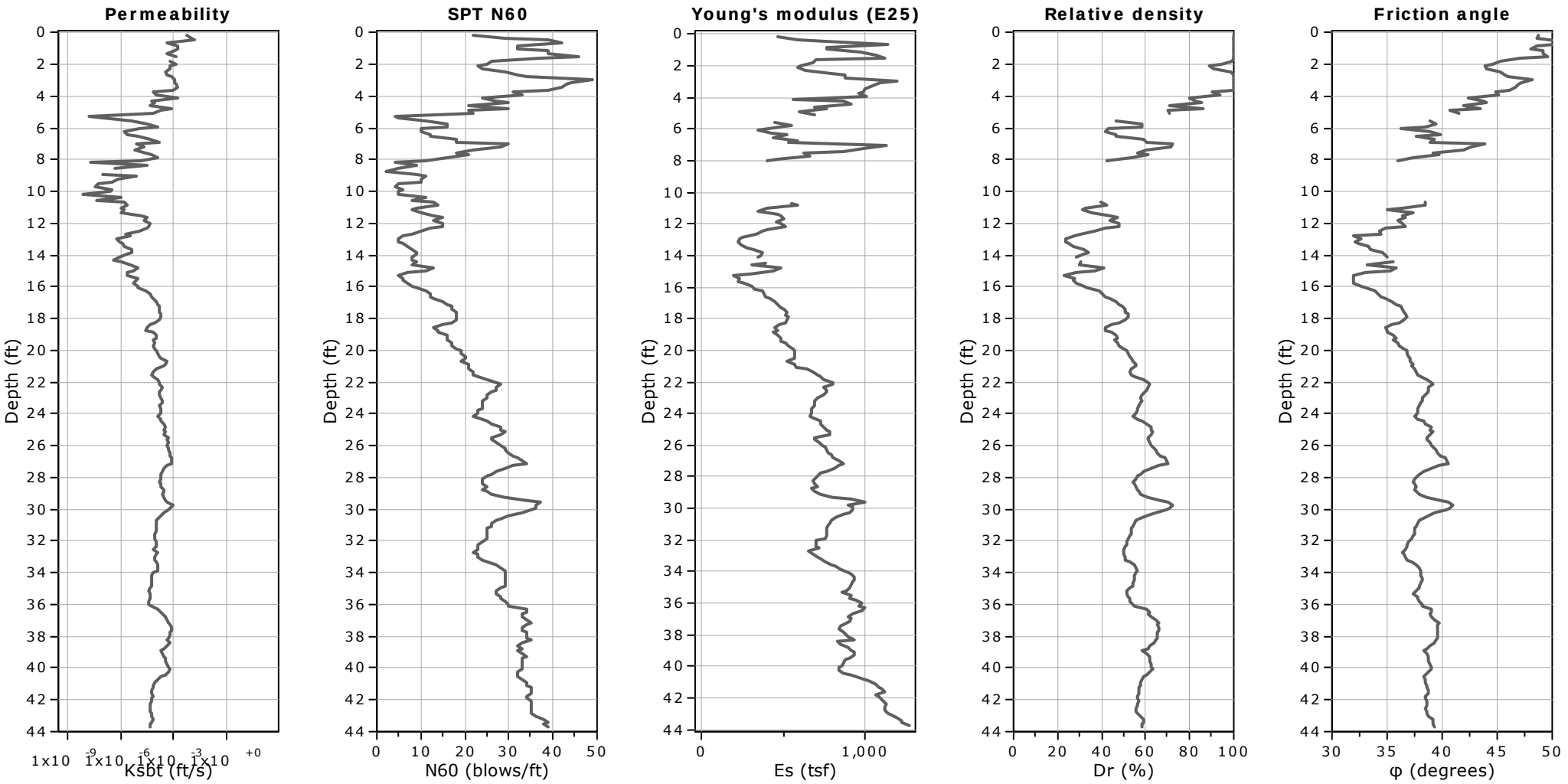

Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative density constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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SCPT-GZ-01
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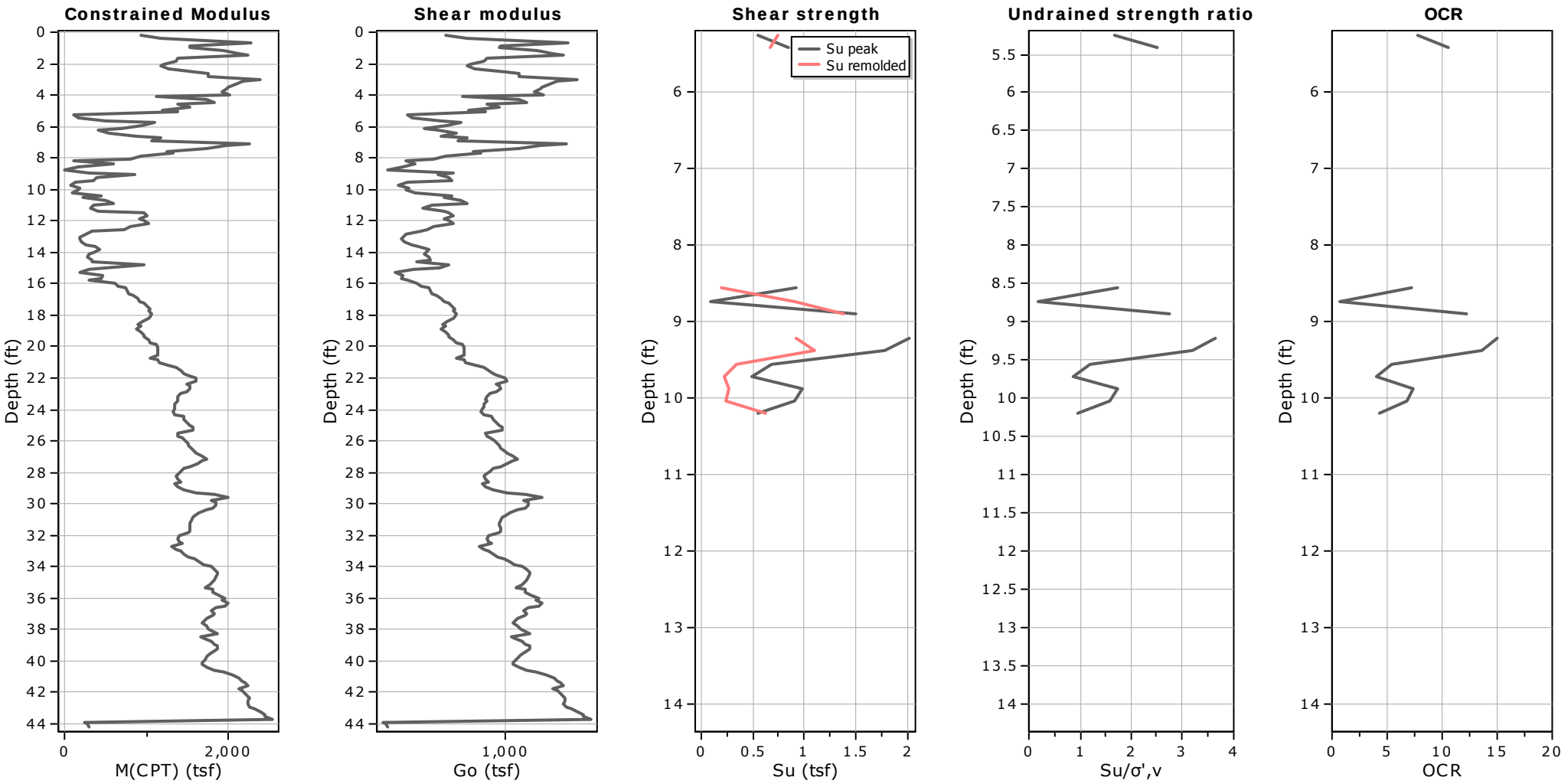

Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14

OCR factor for clays, N_{kt}: 0.33
User defined estimation data
Flat Dilatometer Test data

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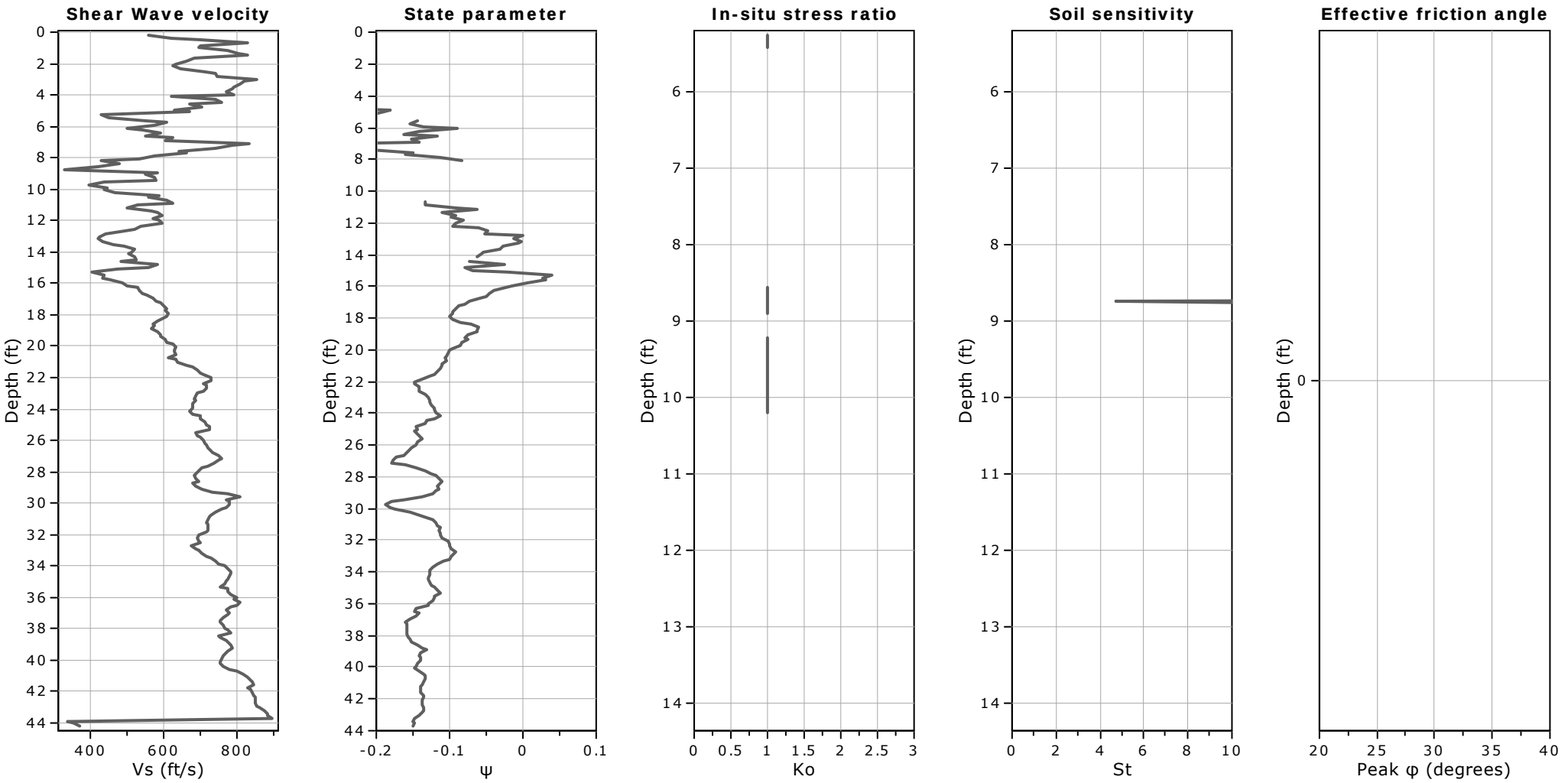
SCPT-GZ-01
Total depth: 44.23 ft



Calculation parameters

Soil Sensitivity factor, N_S: 350.00

User defined estimation data

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SCPT-GZ-01
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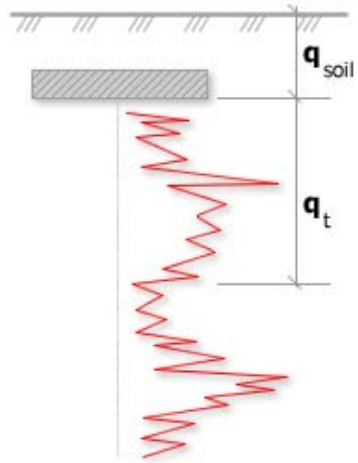
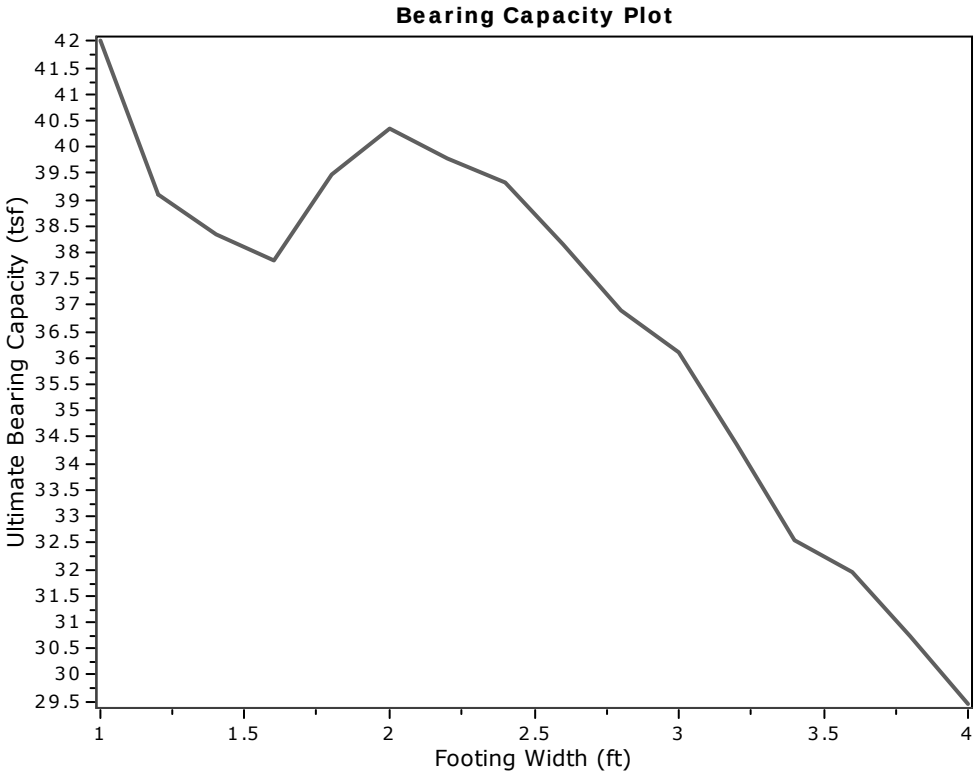


Bearing Capacity calculation is perfromed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:
R_k: Bearing capacity factor
q_t: Average corrected cone resistance over calculation depth
q_{soil}: Pressure applied by soil above footing



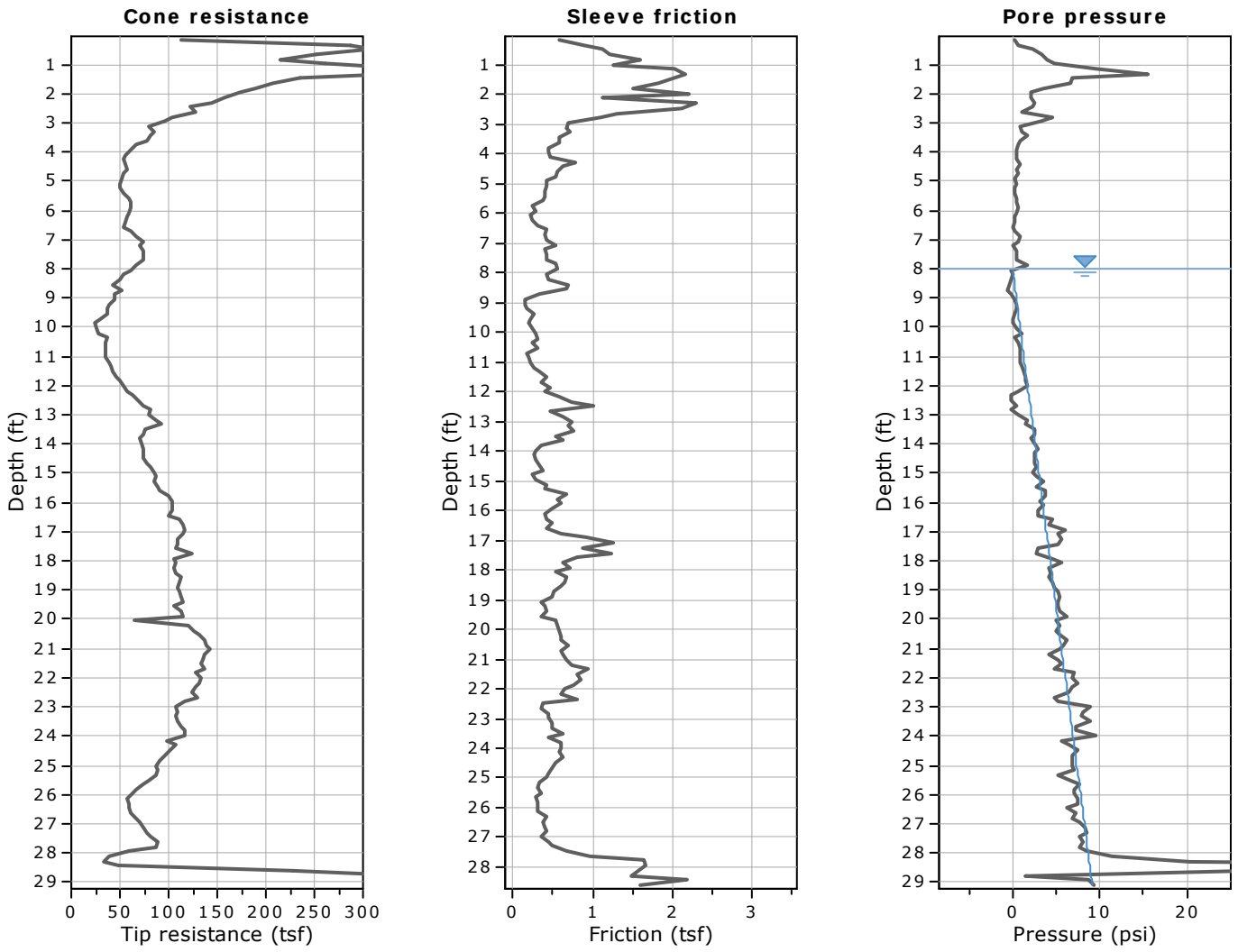
:: Tabular results ::

No	B (ft)	Start Depth (ft)	End Depth (ft)	Ave. q_t (tsf)	R_k	Soil Press. (tsf)	Ult. bearing cap. (tsf)
1	1.00	0.50	2.00	209.91	0.20	0.03	42.01
2	1.20	0.50	2.30	195.29	0.20	0.03	39.09
3	1.40	0.50	2.60	191.50	0.20	0.03	38.33
4	1.60	0.50	2.90	189.12	0.20	0.03	37.85
5	1.80	0.50	3.20	197.16	0.20	0.03	39.46
6	2.00	0.50	3.50	201.58	0.20	0.03	40.35
7	2.20	0.50	3.80	198.76	0.20	0.03	39.78
8	2.40	0.50	4.10	196.53	0.20	0.03	39.34
9	2.60	0.50	4.40	190.65	0.20	0.03	38.16
10	2.80	0.50	4.70	184.32	0.20	0.03	36.89
11	3.00	0.50	5.00	180.38	0.20	0.03	36.11
12	3.20	0.50	5.30	171.76	0.20	0.03	34.38
13	3.40	0.50	5.60	162.54	0.20	0.03	32.54
14	3.60	0.50	5.90	159.58	0.20	0.03	31.95
15	3.80	0.50	6.20	153.53	0.20	0.03	30.74
16	4.00	0.50	6.50	147.08	0.20	0.03	29.45

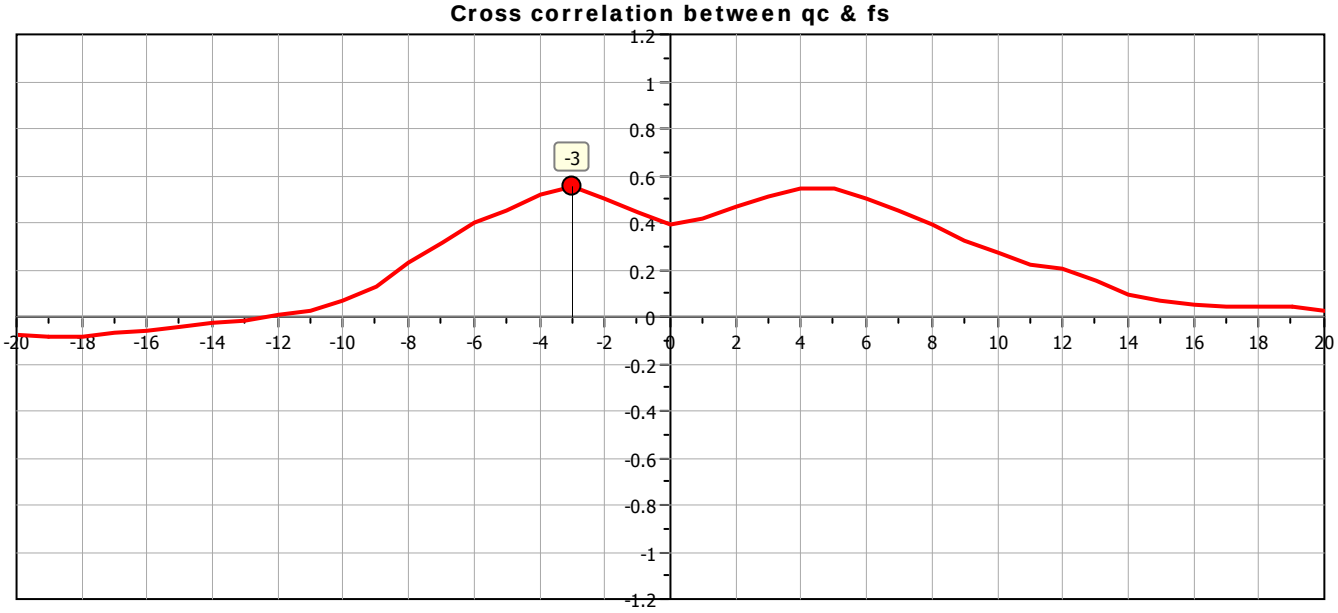
Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: **GZA**
Location: **Astoria Yard - Queens NY**

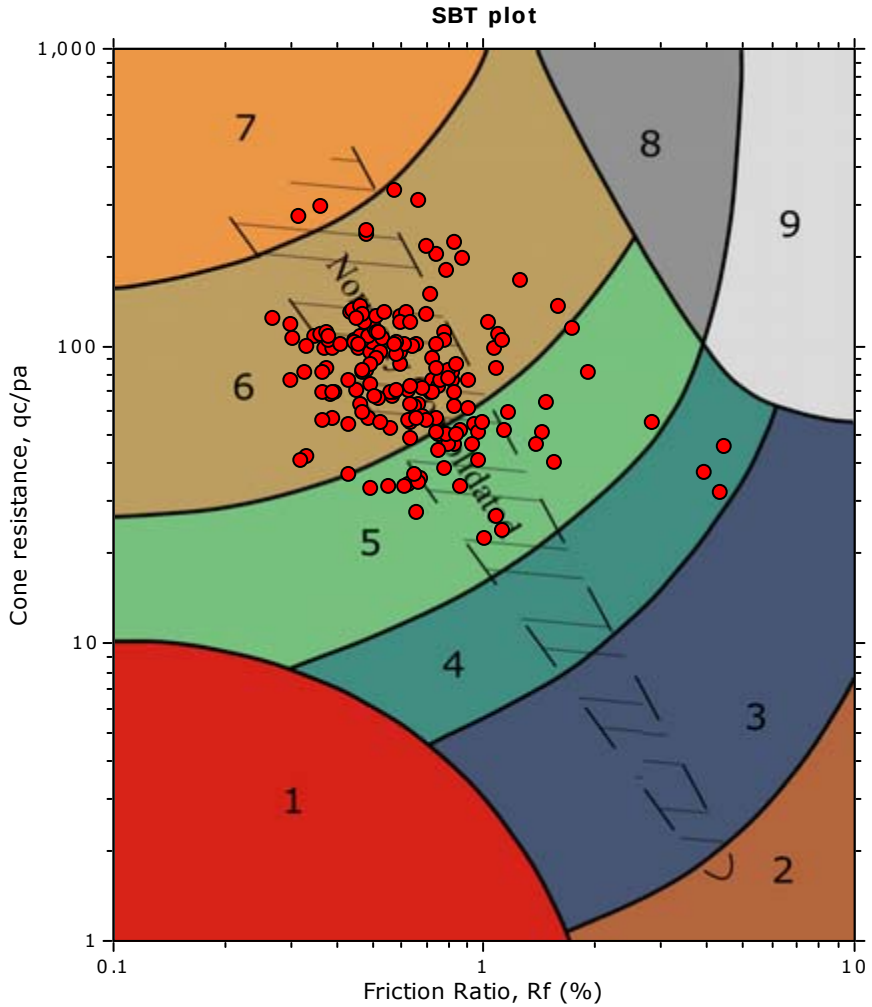
SCPT-GZ-05
Total depth: 29.10 ft

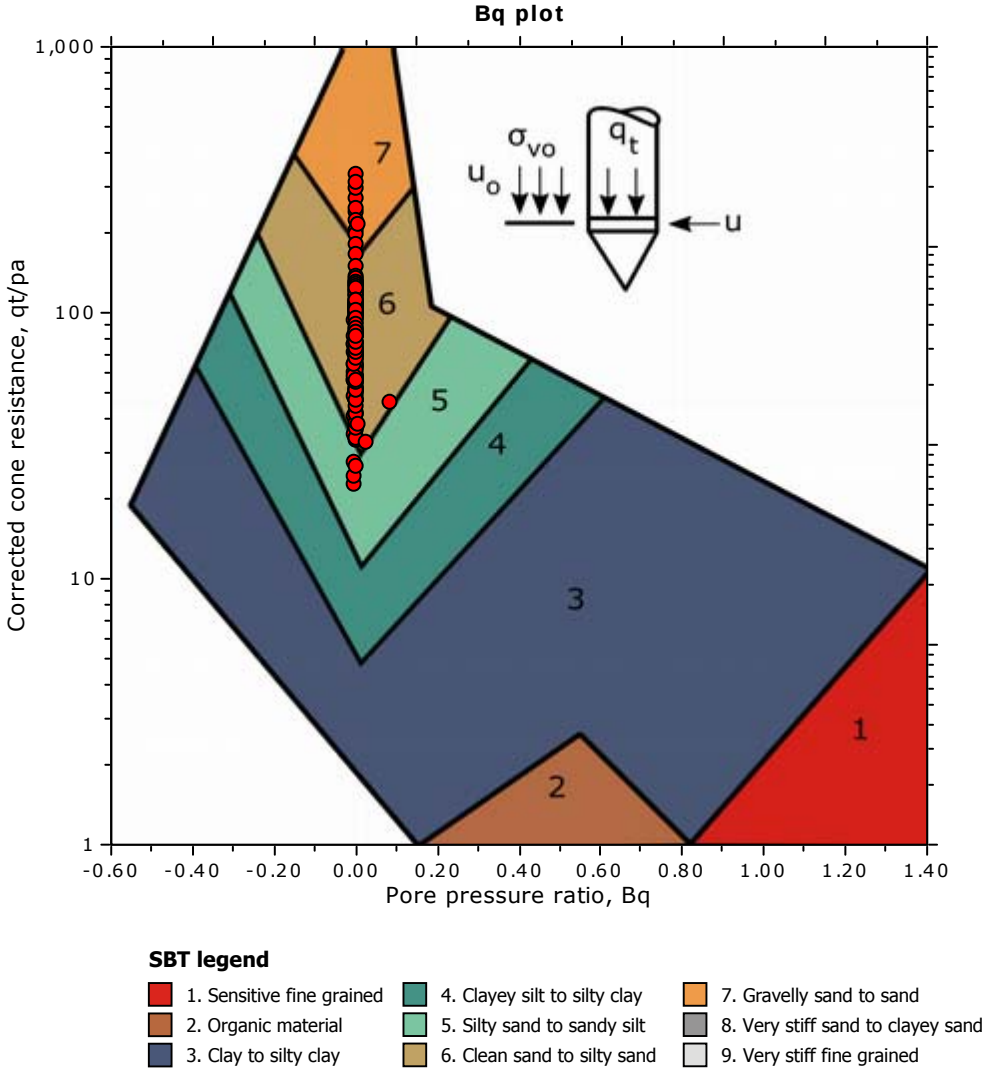


The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



SBT - Bq plots


SBT plot
Cone resistance, qc/pa
Friction Ratio, Rf (%)
1,000
100
10
1
0.1
1
10
Normally consolidated
1
2
3
4
5
6
7
8
9


Bq plot
Corrected cone resistance, qt/pa
Pore pressure ratio, Bq
1,000
100
10
1
-0.60
-0.40
-0.20
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
σvo
uo
qt
u
1
2
3
4
5
6
7
SBT legend
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravelly sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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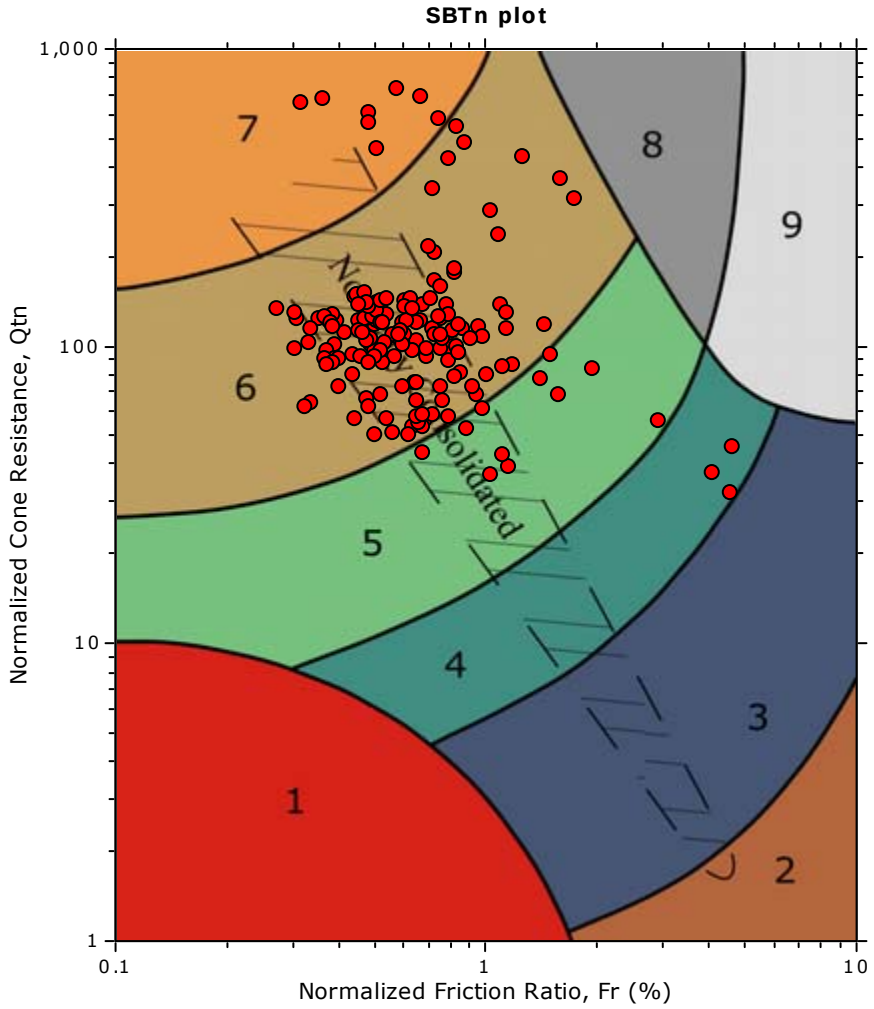
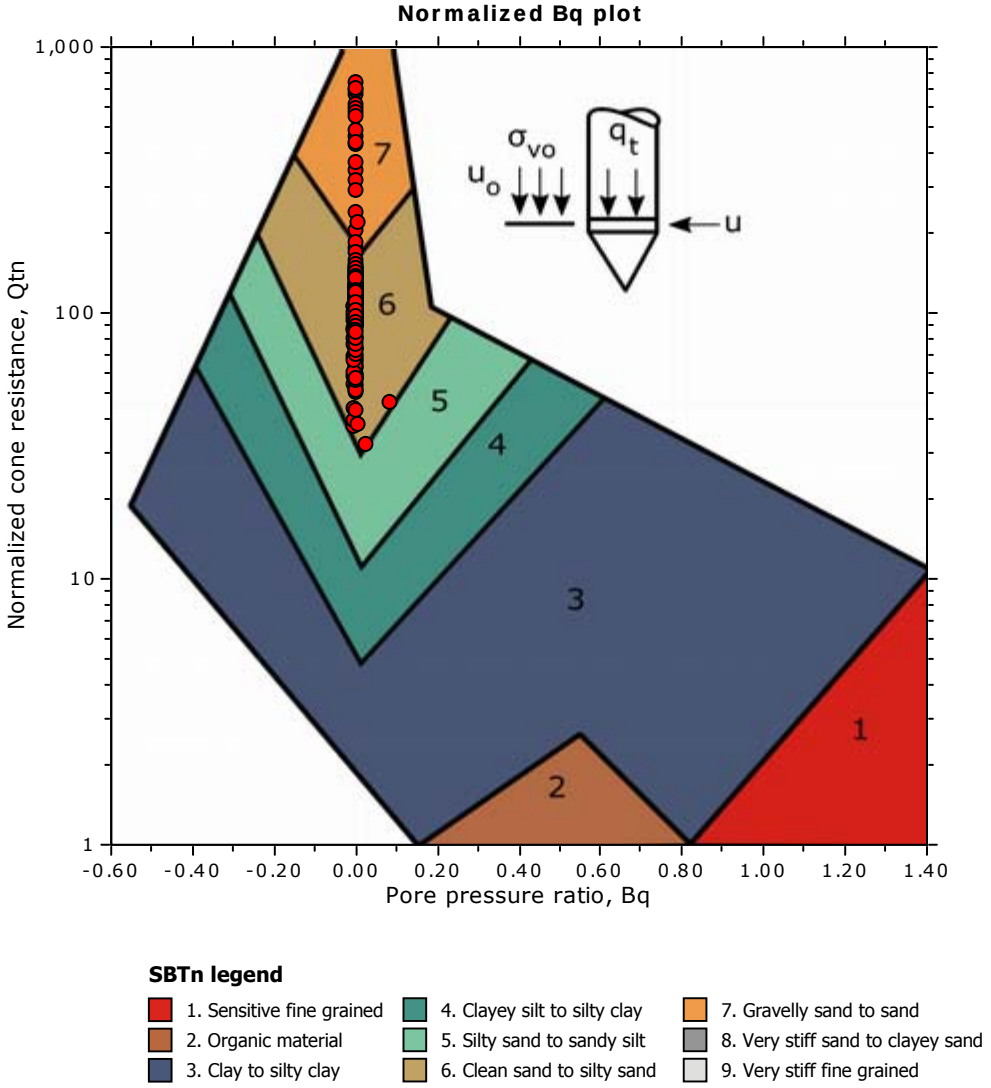
5230 Atlantic Ave
Mays Landing, NJ

Project: **GZA**
Location: **Astoria Yard - Queens NY**

SCPT-GZ-05
Total depth: 29.10 ft

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravelly sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

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SCPT-GZ-05
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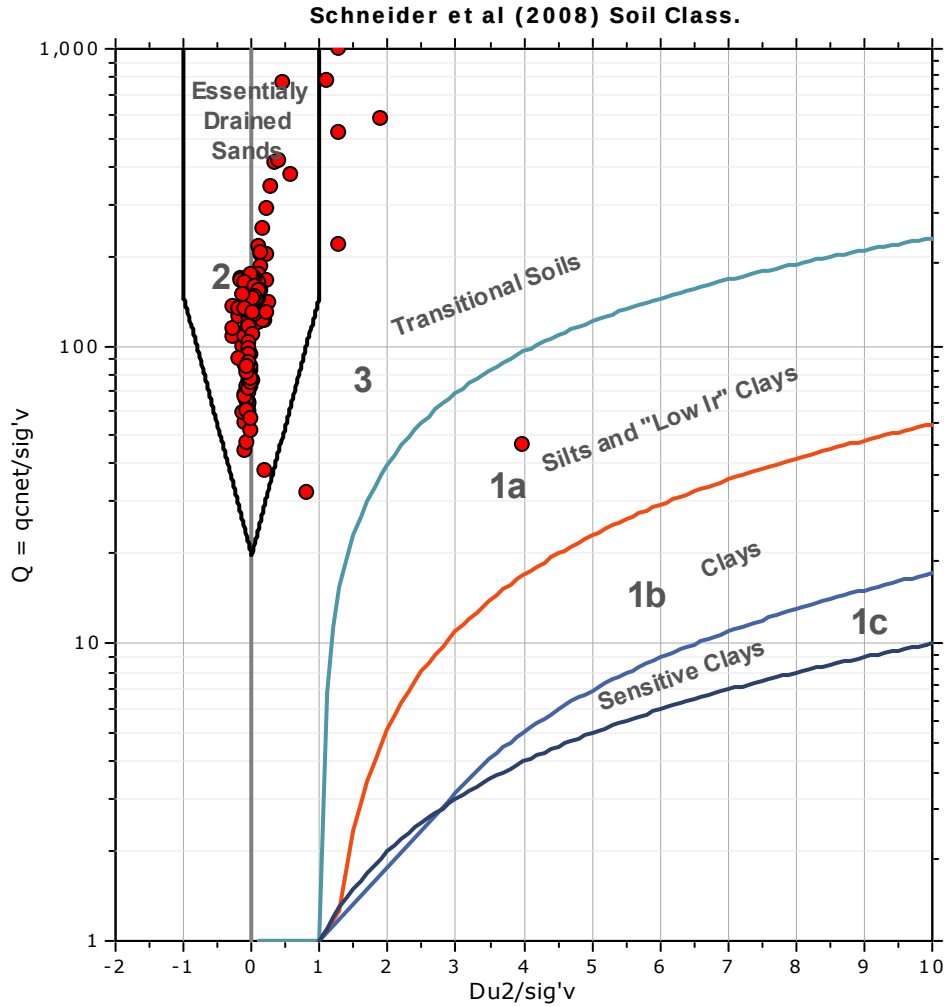
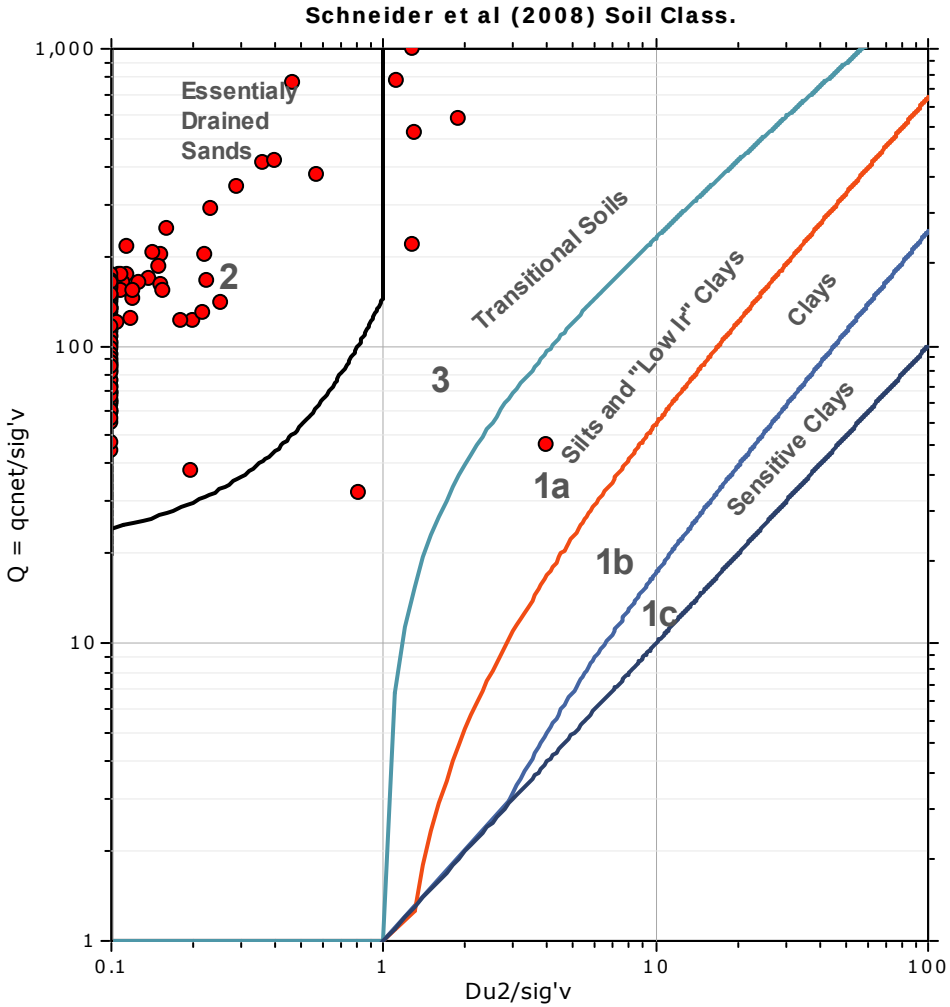
Bq plots (Schneider)





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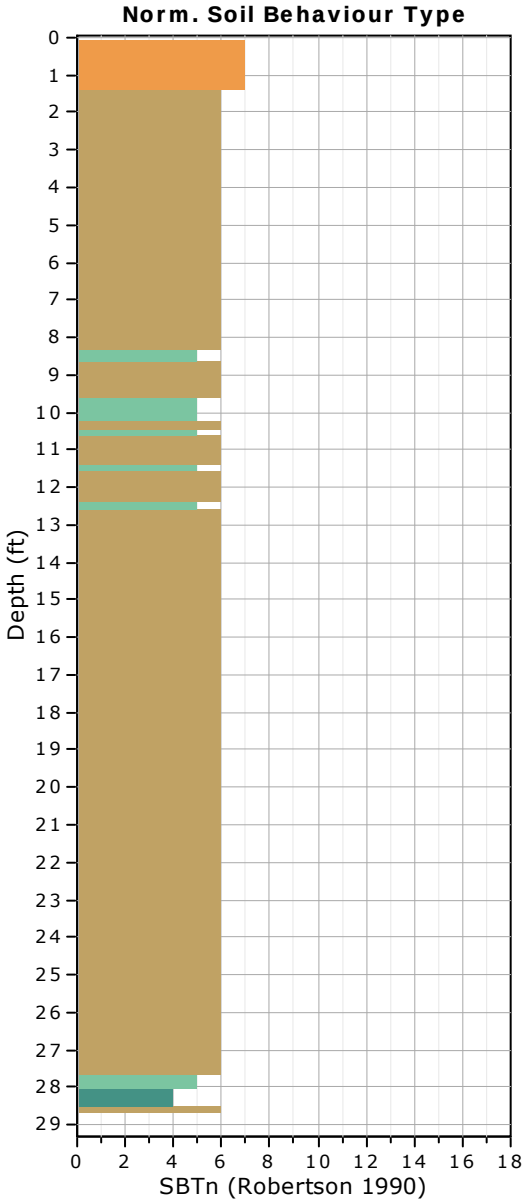

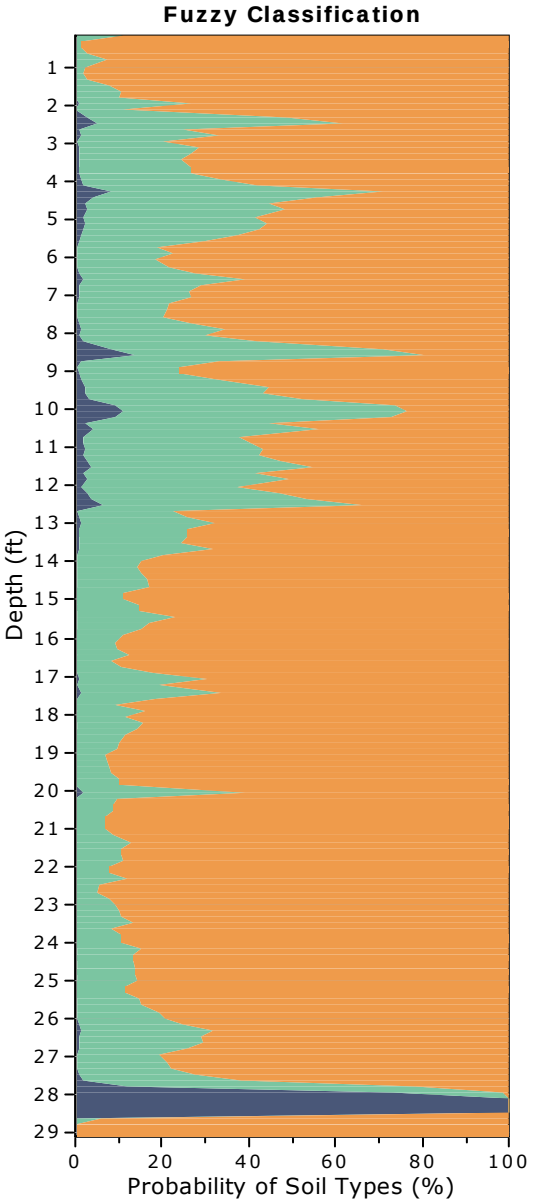

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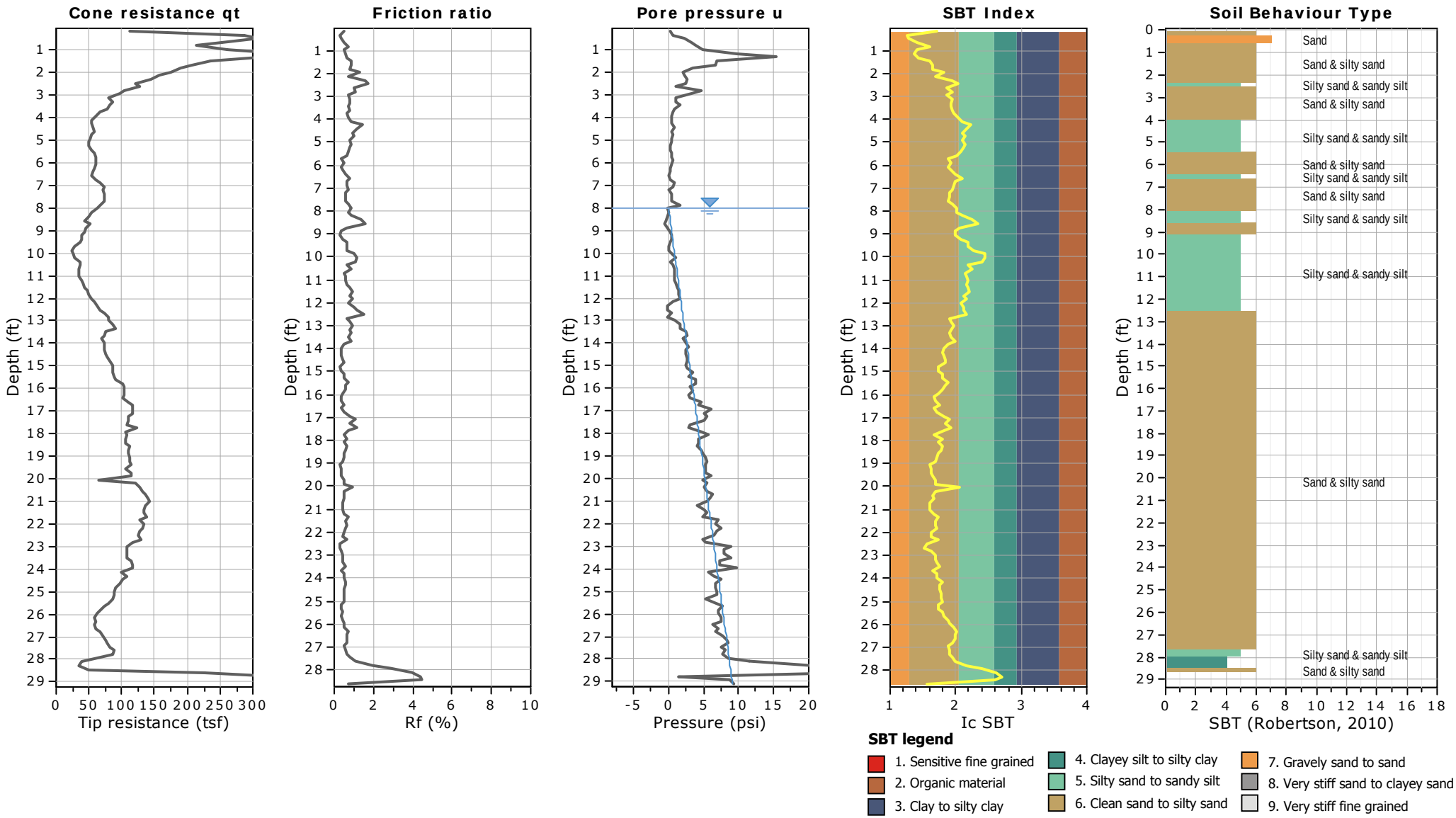

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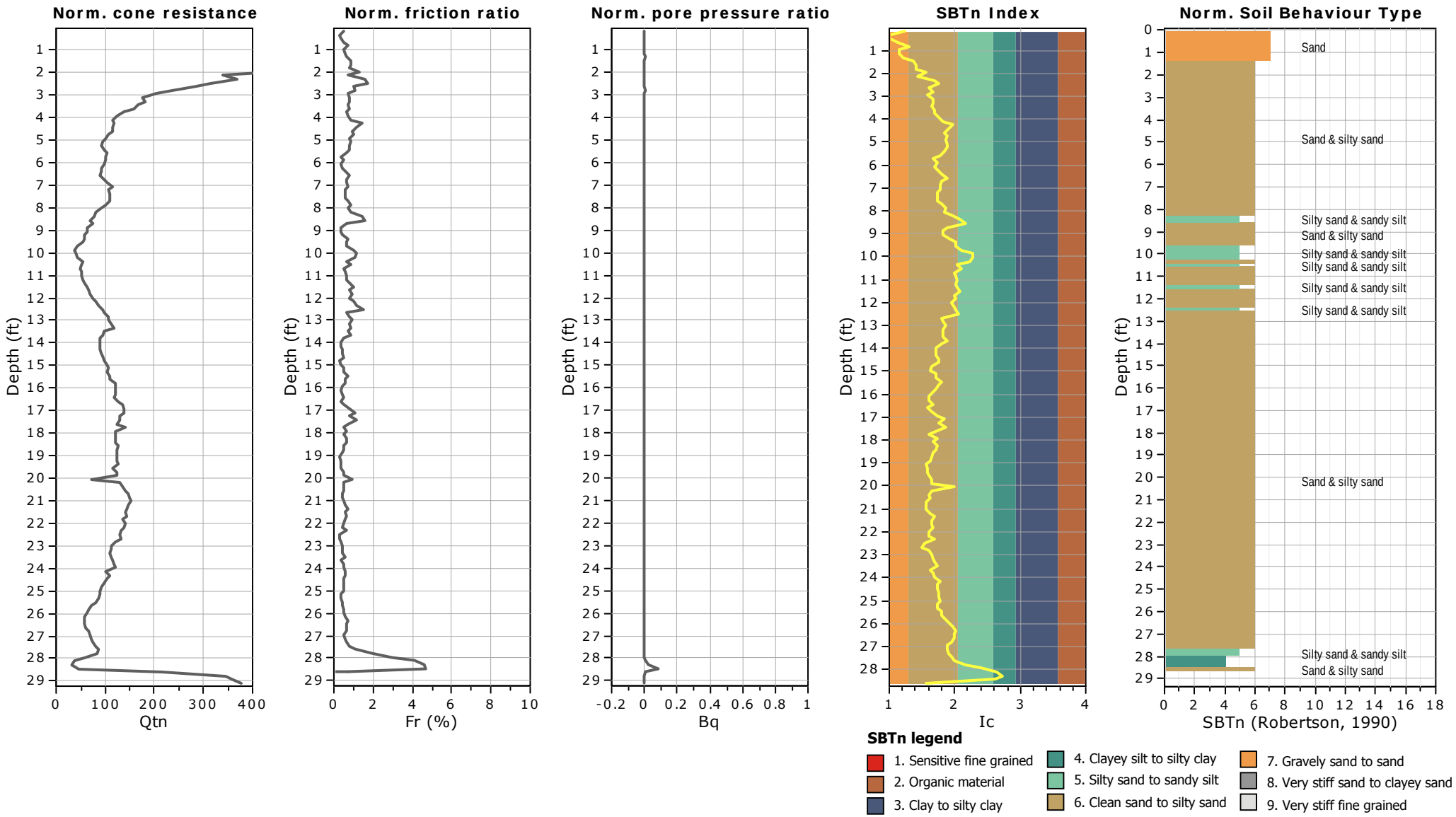

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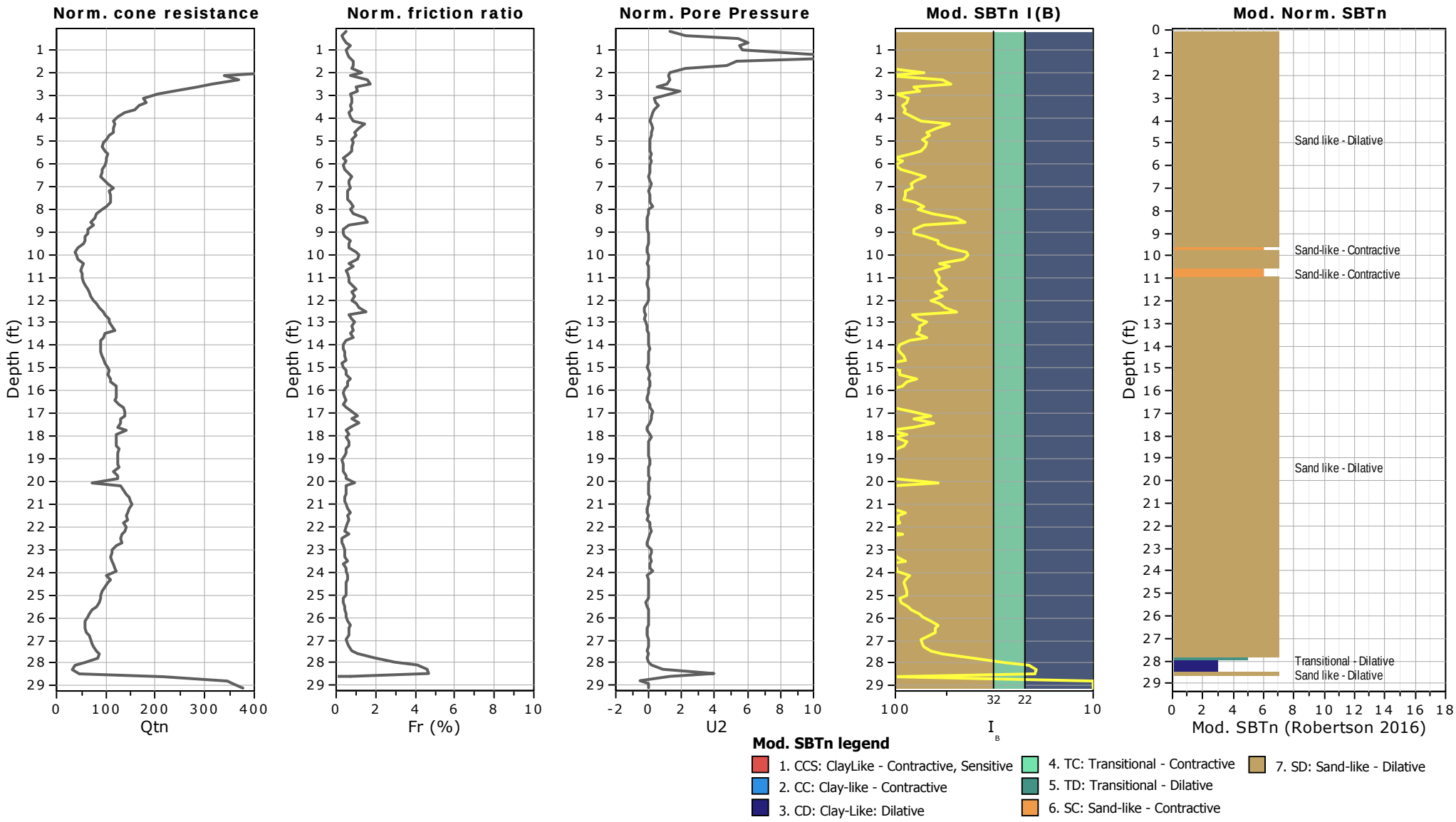

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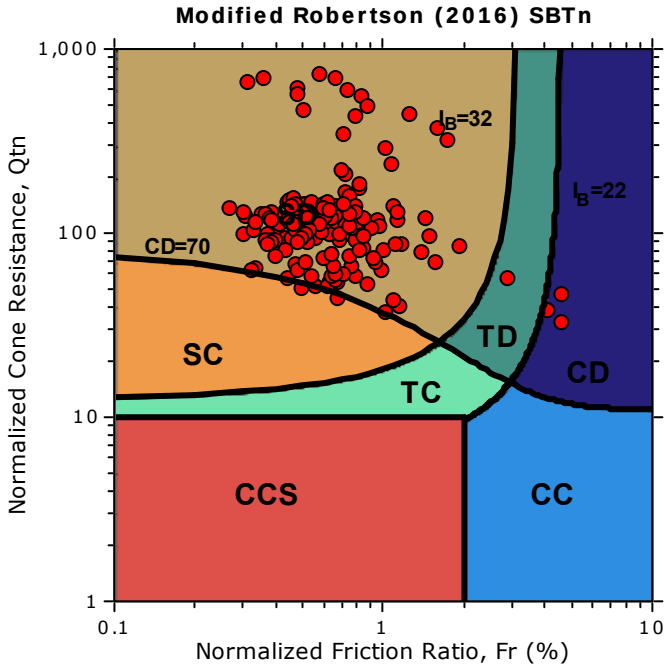
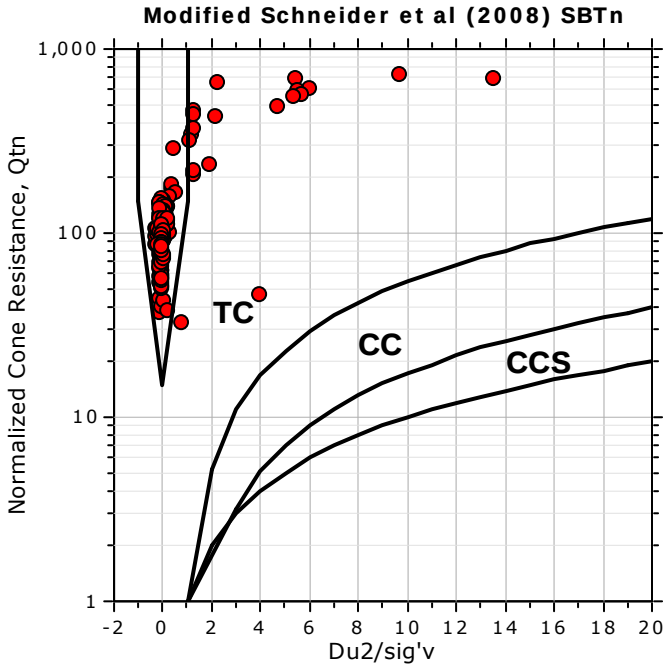
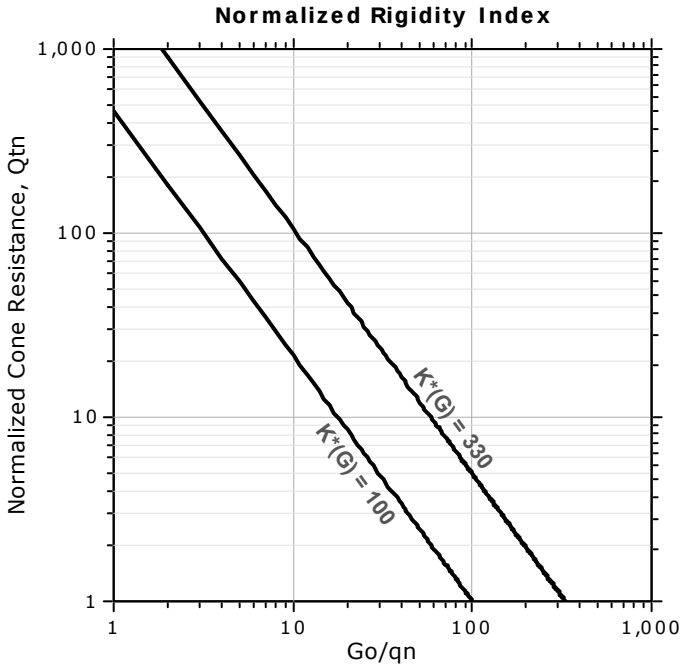
SCPT-GZ-05
Total depth: 29.10 ft

Updated SBTn plots







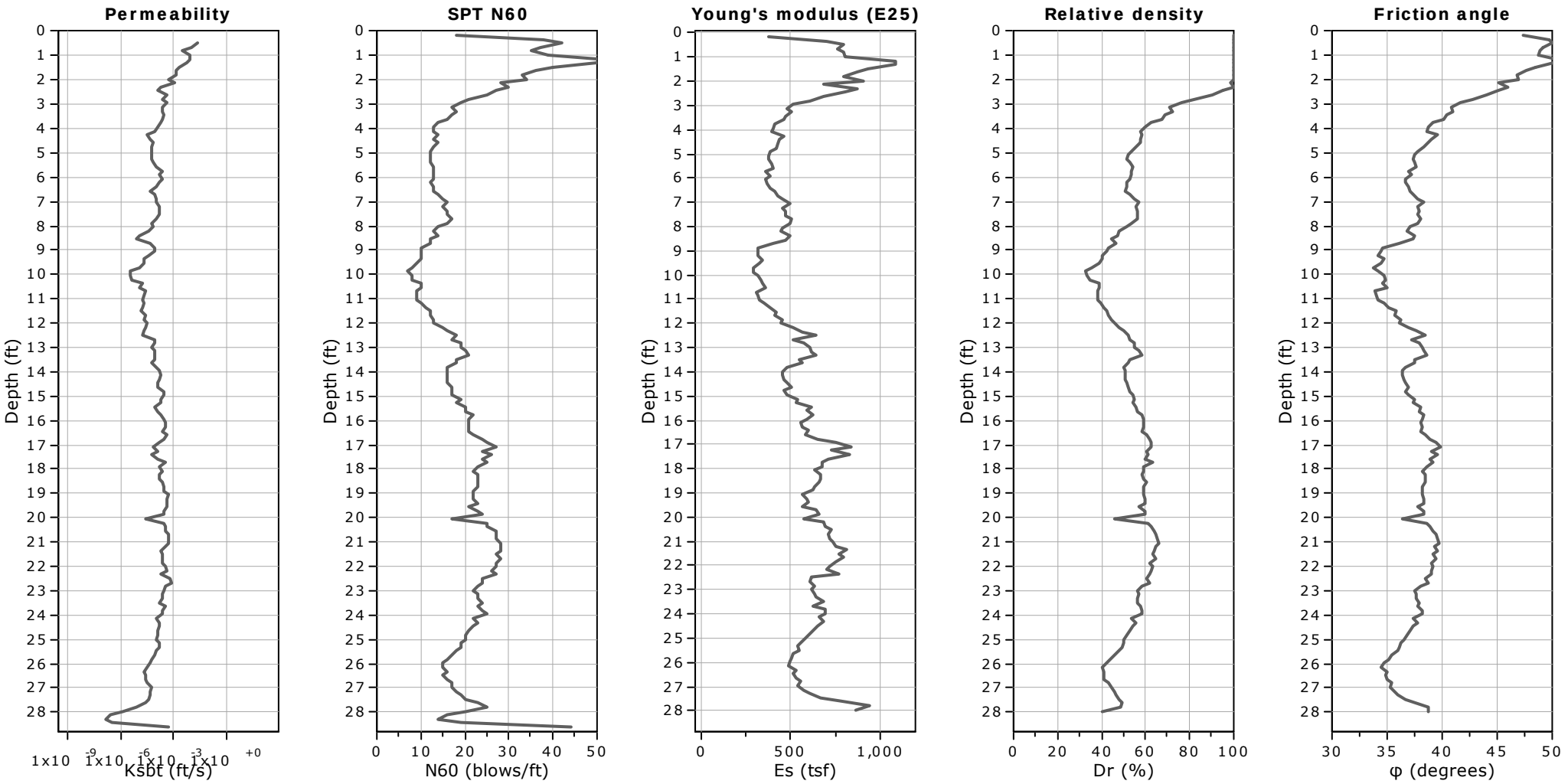
CCS: Clay-like - Contractive - Sensitive
CC: Clay-like - Contractive
CD: Clay-like - Dilative
TC: Transitional - Contractive
TD: Transitional - Dilative
SC: Sand-like - Contractive
SD: Sand-like - Dilative

K(G) > 330: Soils with significant microstructure (e.g. age/cementation)

Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: GZA
Location: Astoria Yard - Queens NY

SCPT-GZ-05
Total depth: 29.10 ft



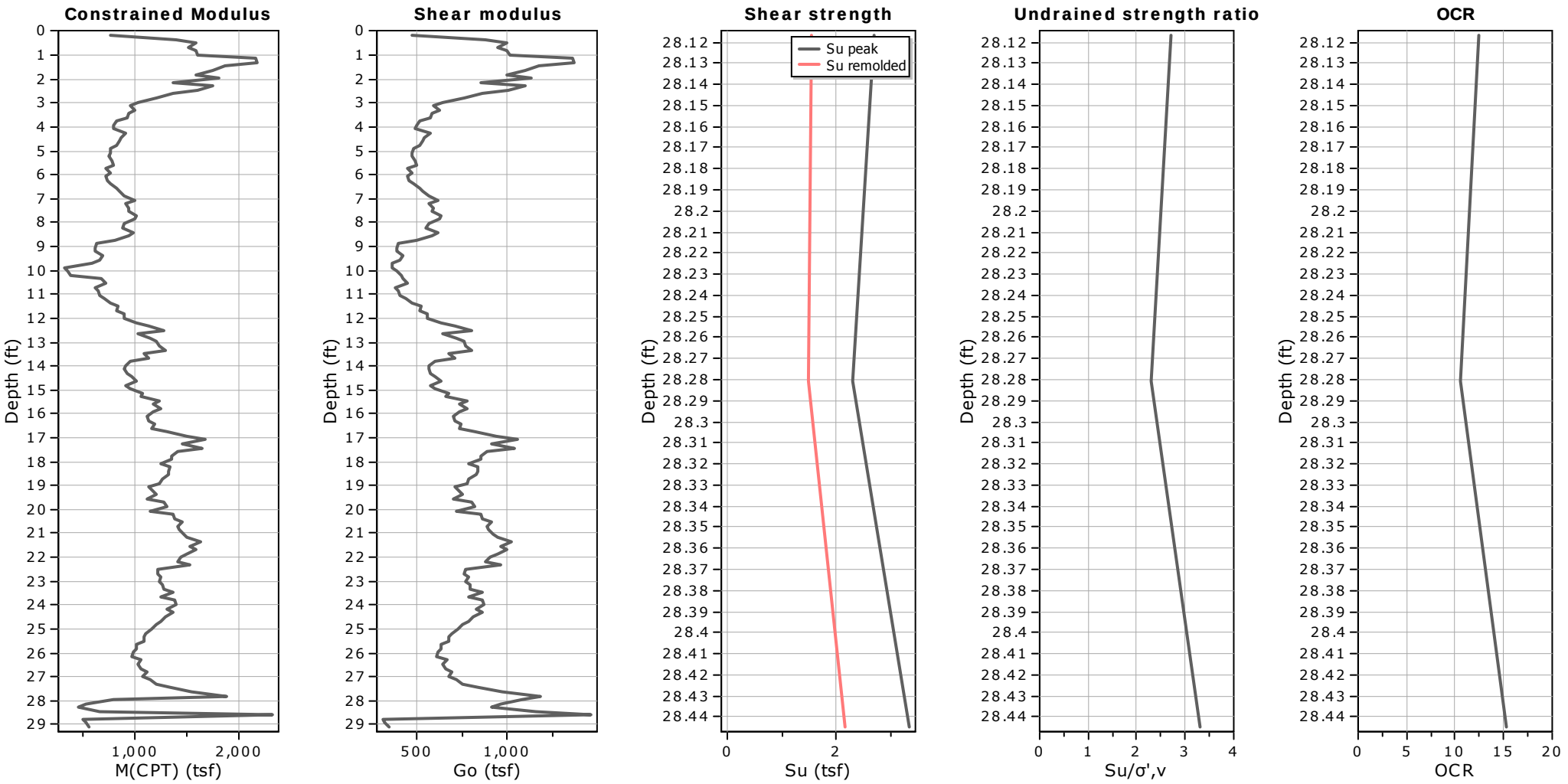
Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative density constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: GZA
Location: Astoria Yard - Queens NY

SCPT-GZ-05
Total depth: 29.10 ft



Calculation parameters

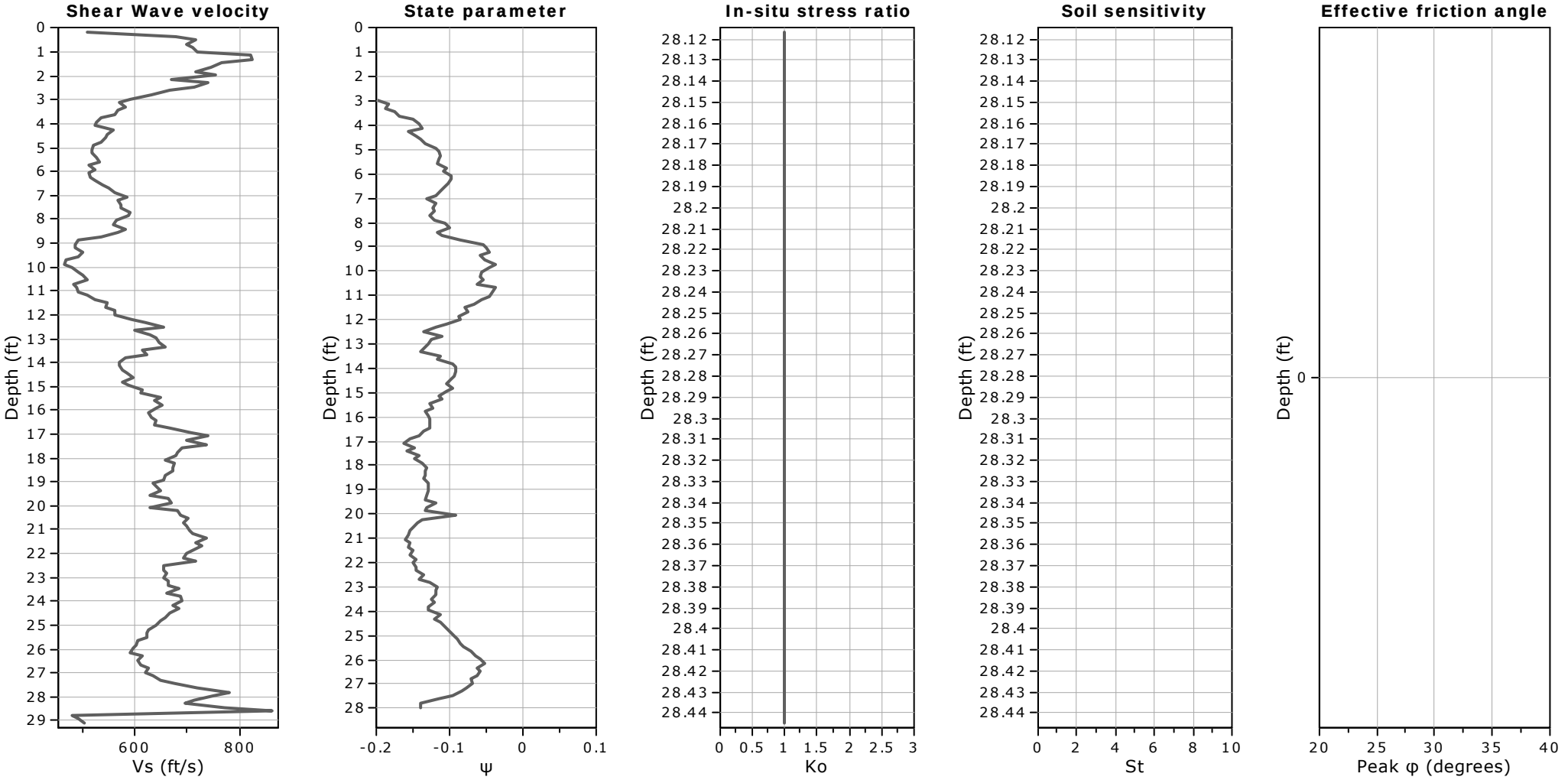
Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14

OCR factor for clays, N_{kt}: 0.33
User defined estimation data
Flat Dilatometer Test data

Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: GZA
Location: Astoria Yard - Queens NY

SCPT-GZ-05
Total depth: 29.10 ft



Calculation parameters

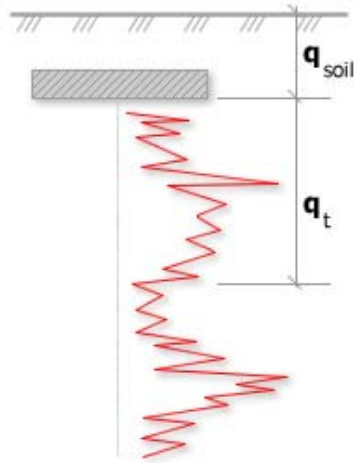
Soil Sensitivity factor, N_S: 350.00

User defined estimation data

Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: **GZA**
Location: **Astoria Yard - Queens NY**

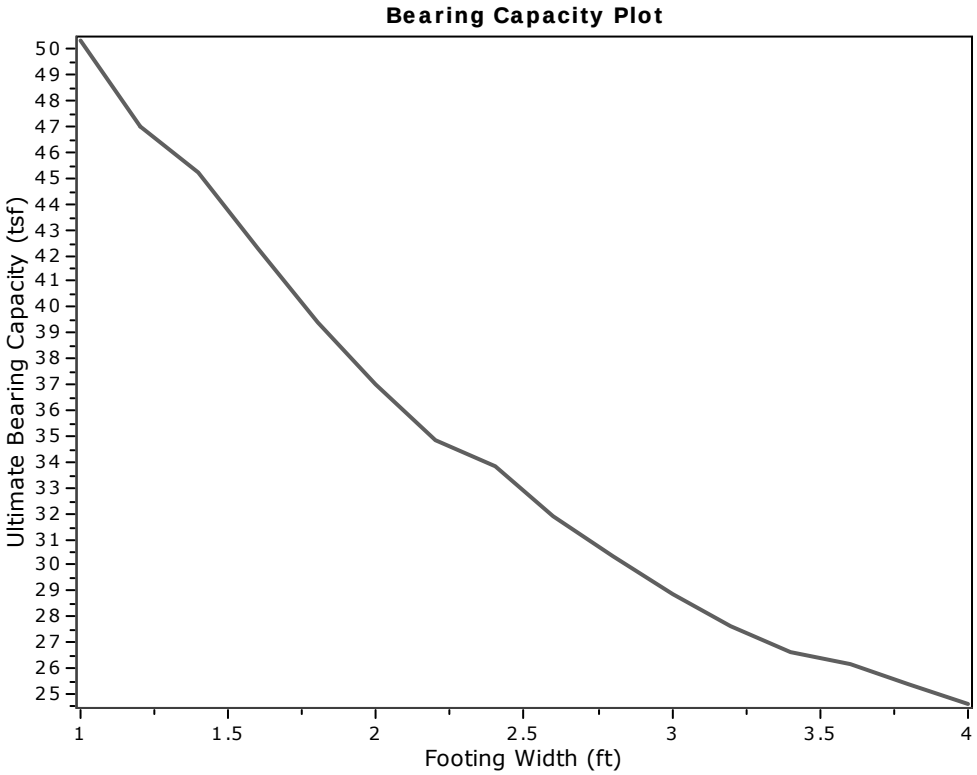
SCPT-GZ-05
Total depth: 29.10 ft



Bearing Capacity calculation is perfromed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:
R_k: Bearing capacity factor
q_t: Average corrected cone resistance over calculation depth
q_{soil}: Pressure applied by soil above footing



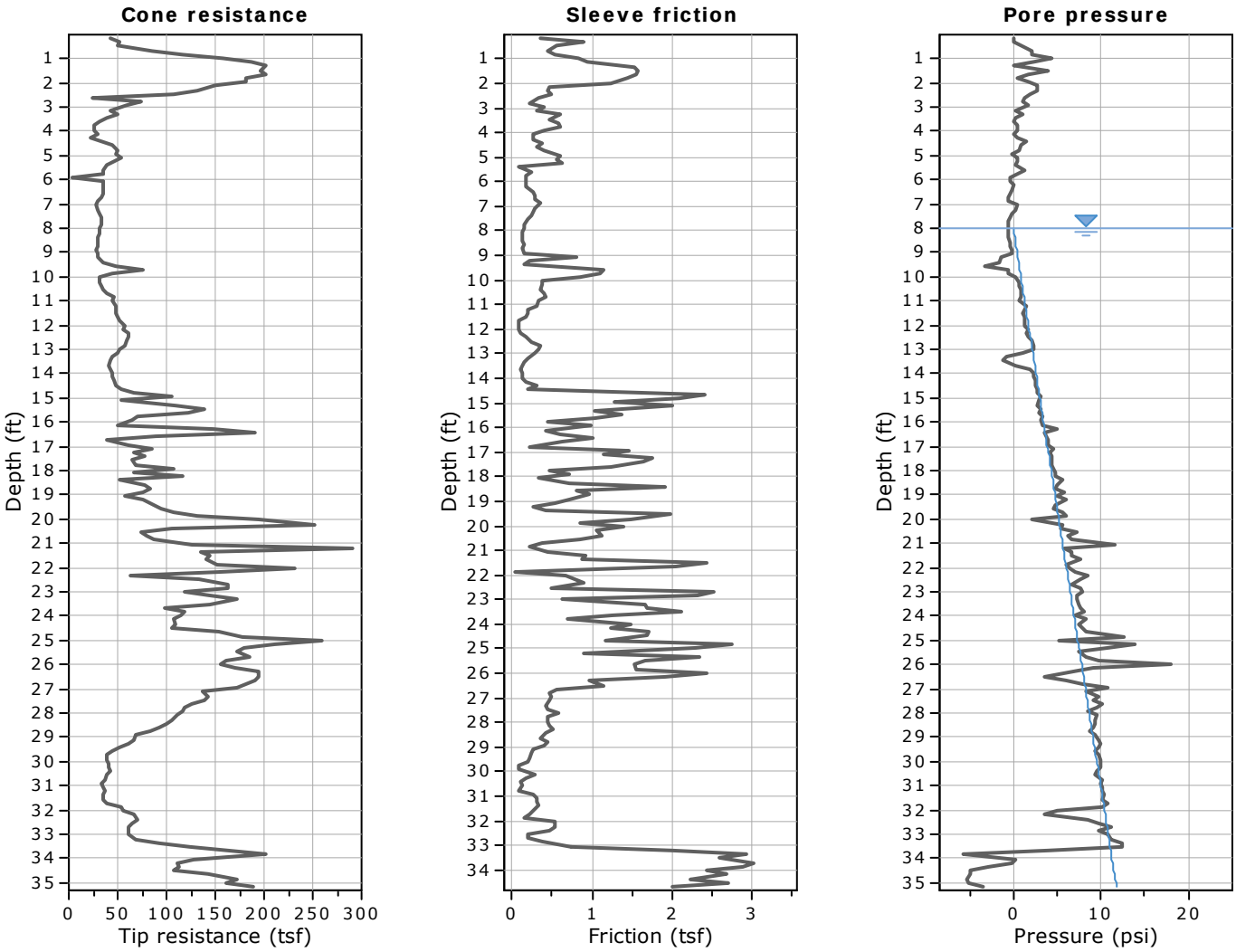
:: Tabular results ::

No	B (ft)	Start Depth (ft)	End Depth (ft)	Ave. q_t (tsf)	R_k	Soil Press. (tsf)	Ult. bearing cap. (tsf)
1	1.00	0.50	2.00	251.51	0.20	0.03	50.33
2	1.20	0.50	2.30	234.67	0.20	0.03	46.96
3	1.40	0.50	2.60	225.97	0.20	0.03	45.22
4	1.60	0.50	2.90	211.19	0.20	0.03	42.27
5	1.80	0.50	3.20	196.75	0.20	0.03	39.38
6	2.00	0.50	3.50	184.83	0.20	0.03	37.00
7	2.20	0.50	3.80	174.10	0.20	0.03	34.85
8	2.40	0.50	4.10	168.92	0.20	0.03	33.81
9	2.60	0.50	4.40	159.37	0.20	0.03	31.90
10	2.80	0.50	4.70	151.46	0.20	0.03	30.32
11	3.00	0.50	5.00	144.39	0.20	0.03	28.91
12	3.20	0.50	5.30	138.05	0.20	0.03	27.64
13	3.40	0.50	5.60	132.92	0.20	0.03	26.61
14	3.60	0.50	5.90	130.73	0.20	0.03	26.18
15	3.80	0.50	6.20	126.69	0.20	0.03	25.37
16	4.00	0.50	6.50	122.90	0.20	0.03	24.61

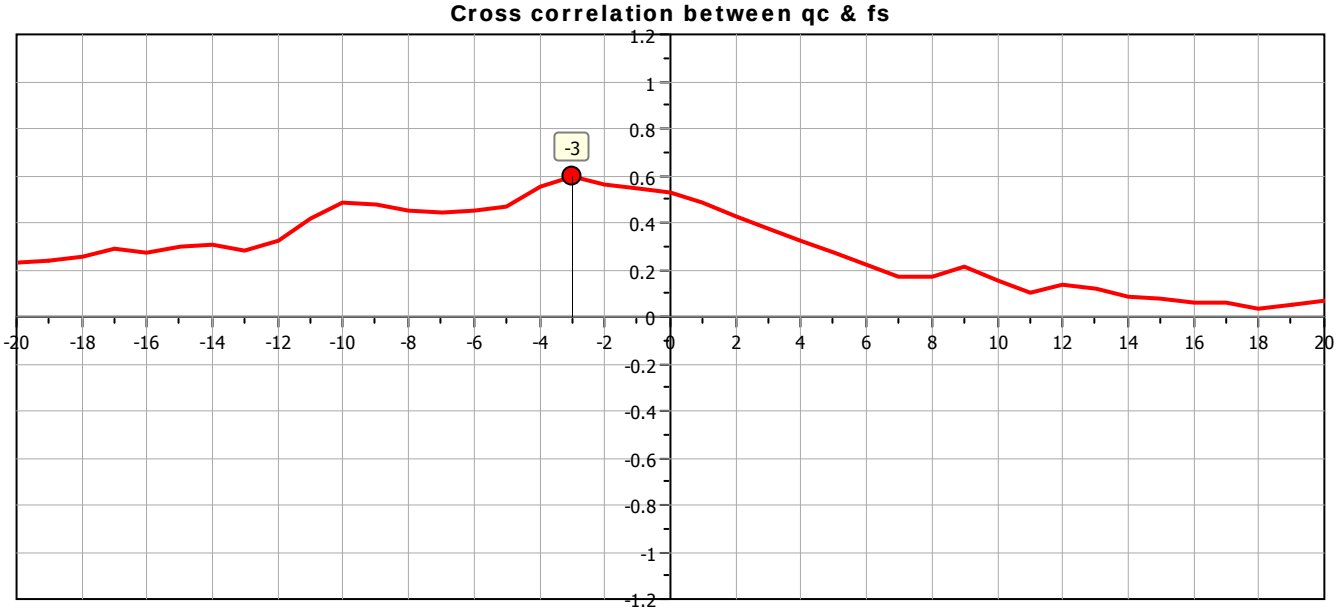
Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: **GZA**
Location: **Astoria Yard - Queens NY**

SCPT-GZ-20
Total depth: 35.17 ft



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).

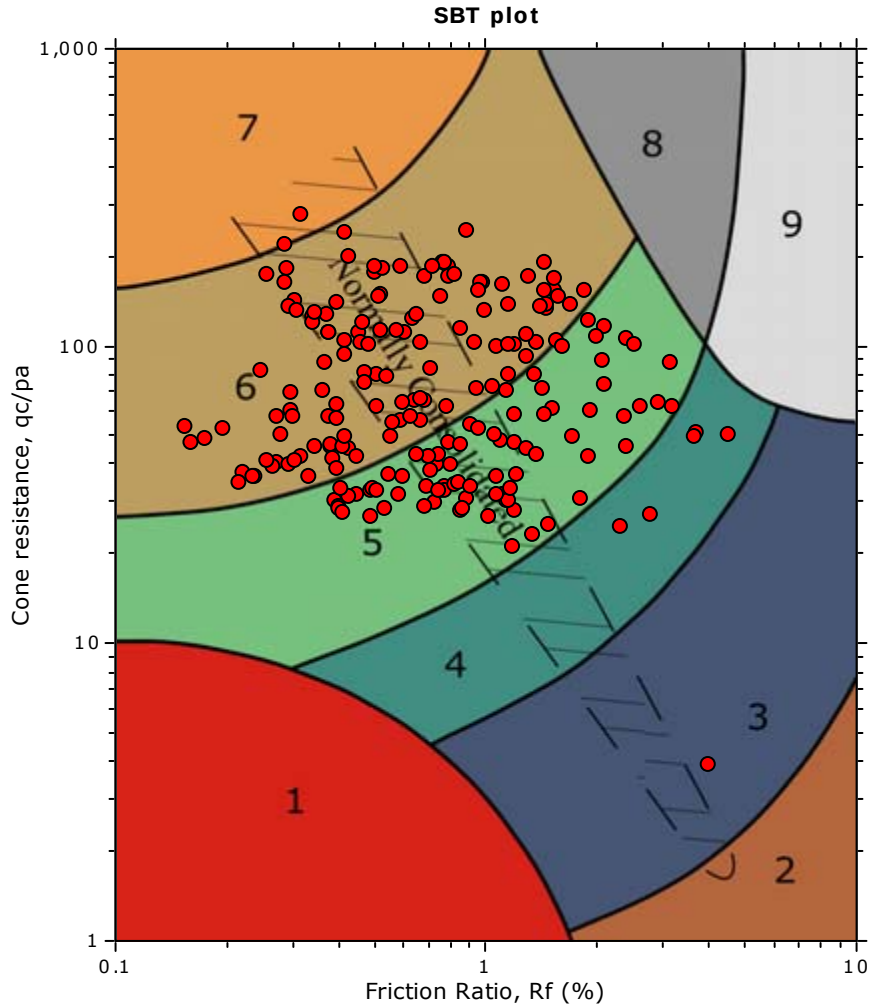


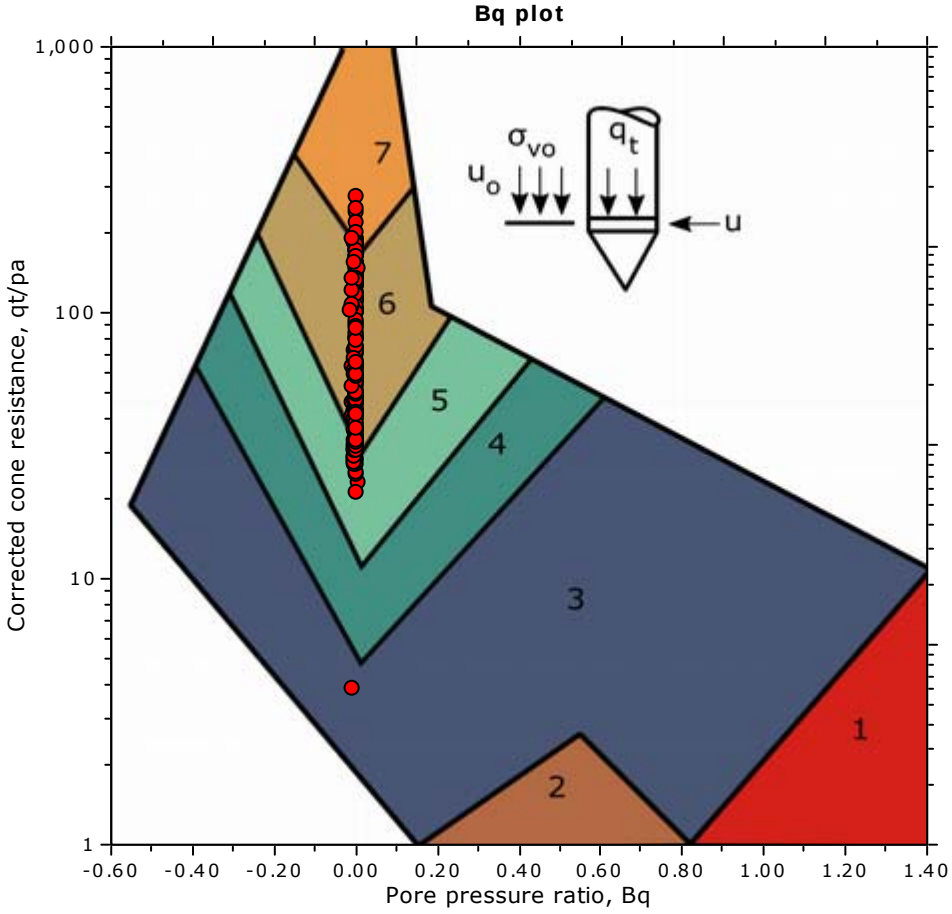
Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: **GZA**
Location: **Astoria Yard - Queens NY**

SCPT-GZ-20
Total depth: 35.17 ft

SBT - Bq plots





SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravelly sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Craig Test Boring
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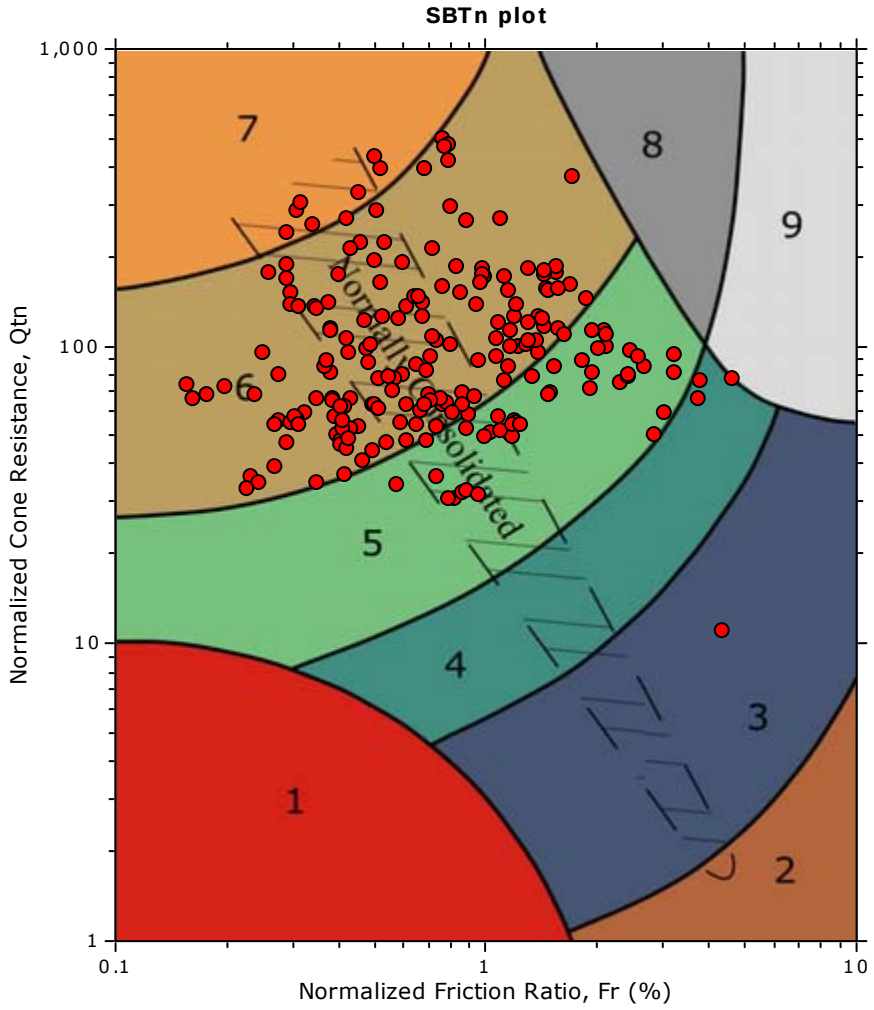
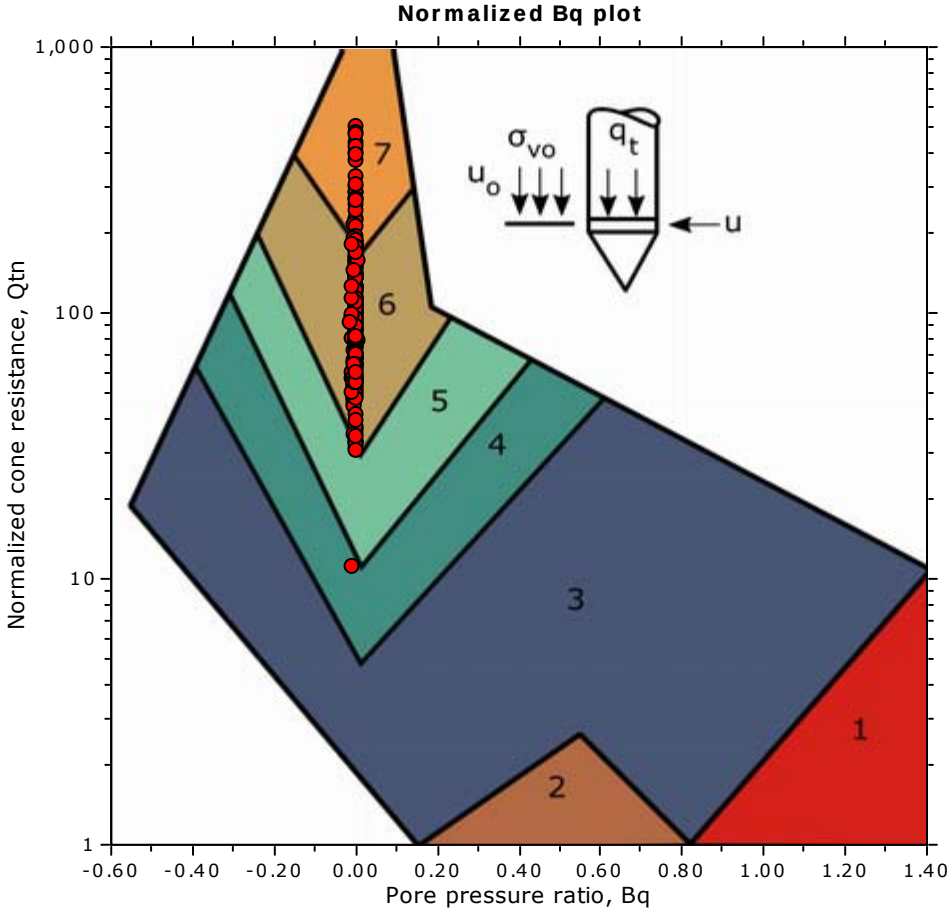
Mays Landing, NJ

Project: **GZA**
Location: **Astoria Yard - Queens NY**

SCPT-GZ-20
Total depth: 35.17 ft

SBT - Bq plots (normalized)





SBTn legend

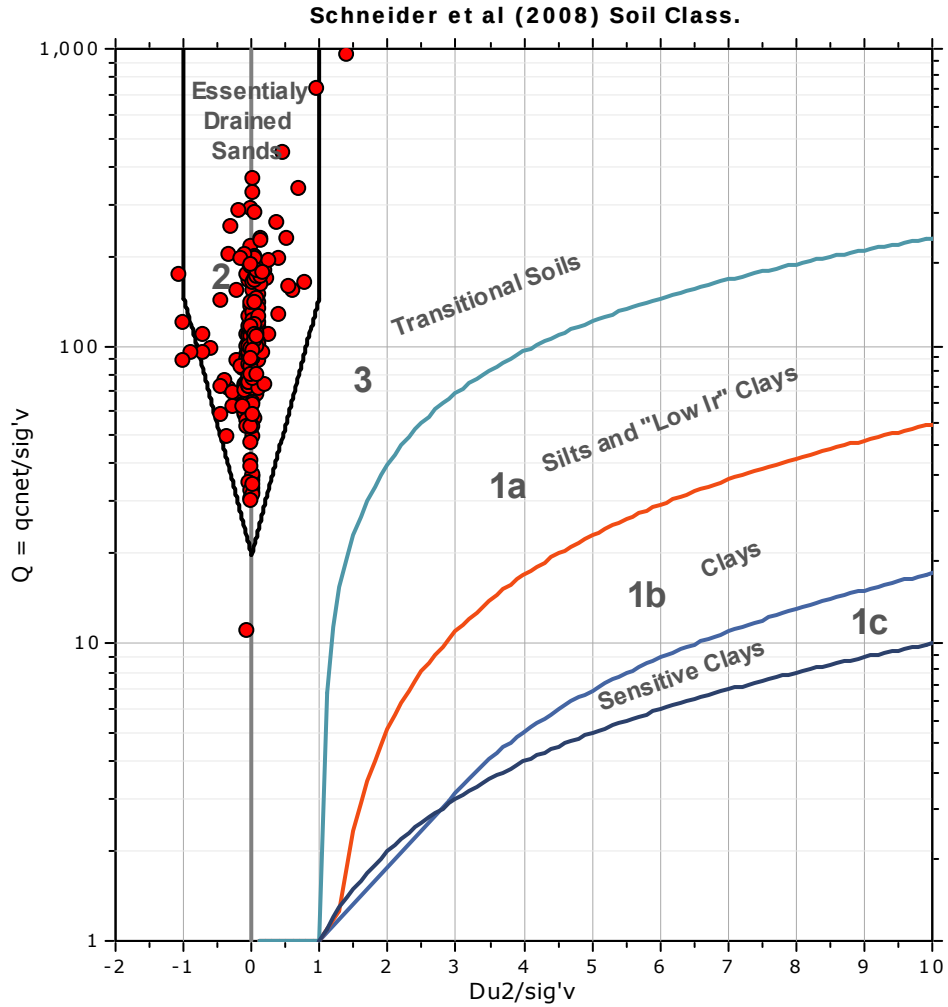
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravelly sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

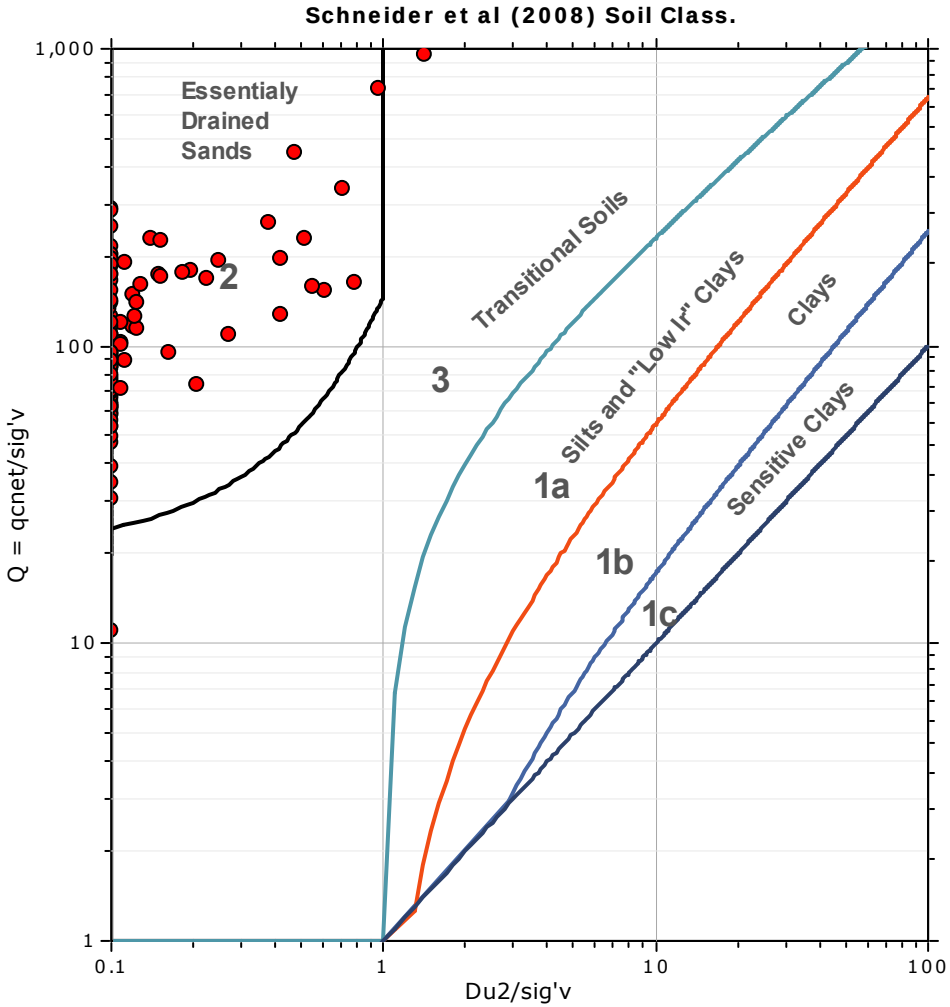
Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: GZA
Location: Astoria Yard - Queens NY

SCPT-GZ-20
Total depth: 35.17 ft

Bq plots (Schneider)





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Mays Landing, NJ

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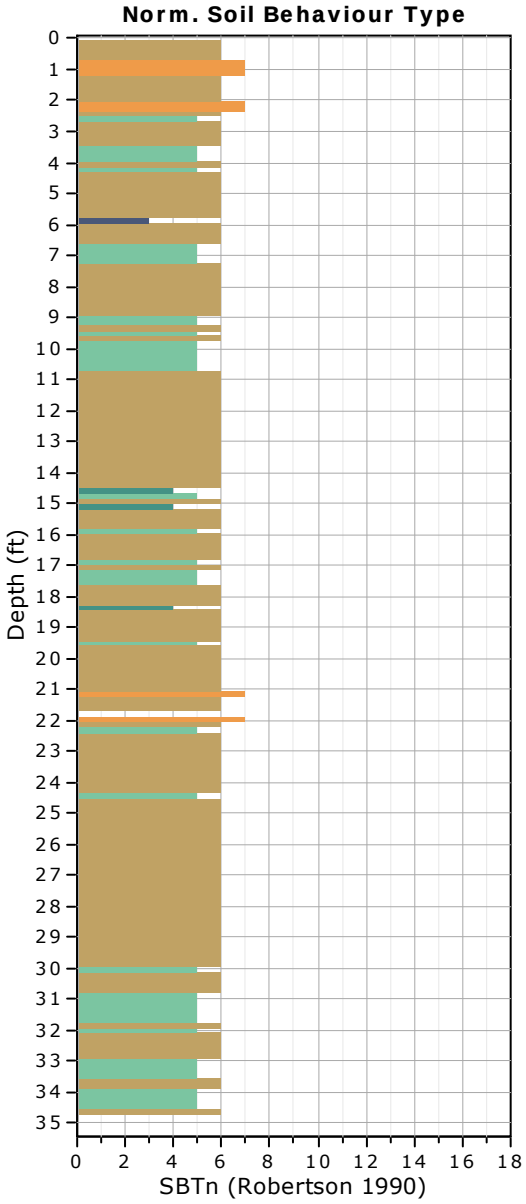
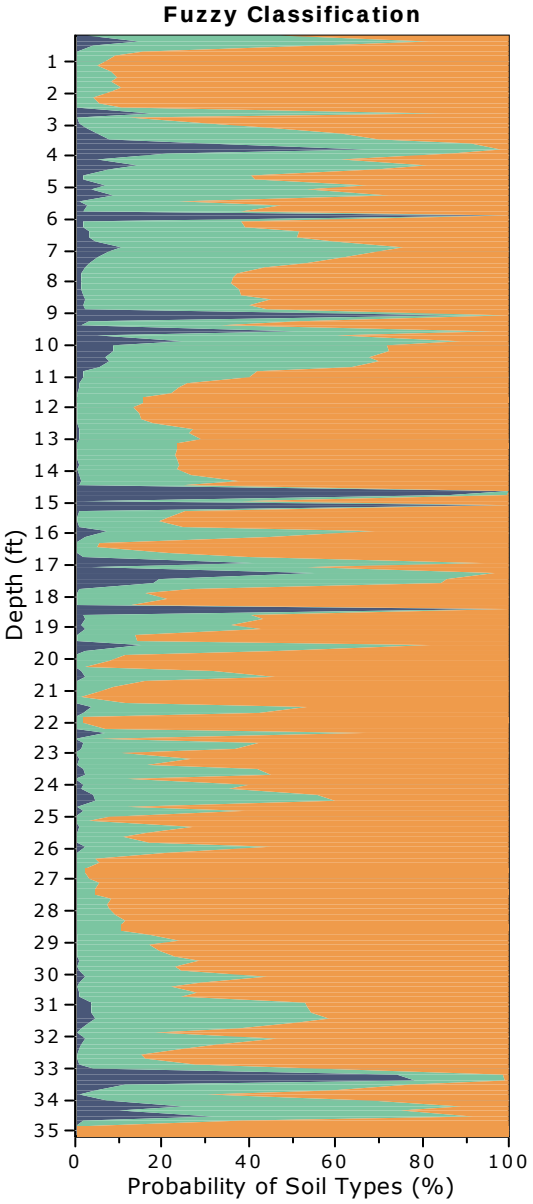
Location: **Astoria Yard - Queens NY**

SCPT-GZ-20
Total depth: 35.17 ft





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Mays Landing, NJ

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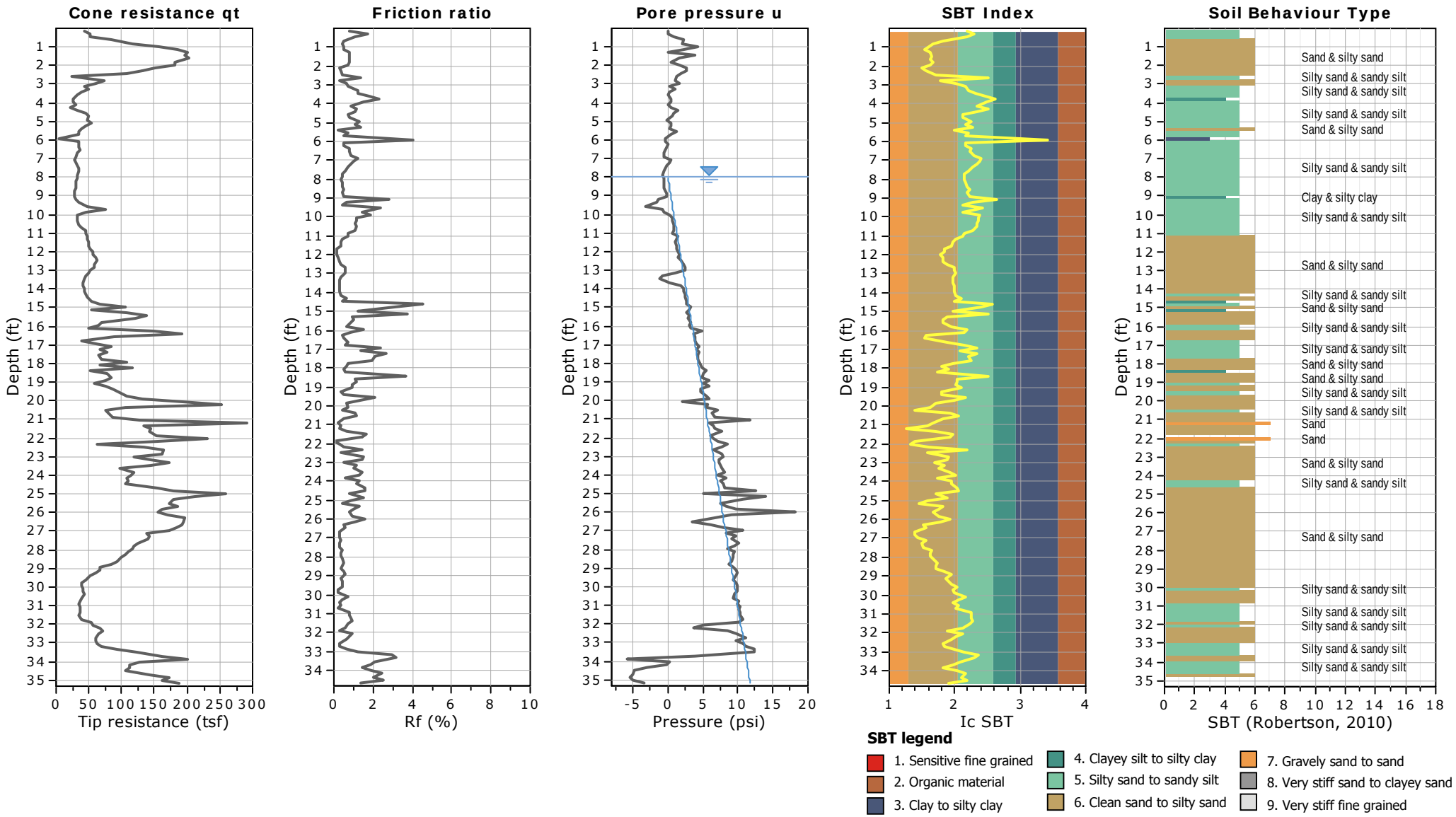
Location: Astoria Yard - Queens NY

SCPT-GZ-20
Total depth: 35.17 ft



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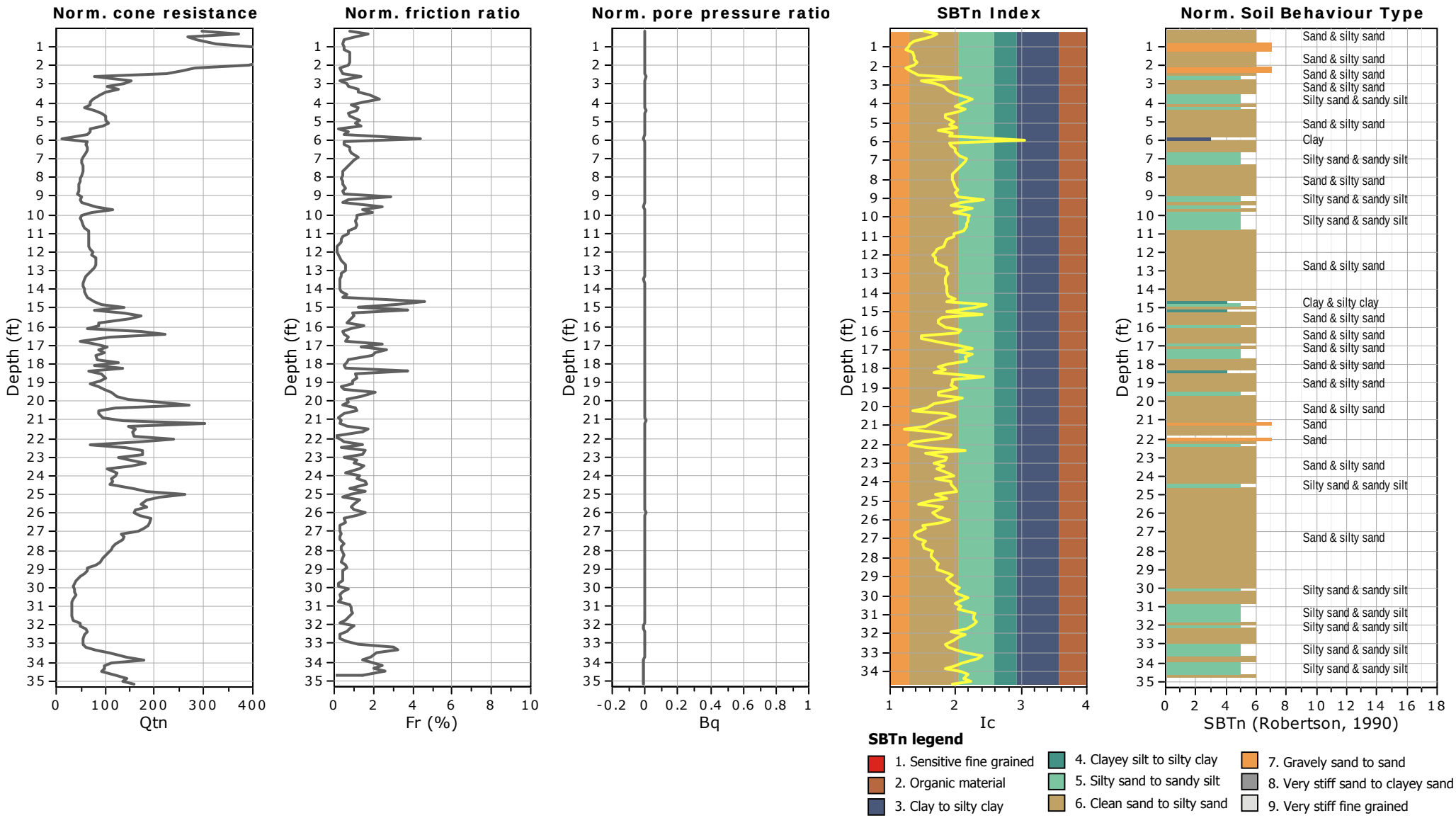
Location: Astoria Yard - Queens NY

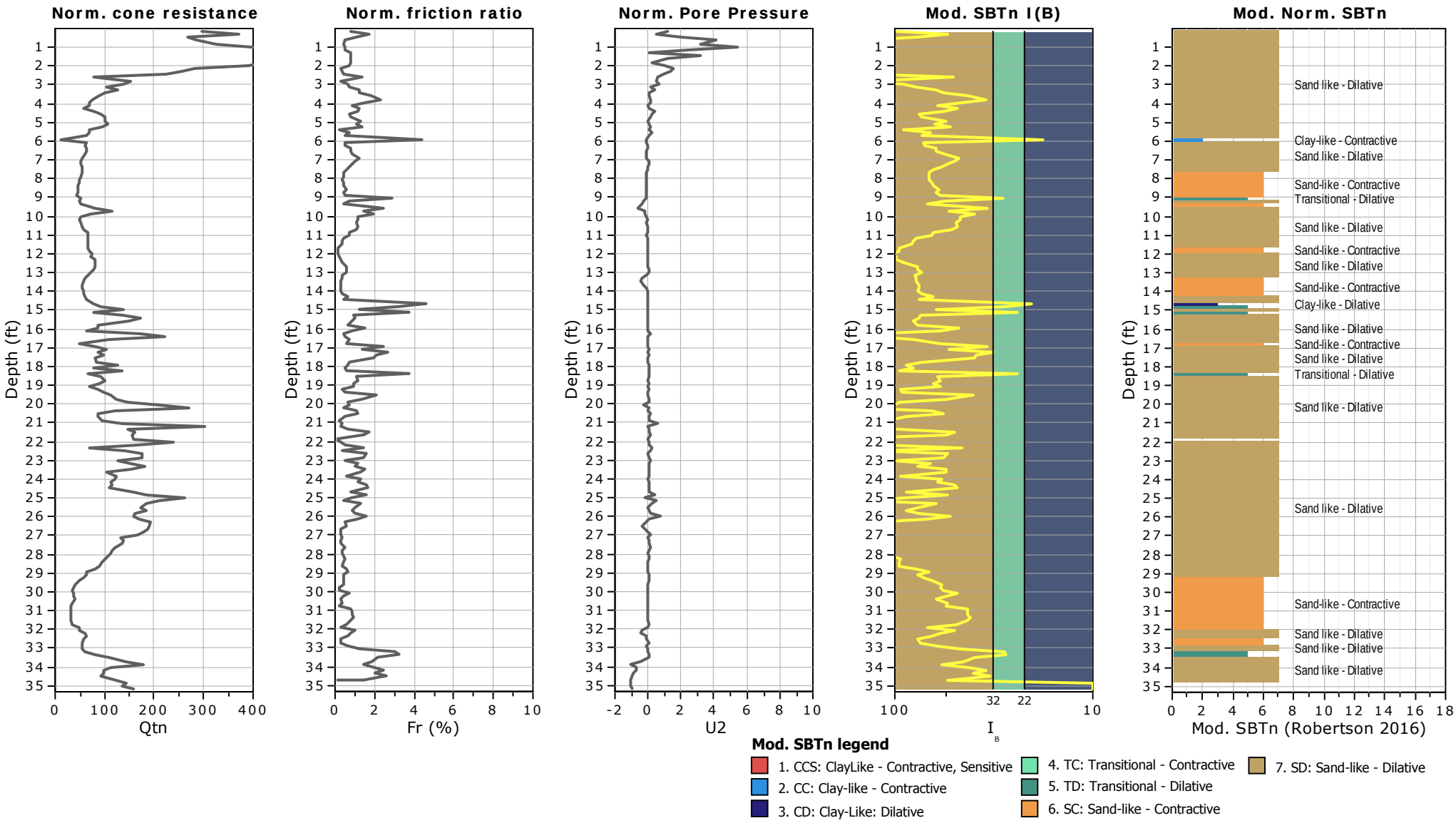
SCPT-GZ-20
Total depth: 35.17 ft



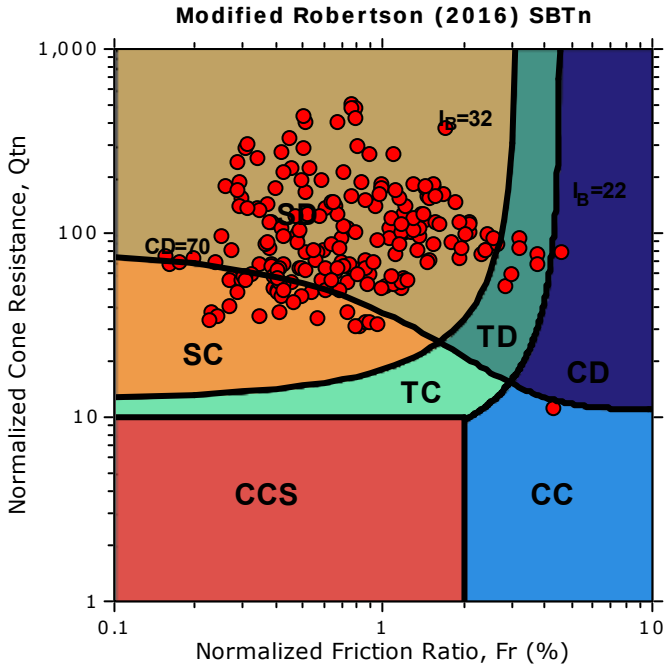
Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

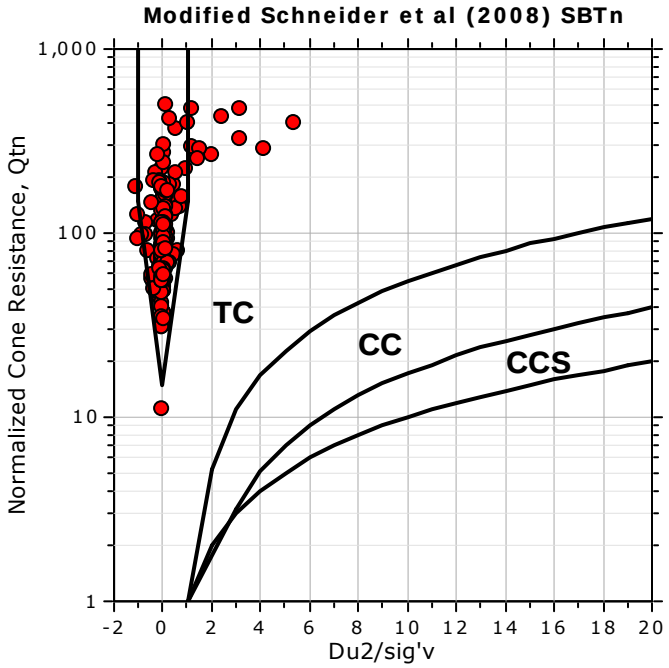
Project: GZA
Location: Astoria Yard - Queens NY

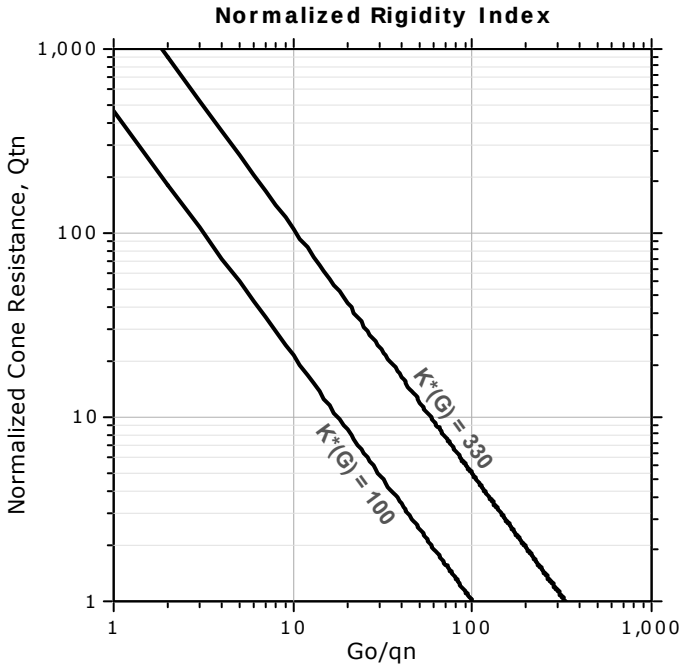
SCPT-GZ-20
Total depth: 35.17 ft



Updated SBTn plots







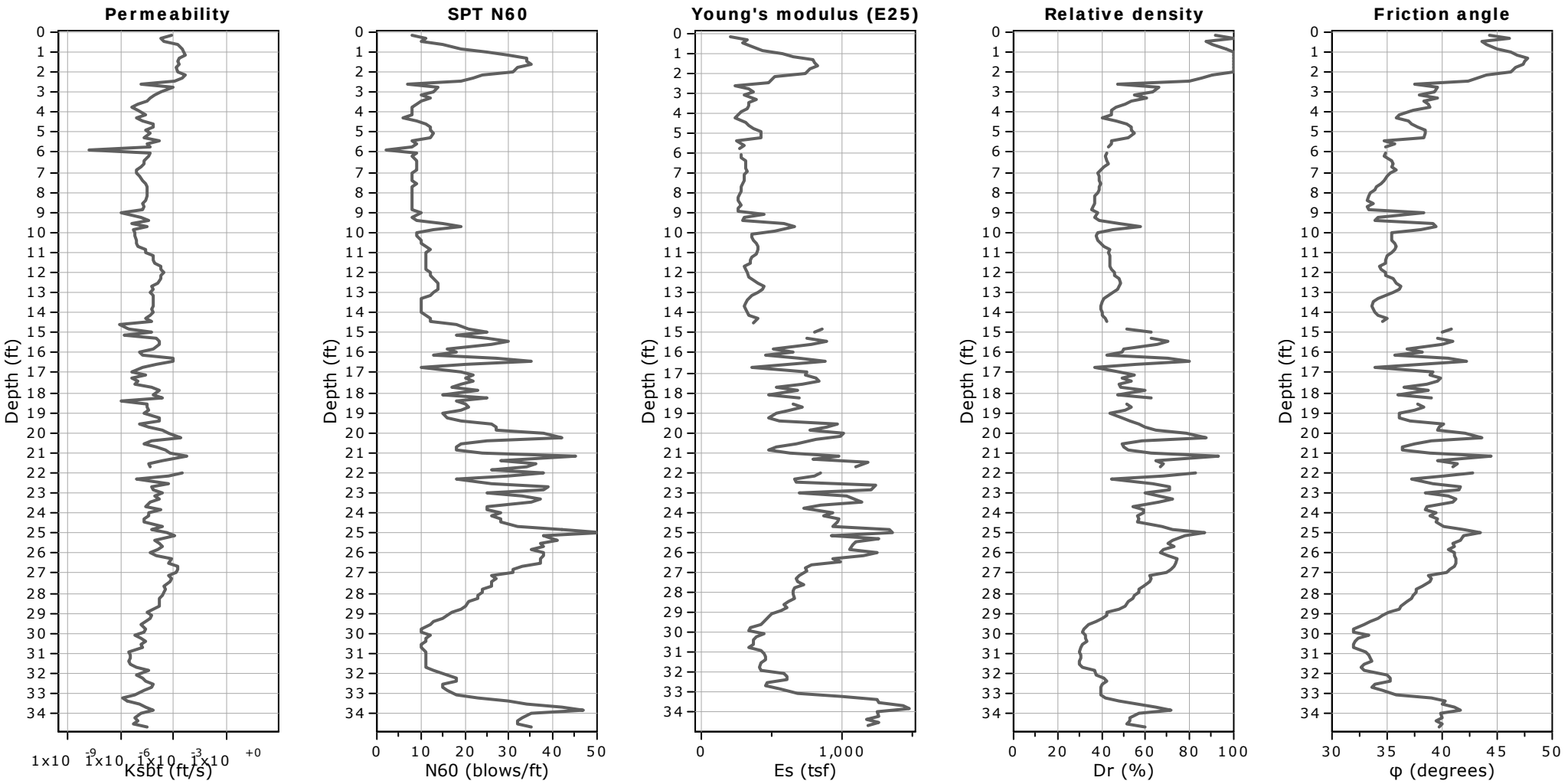
CCS: Clay-like - Contractive - Sensitive
CC: Clay-like - Contractive
CD: Clay-like - Dilative
TC: Transitional - Contractive
TD: Transitional - Dilative
SC: Sand-like - Contractive
SD: Sand-like - Dilative

K(G) > 330: Soils with significant microstructure (e.g. age/cementation)

Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: GZA
Location: Astoria Yard - Queens NY

SCPT-GZ-20
Total depth: 35.17 ft



Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative density constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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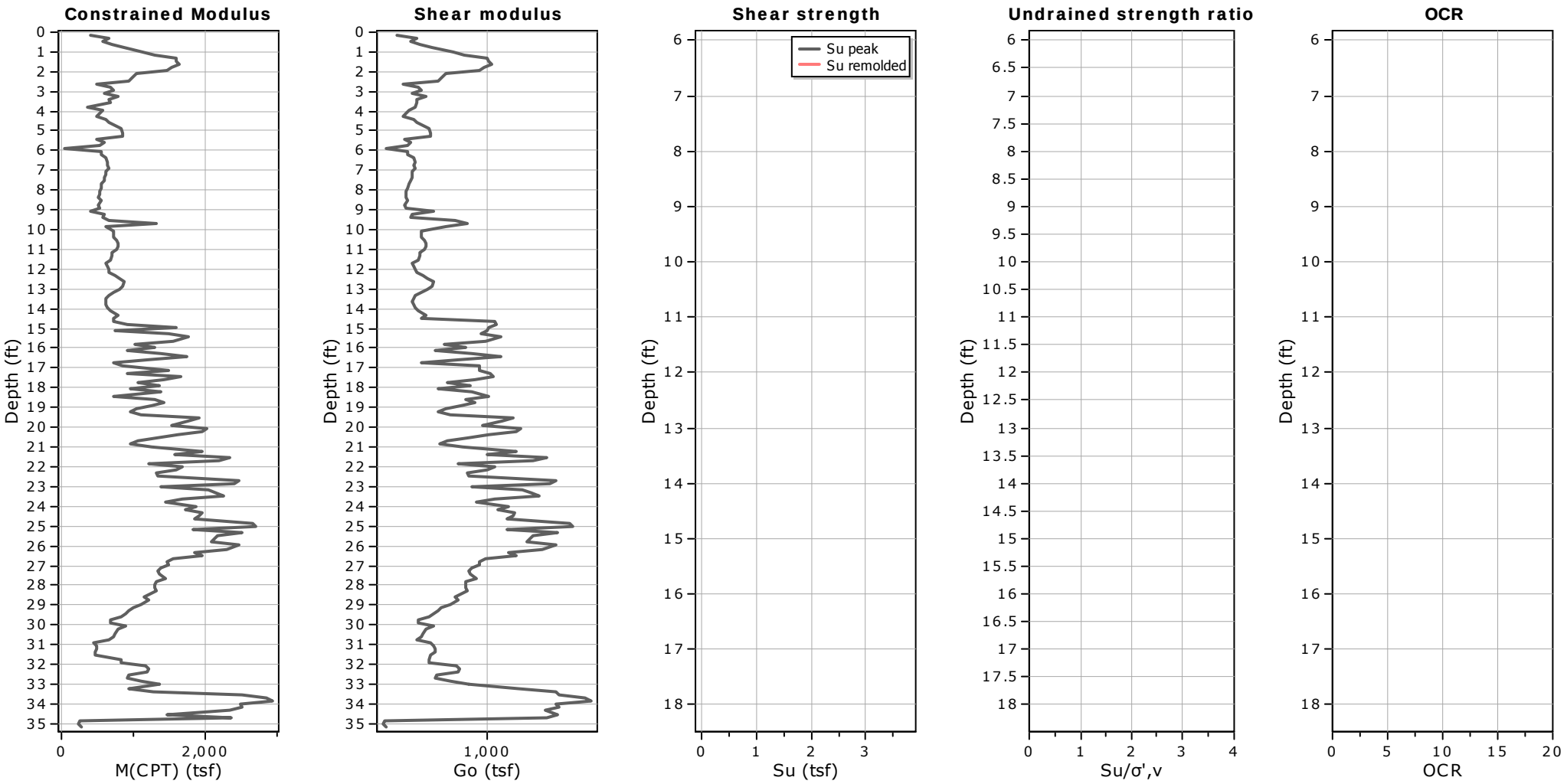
5230 Atlantic Ave
Mays Landing, NJ

Project: GZA
Location: Astoria Yard - Queens NY

SCPT-GZ-20
Total depth: 35.17 ft



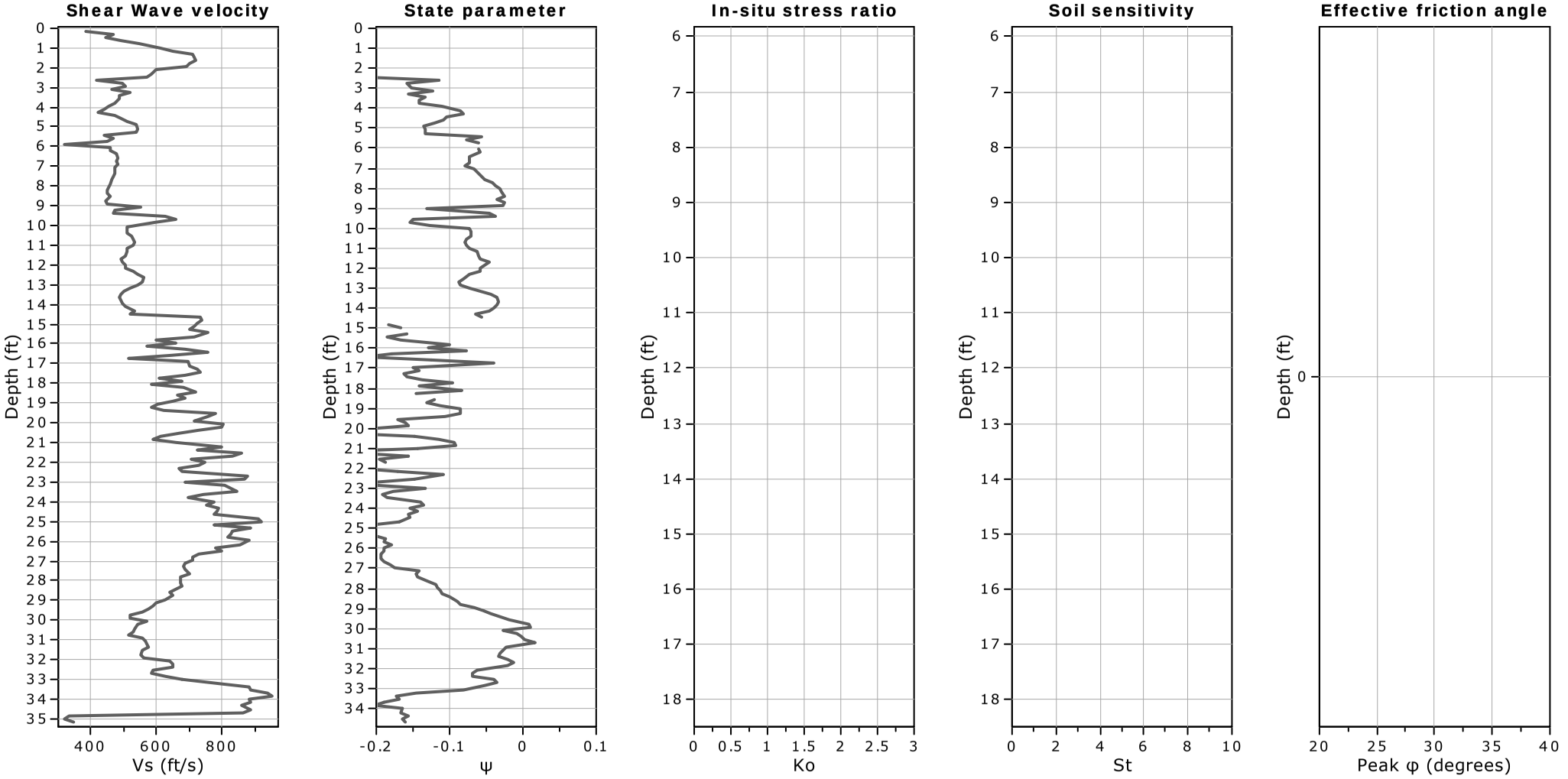
Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data
Flat Dilatometer Test data

Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: GZA
Location: Astoria Yard - Queens NY

SCPT-GZ-20
Total depth: 35.17 ft



Calculation parameters

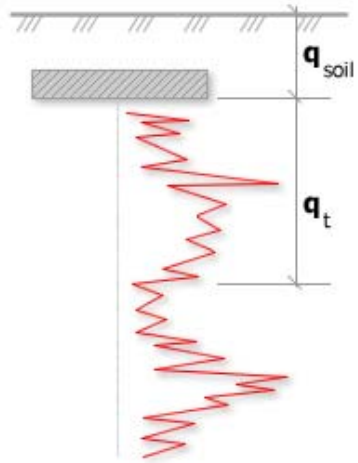
Soil Sensitivity factor, N_S: 350.00

User defined estimation data

Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: **GZA**
Location: **Astoria Yard - Queens NY**

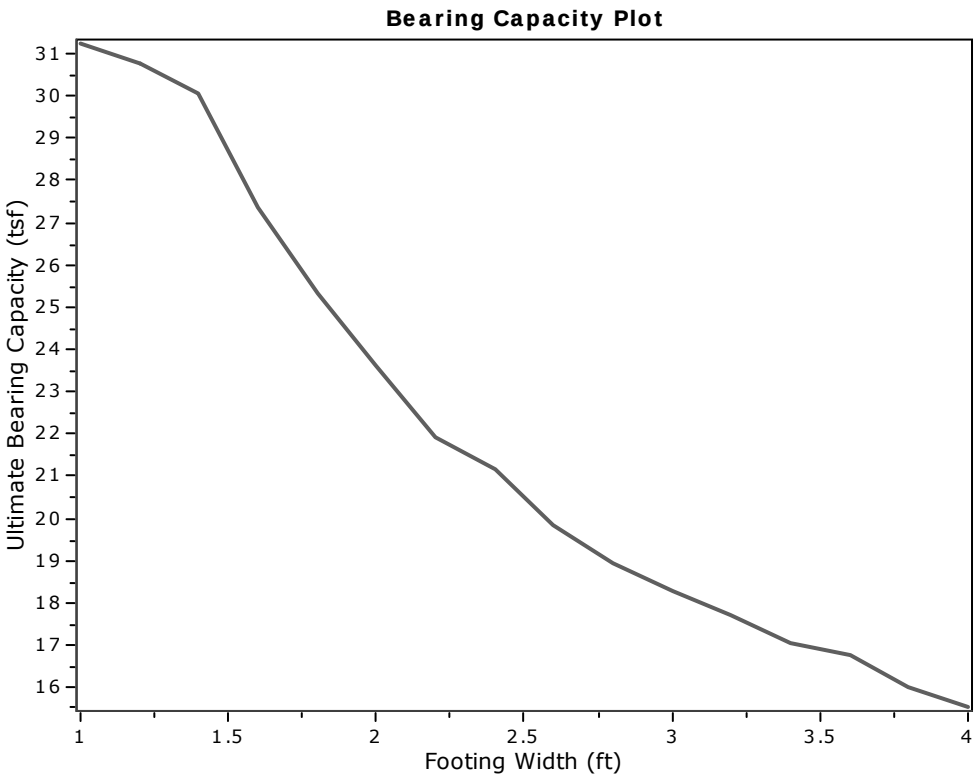
SCPT-GZ-20
Total depth: 35.17 ft



Bearing Capacity calculation is perfromed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:
R_k: Bearing capacity factor
q_t: Average corrected cone resistance over calculation depth
q_{soil}: Pressure applied by soil above footing



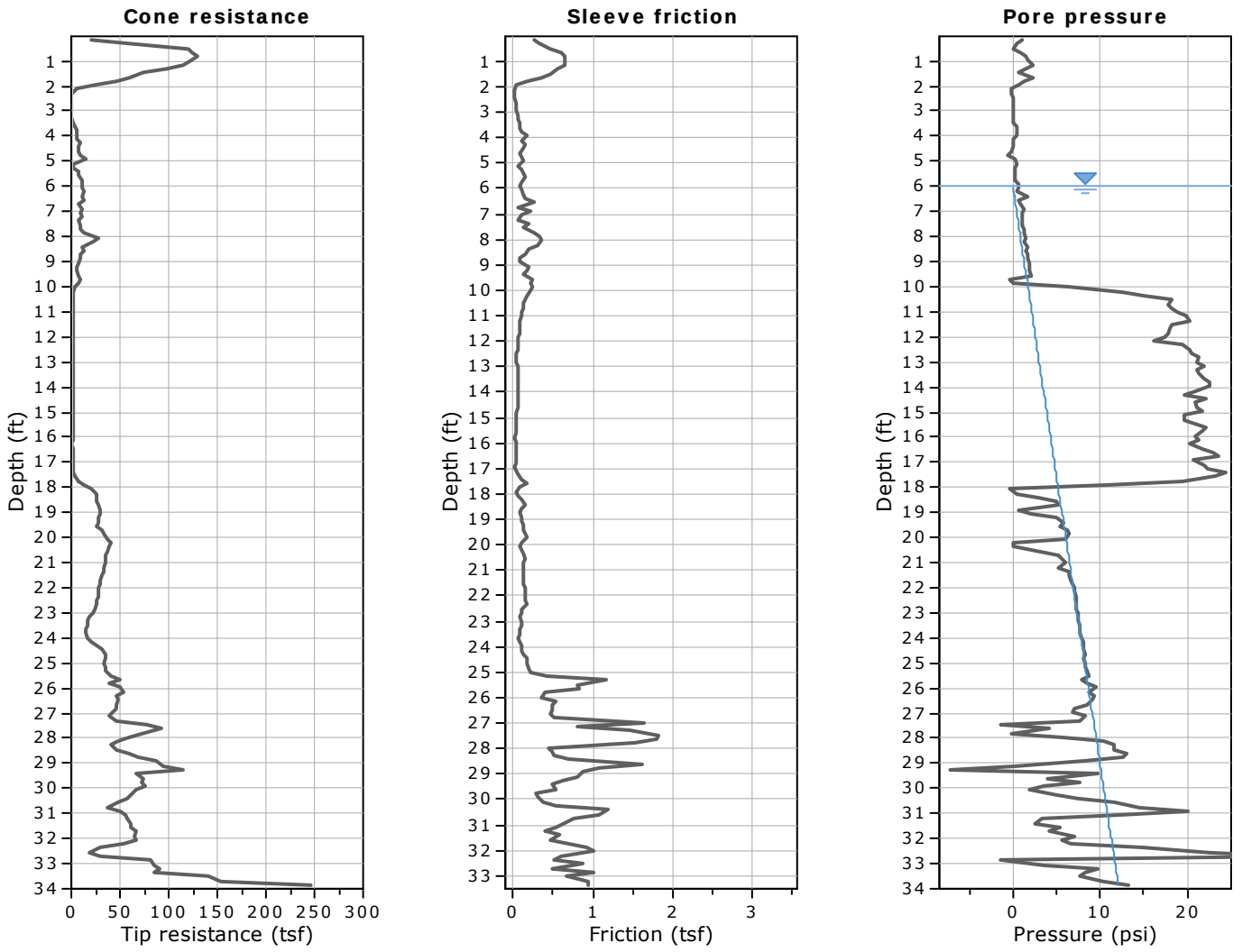
:: Tabular results ::

No	B (ft)	Start Depth (ft)	End Depth (ft)	Ave. q_t (tsf)	R_k	Soil Press. (tsf)	Ult. bearing cap. (tsf)
1	1.00	0.50	2.00	156.01	0.20	0.03	31.23
2	1.20	0.50	2.30	153.58	0.20	0.03	30.75
3	1.40	0.50	2.60	150.07	0.20	0.03	30.04
4	1.60	0.50	2.90	136.63	0.20	0.03	27.36
5	1.80	0.50	3.20	126.56	0.20	0.03	25.34
6	2.00	0.50	3.50	117.92	0.20	0.03	23.61
7	2.20	0.50	3.80	109.48	0.20	0.03	21.93
8	2.40	0.50	4.10	105.71	0.20	0.03	21.17
9	2.60	0.50	4.40	99.07	0.20	0.03	19.84
10	2.80	0.50	4.70	94.47	0.20	0.03	18.92
11	3.00	0.50	5.00	91.21	0.20	0.03	18.27
12	3.20	0.50	5.30	88.42	0.20	0.03	17.71
13	3.40	0.50	5.60	85.21	0.20	0.03	17.07
14	3.60	0.50	5.90	83.67	0.20	0.03	16.76
15	3.80	0.50	6.20	80.01	0.20	0.03	16.03
16	4.00	0.50	6.50	77.55	0.20	0.03	15.54

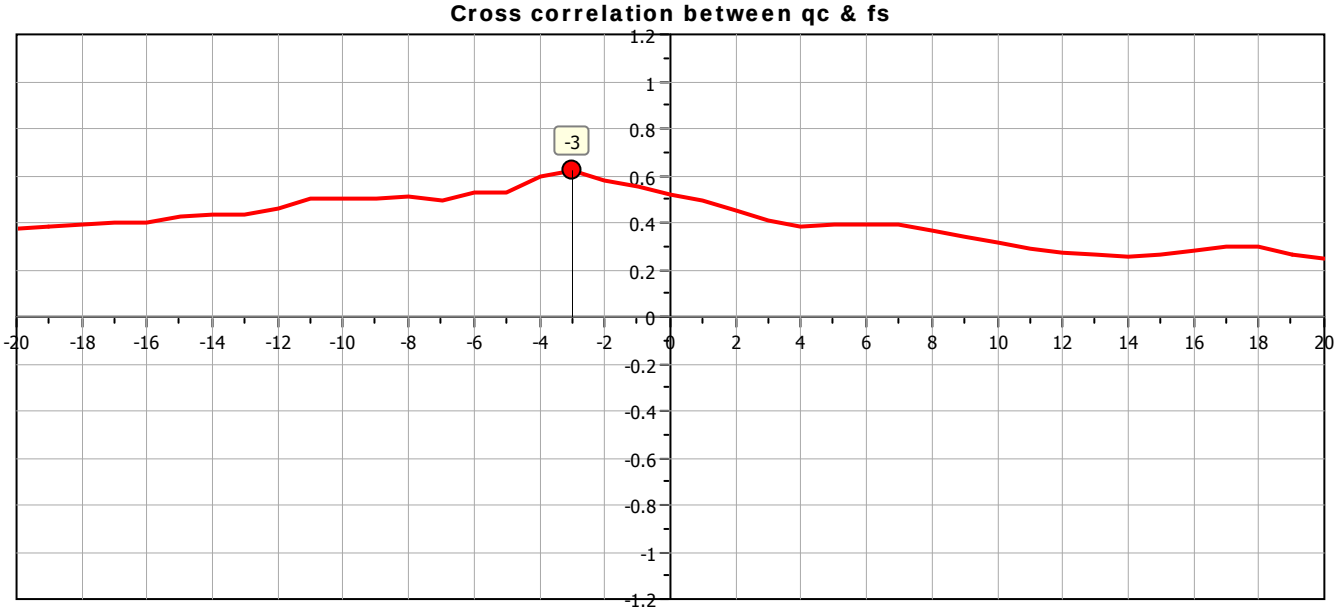
Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: **GZA**
Location: **Astoria Yard - Queens NY**

SCPT-GZ-37
Total depth: 33.86 ft



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).

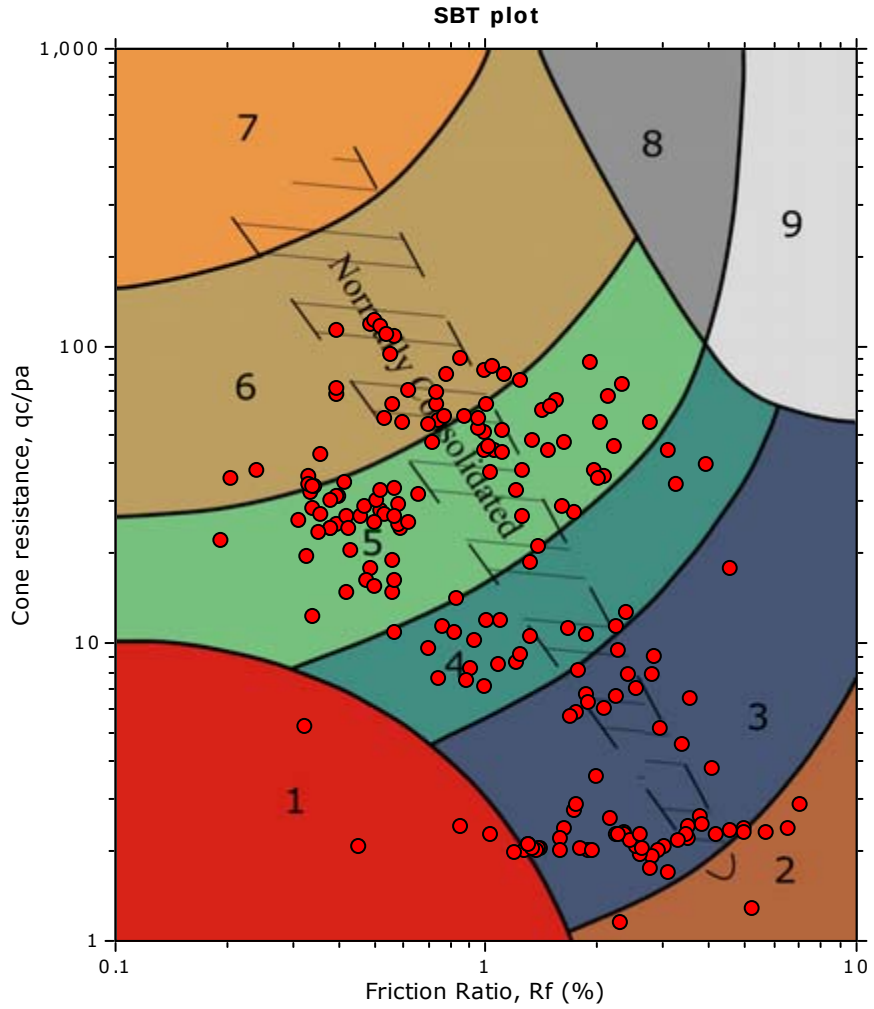


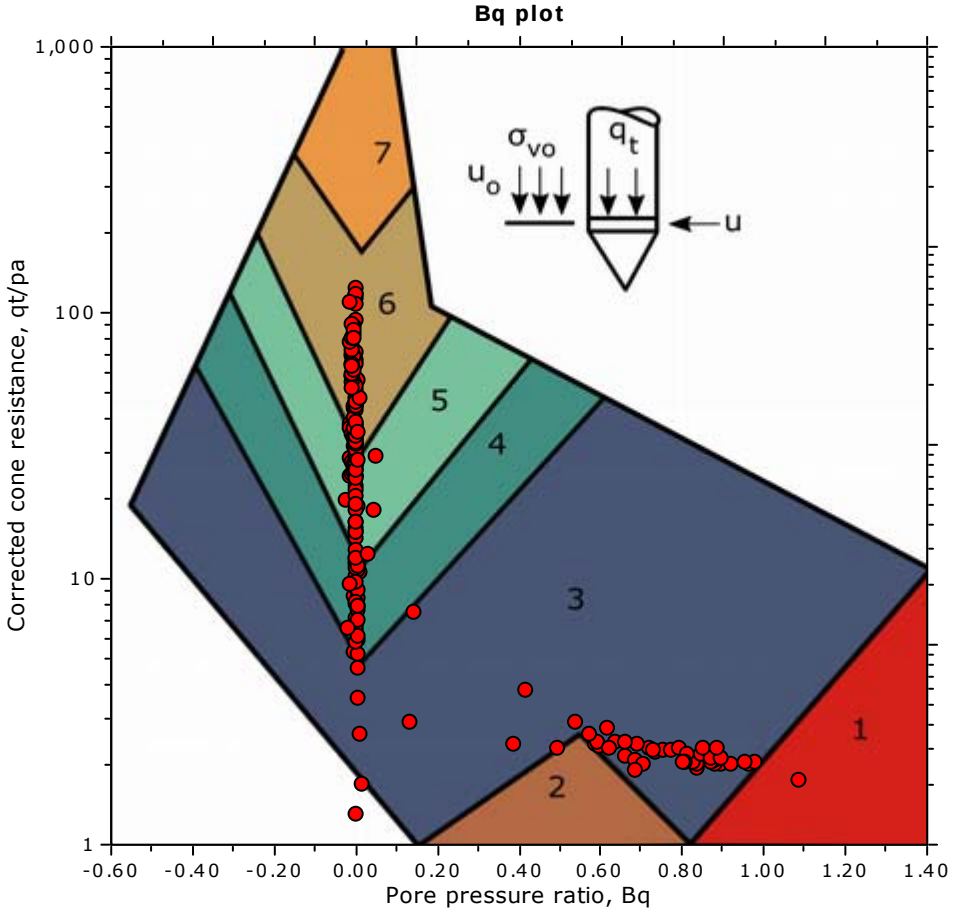
Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: GZA
Location: Astoria Yard - Queens NY

SCPT-GZ-37
Total depth: 33.86 ft

SBT - Bq plots





SBT legend

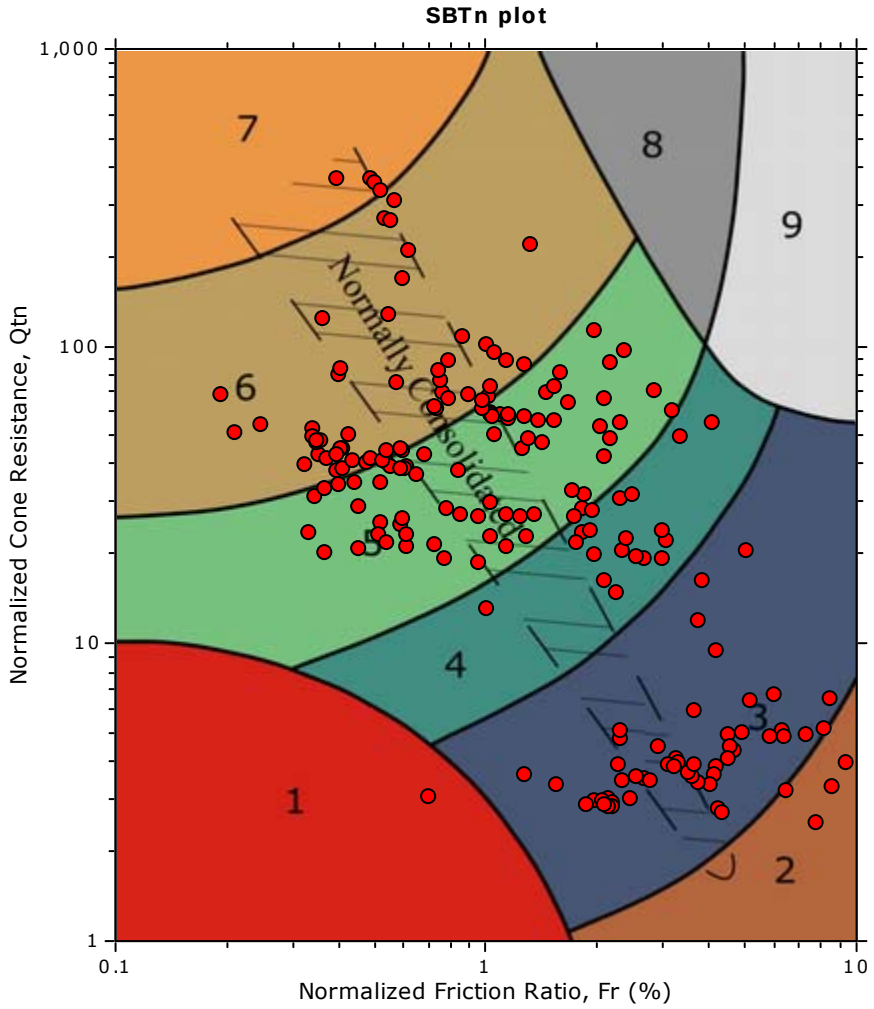
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravelly sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

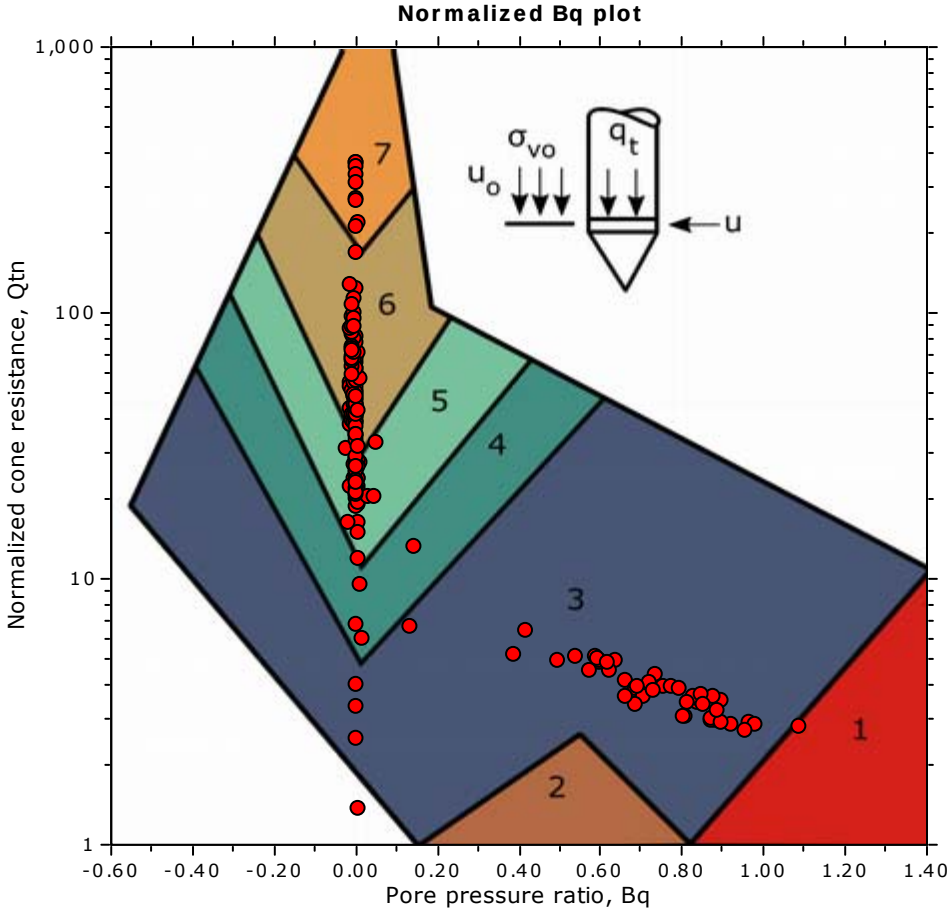
Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: GZA
Location: Astoria Yard - Queens NY

SCPT-GZ-37
Total depth: 33.86 ft

SBT - Bq plots (normalized)





SBTn legend

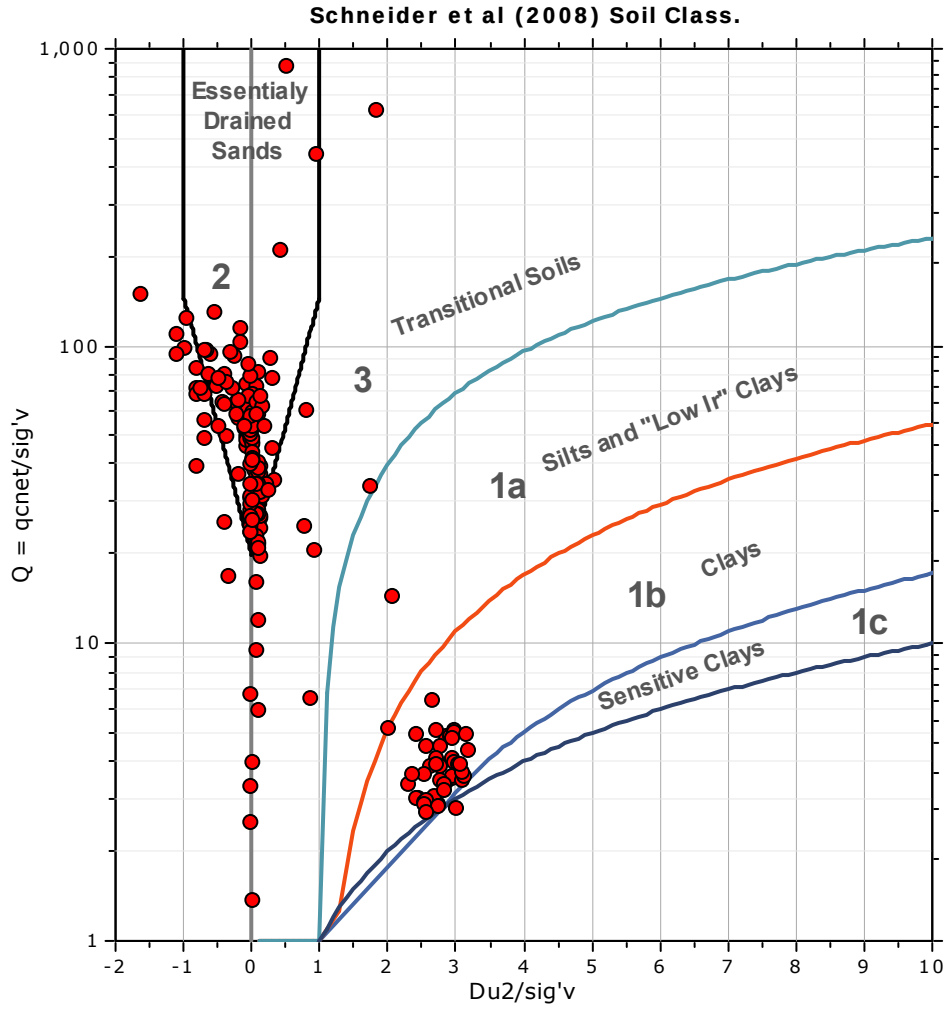
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravelly sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

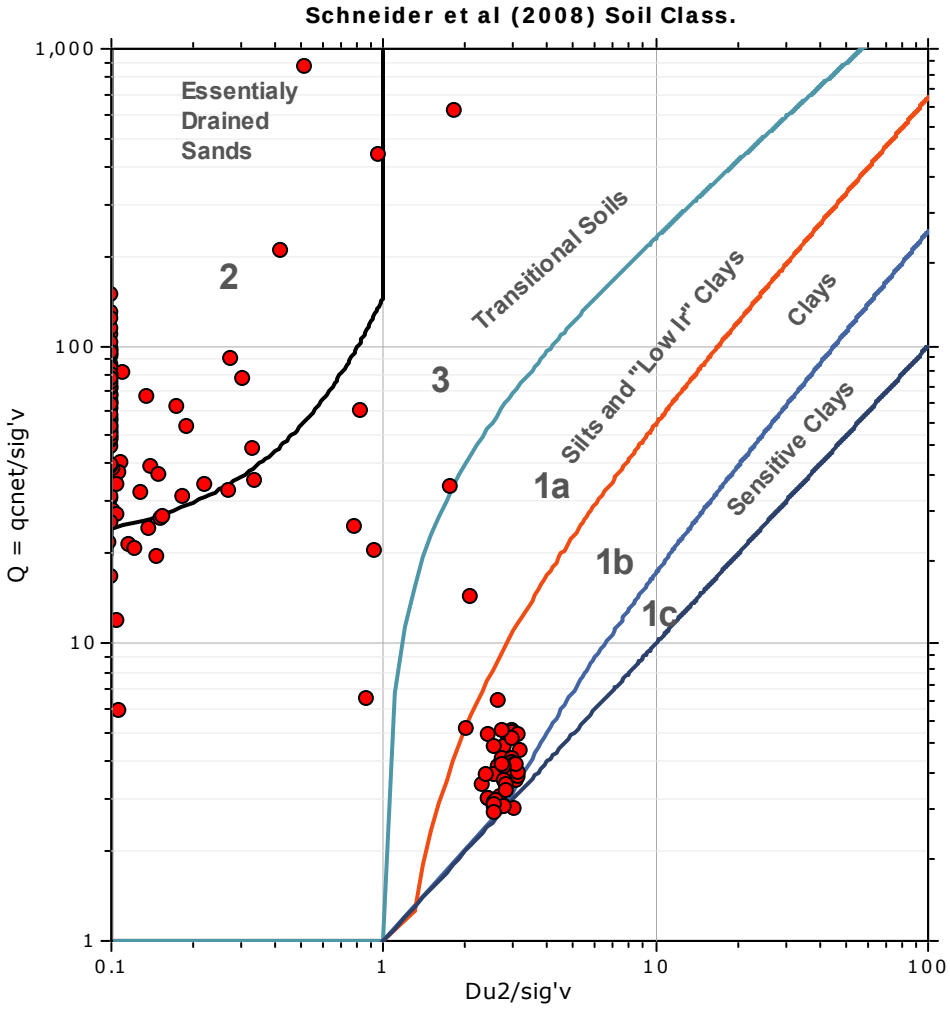
Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: GZA
Location: Astoria Yard - Queens NY

SCPT-GZ-37
Total depth: 33.86 ft

Bq plots (Schneider)

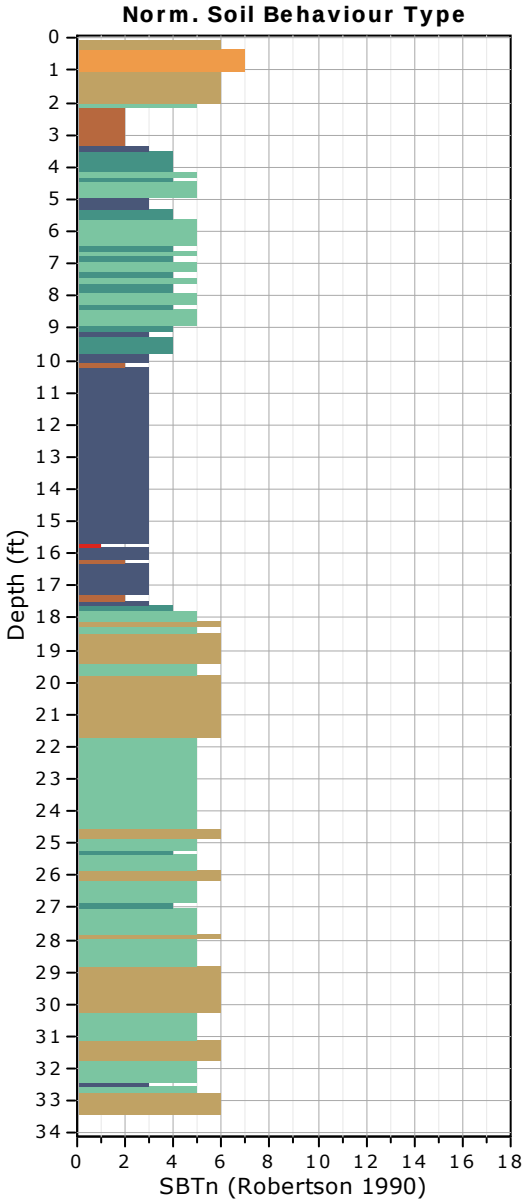


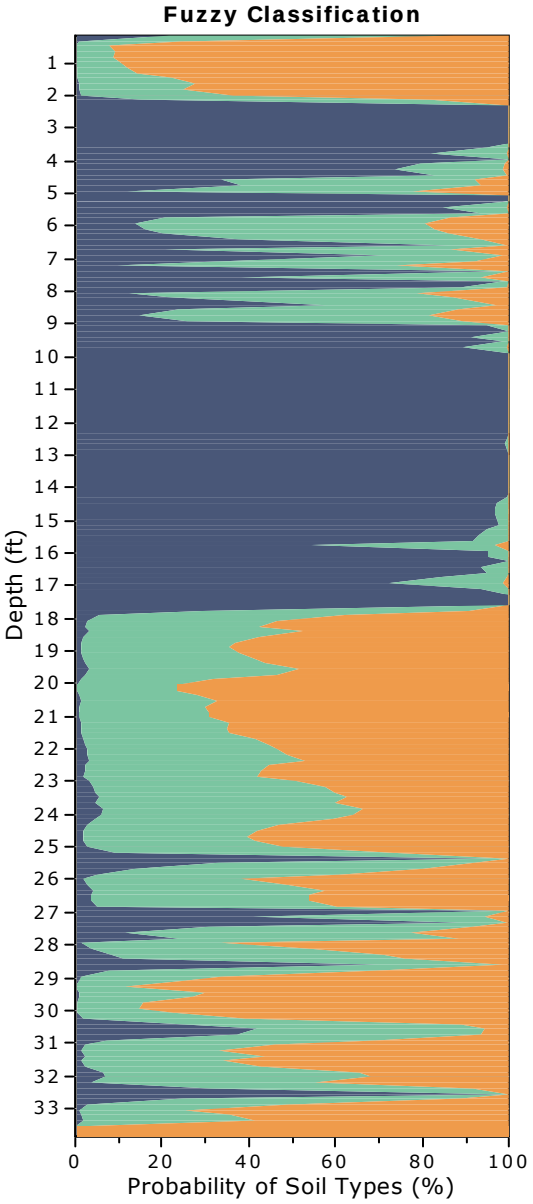


Craig Test Boring
5230 Atlantic Ave
Mays Landing, NJ

Project: **GZA**
Location: **Astoria Yard - Queens NY**

SCPT-GZ-37
Total depth: 33.86 ft





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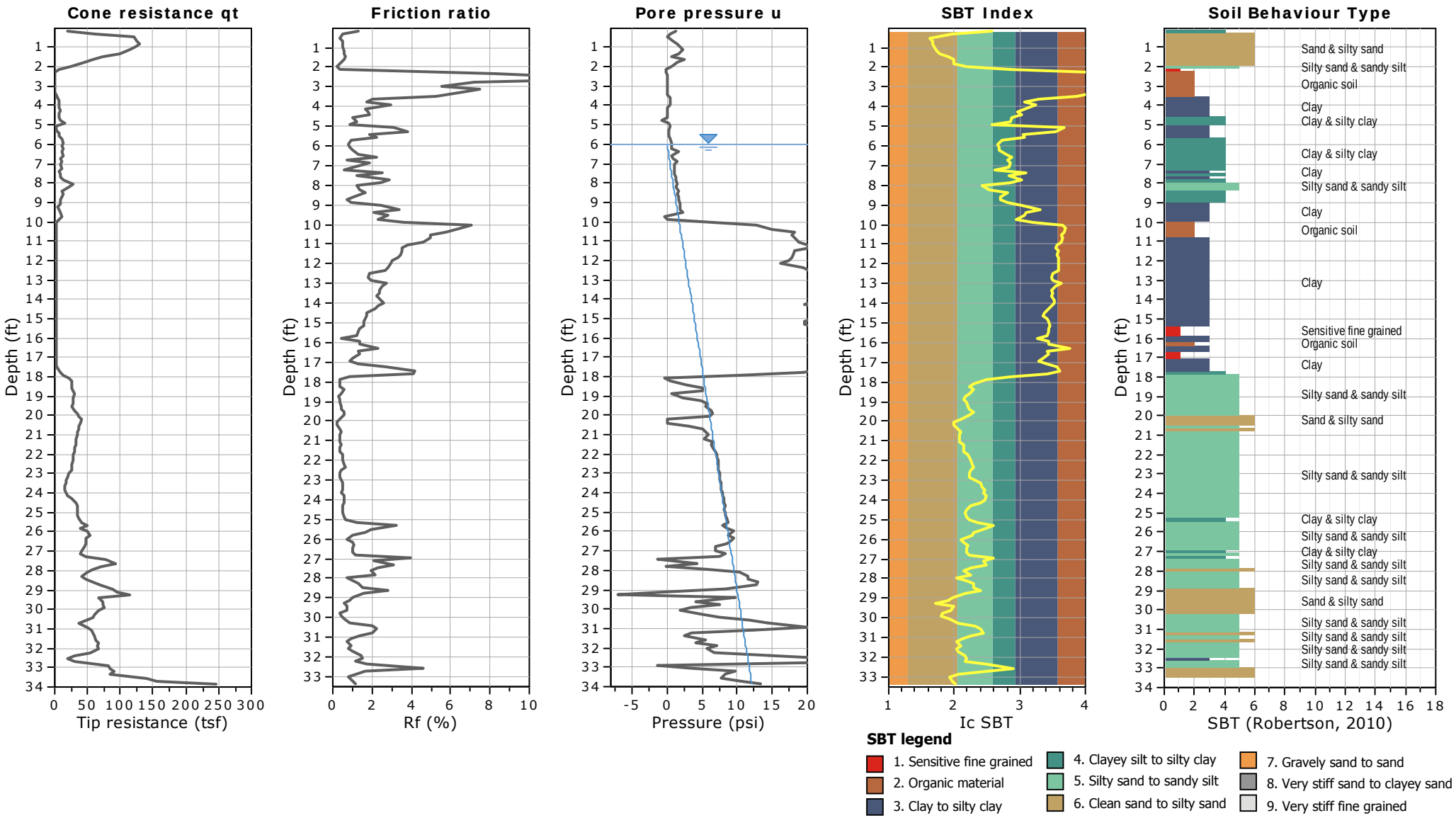

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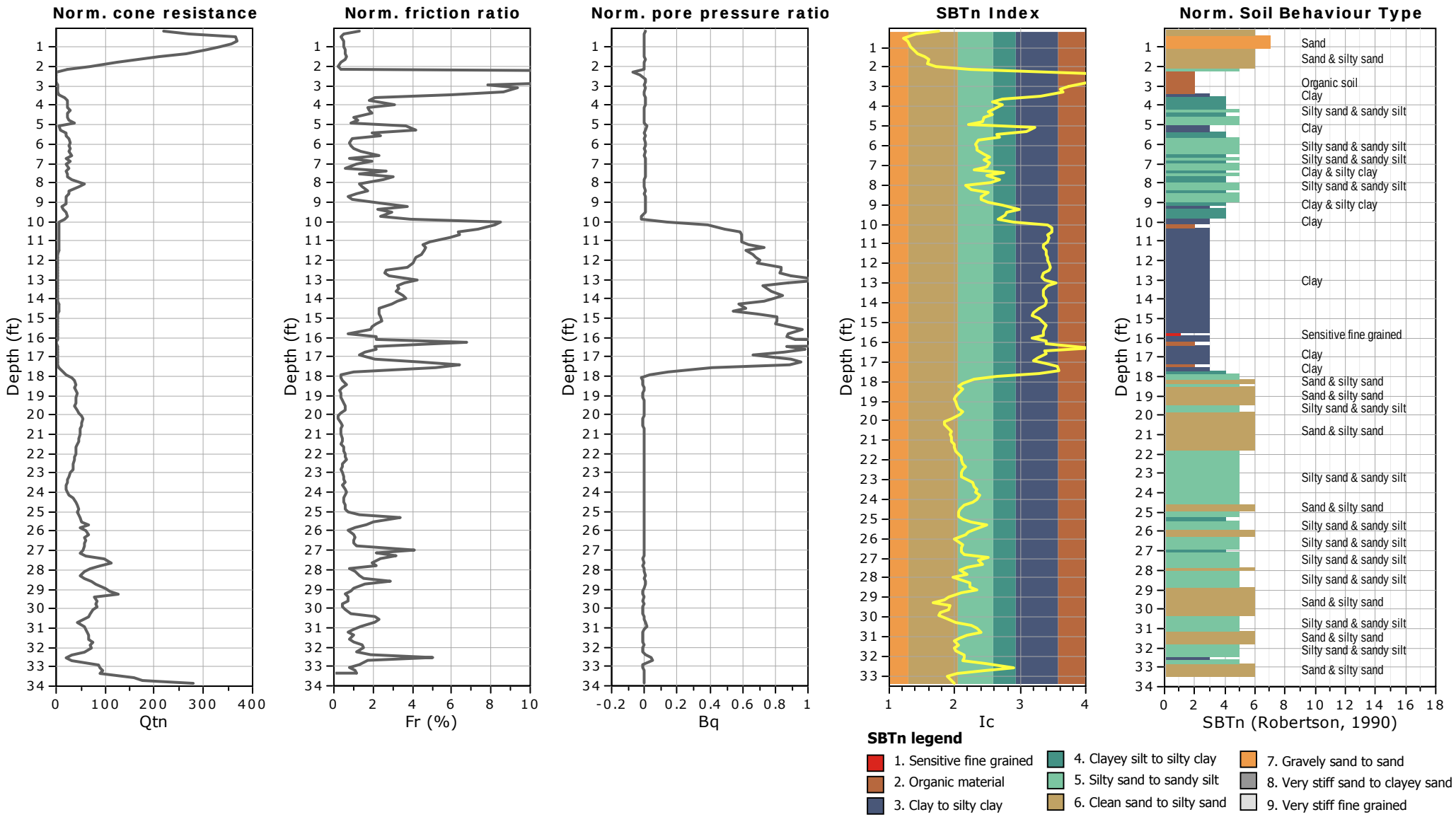

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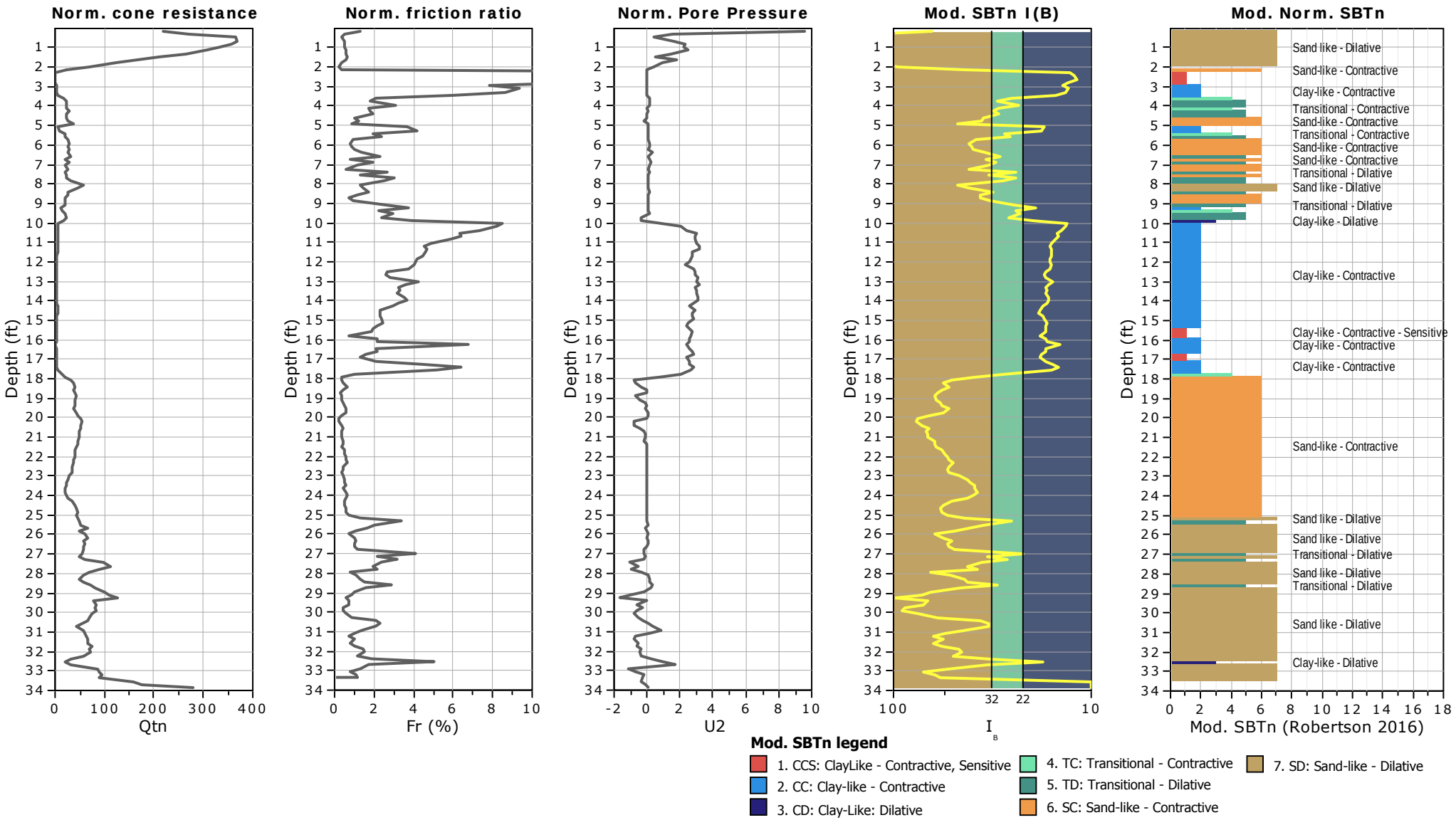

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SCPT-GZ-37
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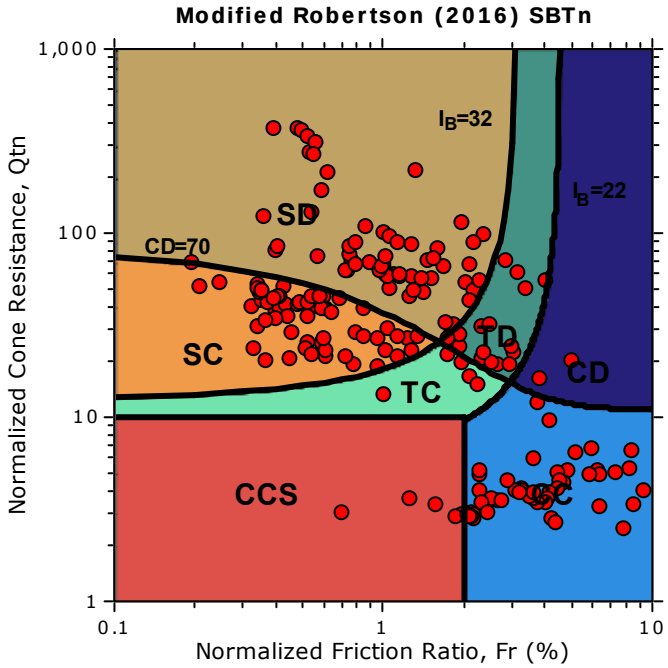
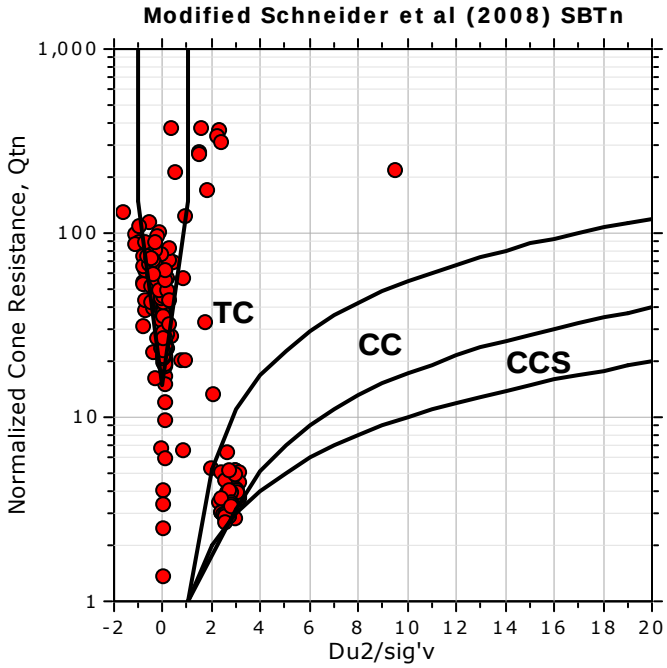
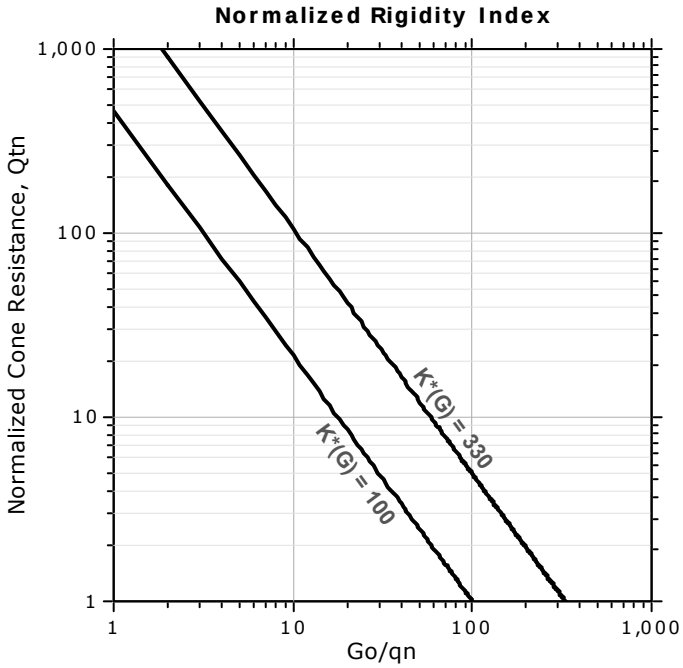
Updated SBTn plots







CCS: Clay-like - Contractive - Sensitive
CC: Clay-like - Contractive
CD: Clay-like - Dilative
TC: Transitional - Contractive
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SC: Sand-like - Contractive
SD: Sand-like - Dilative

K(G) > 330: Soils with significant microstructure (e.g. age/cementation)

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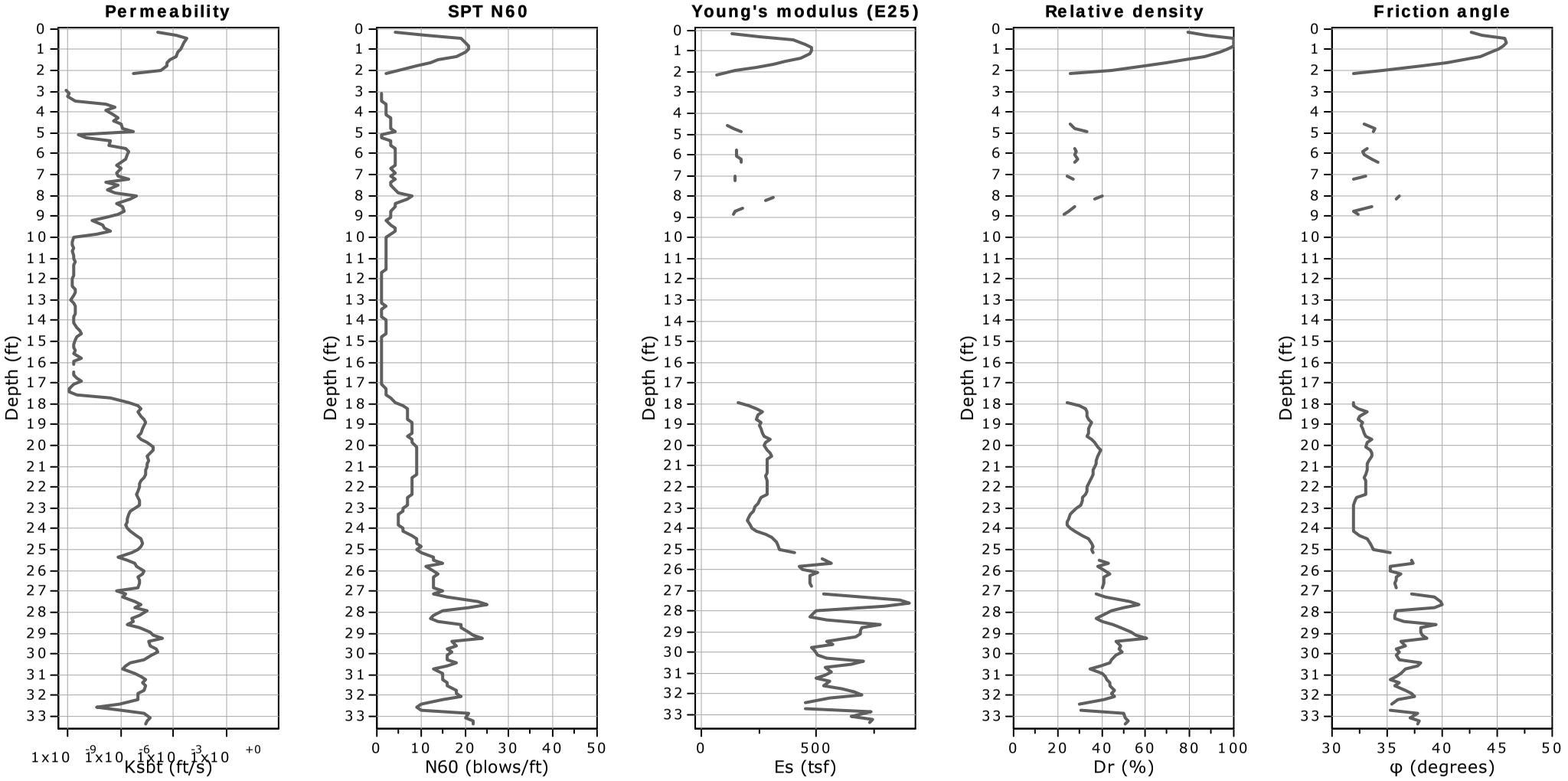

Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative density constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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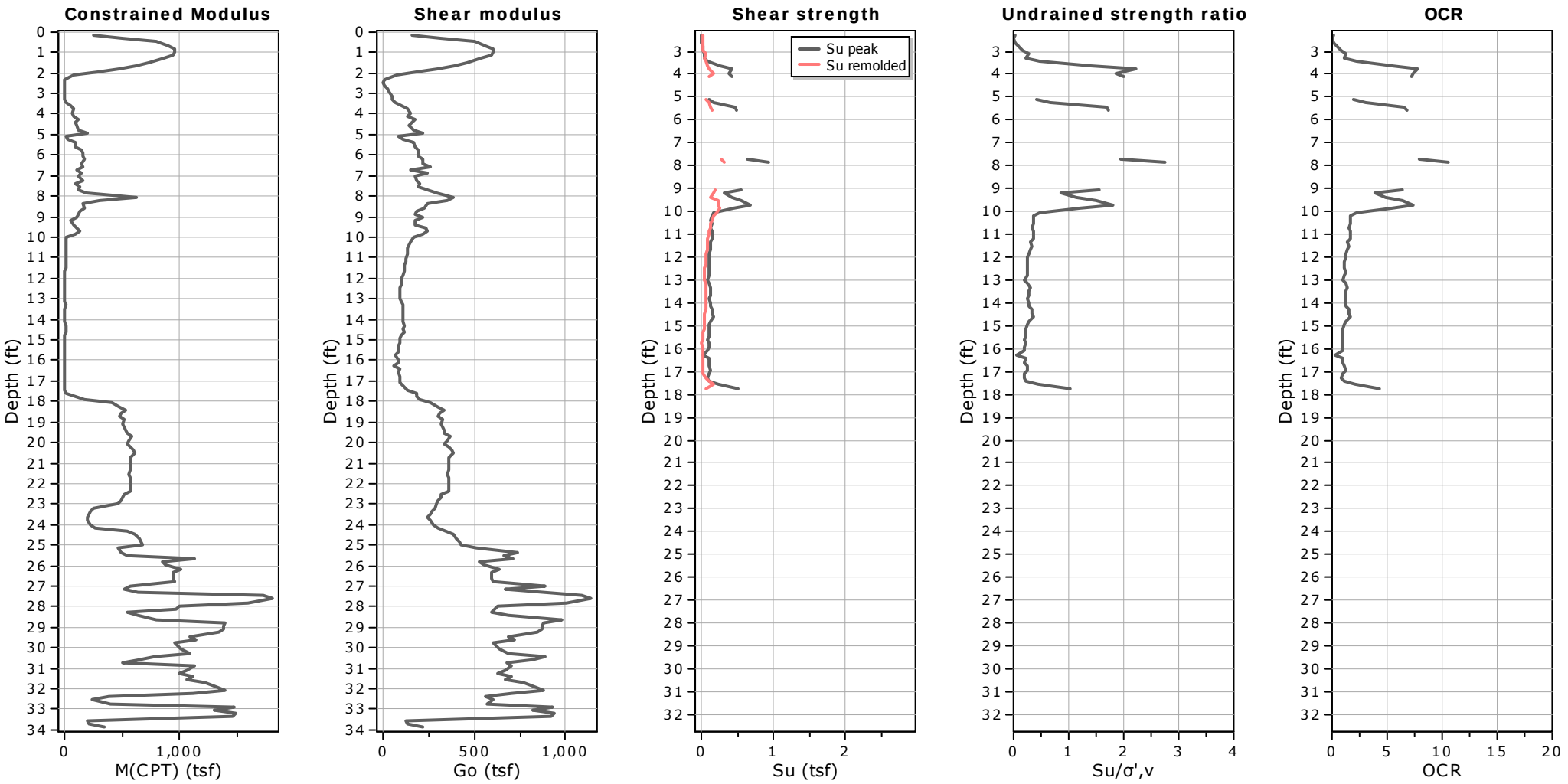

Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14

OCR factor for clays, N_{kt}: 0.33
User defined estimation data
Flat Dilatometer Test data

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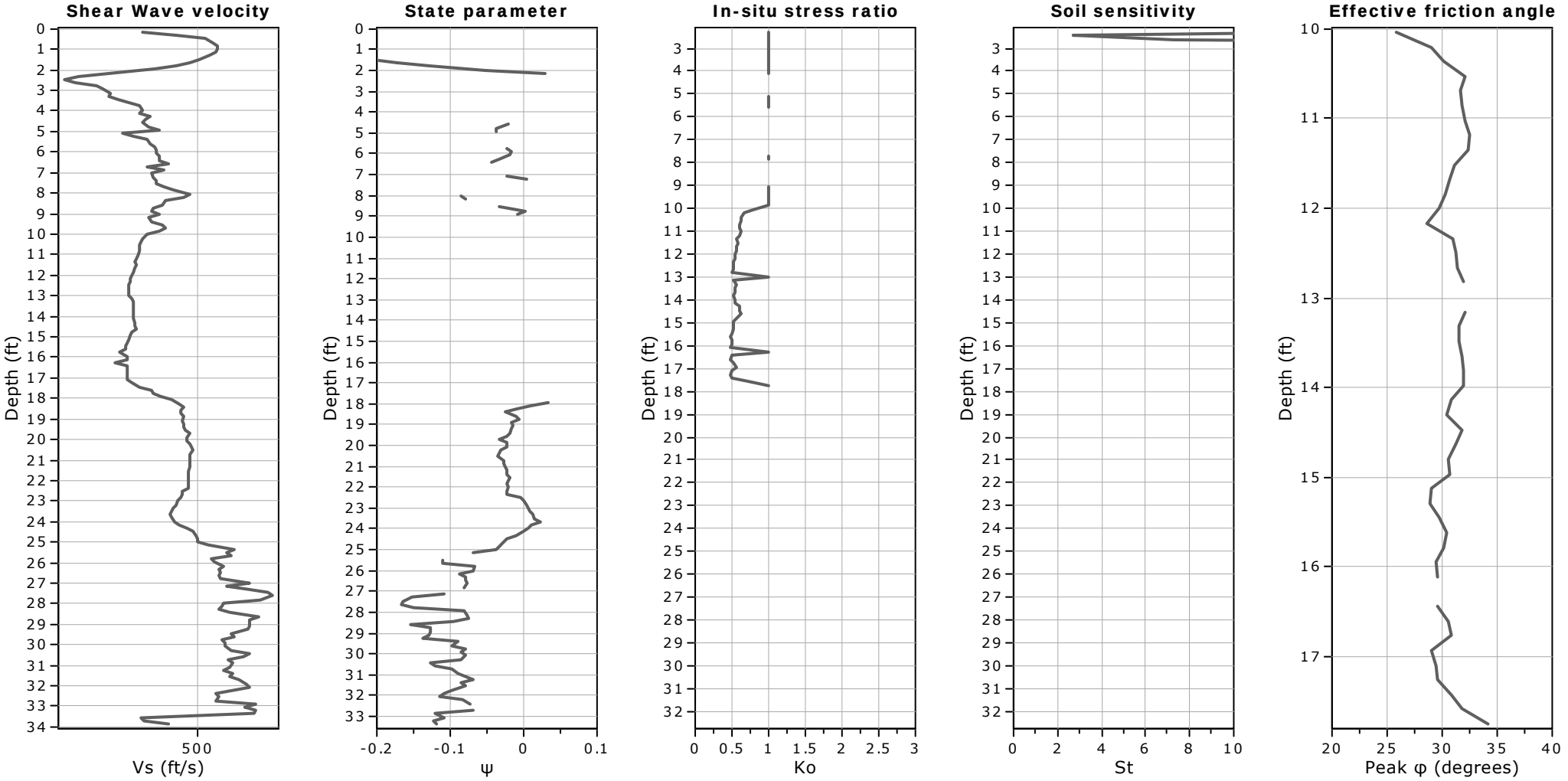

Calculation parameters

Soil Sensitivity factor, N_S: 350.00

User defined estimation data

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Mays Landing, NJ

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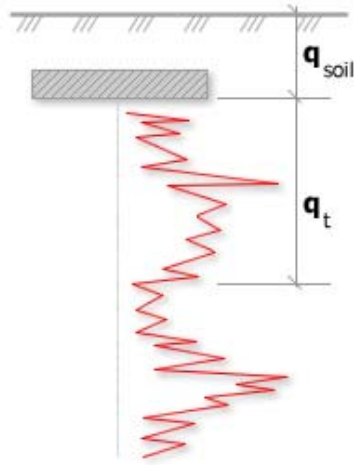
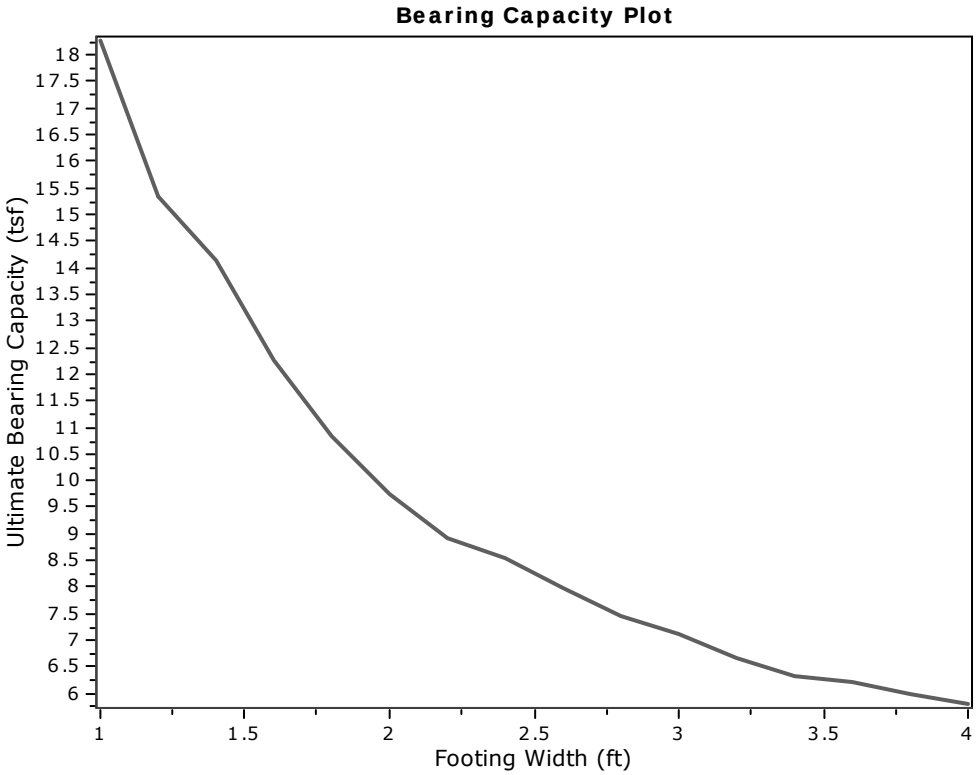


Bearing Capacity calculation is perfromed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:
R_k: Bearing capacity factor
q_t: Average corrected cone resistance over calculation depth
q_{soil}: Pressure applied by soil above footing



:: Tabular results ::

No	B (ft)	Start Depth (ft)	End Depth (ft)	Ave. q_t (tsf)	R_k	Soil Press. (tsf)	Ult. bearing cap. (tsf)
1	1.00	0.50	2.00	91.19	0.20	0.03	18.27
2	1.20	0.50	2.30	76.47	0.20	0.03	15.32
3	1.40	0.50	2.60	70.60	0.20	0.03	14.15
4	1.60	0.50	2.90	61.22	0.20	0.03	12.27
5	1.80	0.50	3.20	54.10	0.20	0.03	10.85
6	2.00	0.50	3.50	48.51	0.20	0.03	9.73
7	2.20	0.50	3.80	44.37	0.20	0.03	8.90
8	2.40	0.50	4.10	42.60	0.20	0.03	8.55
9	2.60	0.50	4.40	39.66	0.20	0.03	7.96
10	2.80	0.50	4.70	37.17	0.20	0.03	7.46
11	3.00	0.50	5.00	35.37	0.20	0.03	7.10
12	3.20	0.50	5.30	33.17	0.20	0.03	6.66
13	3.40	0.50	5.60	31.52	0.20	0.03	6.33
14	3.60	0.50	5.90	30.90	0.20	0.03	6.21
15	3.80	0.50	6.20	29.80	0.20	0.03	5.99
16	4.00	0.50	6.50	28.84	0.20	0.03	5.80

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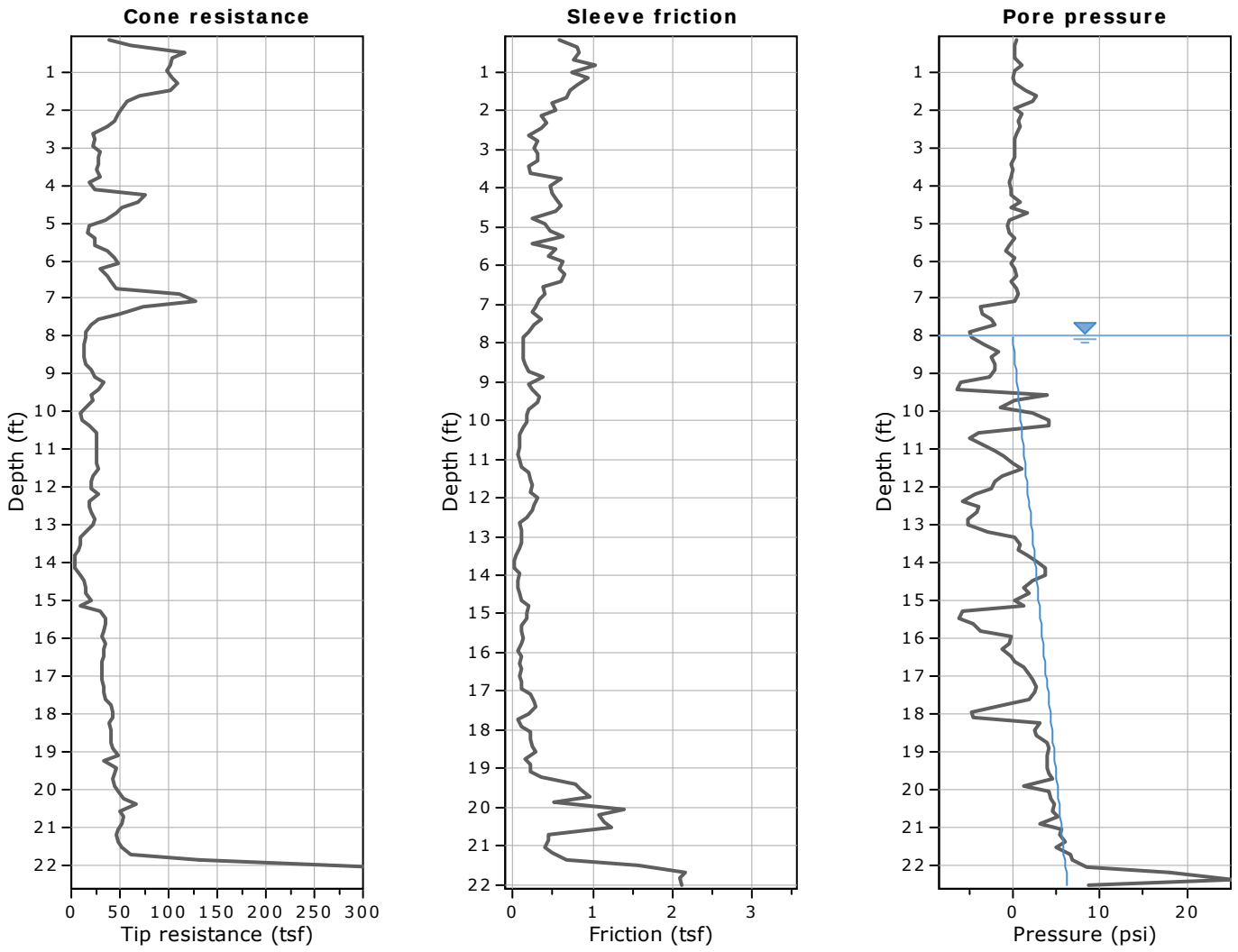
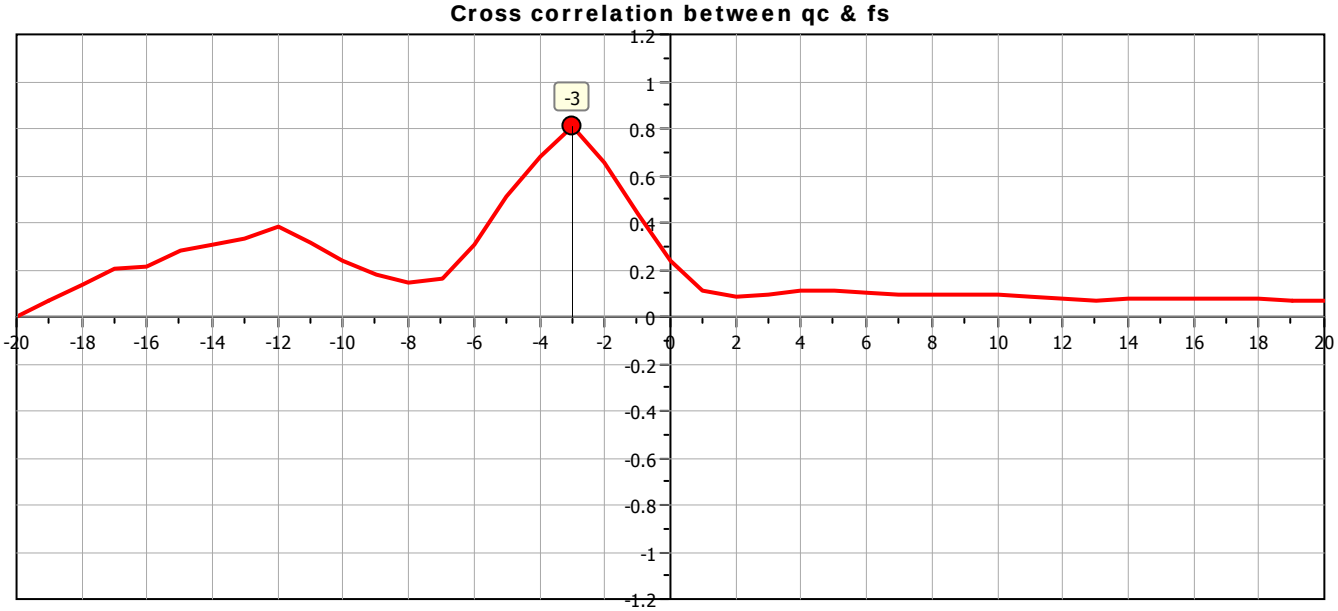
SCPT-GZ-38
Total depth: 22.51 ft



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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SCPT-GZ-38
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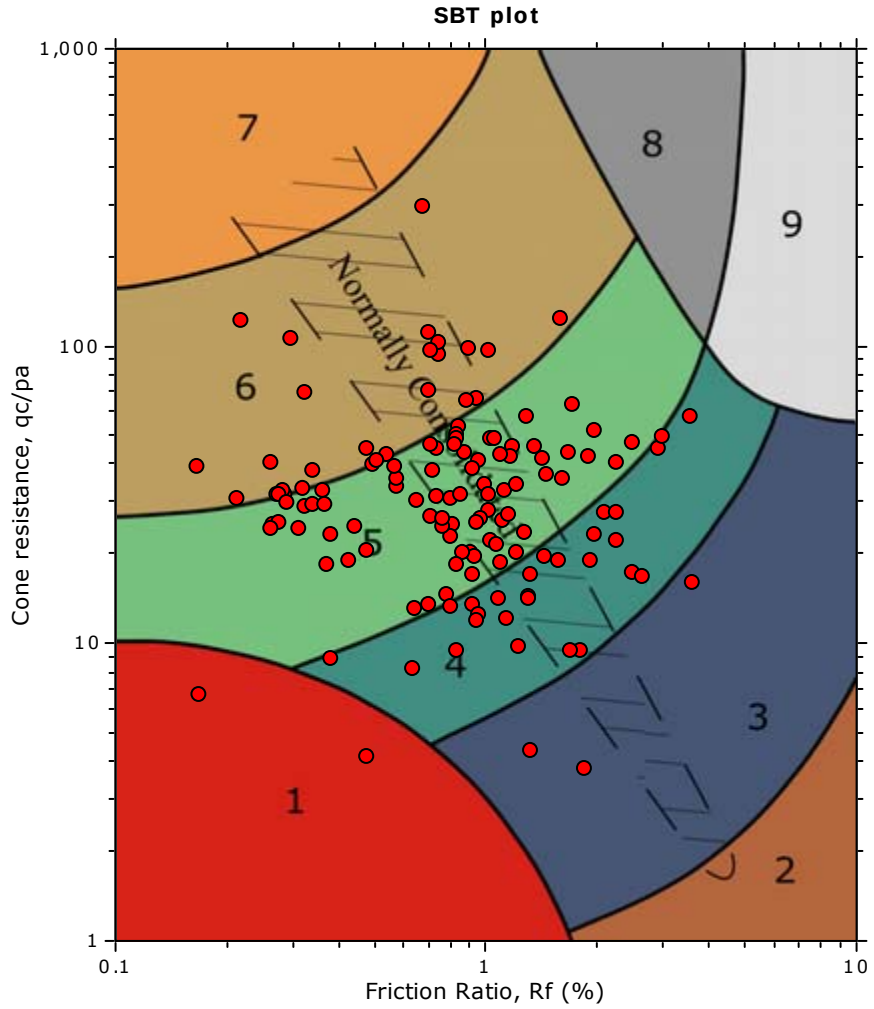
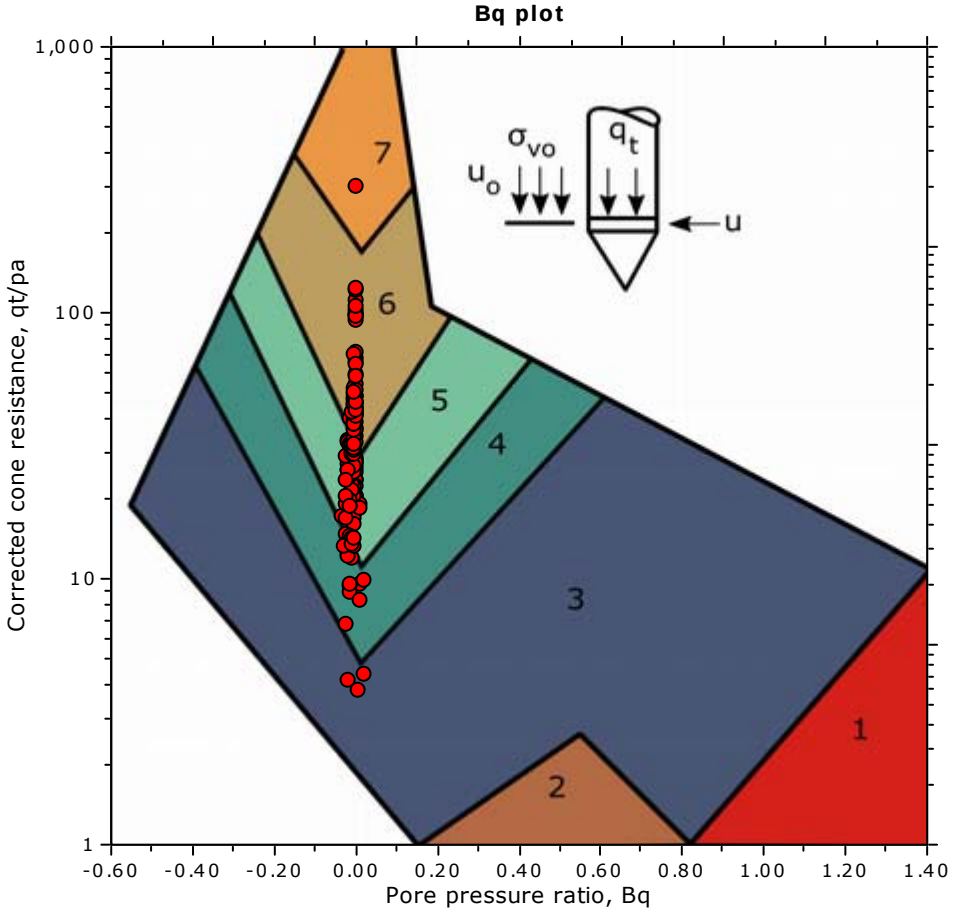
SBT - Bq plots





SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravelly sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

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SCPT-GZ-38
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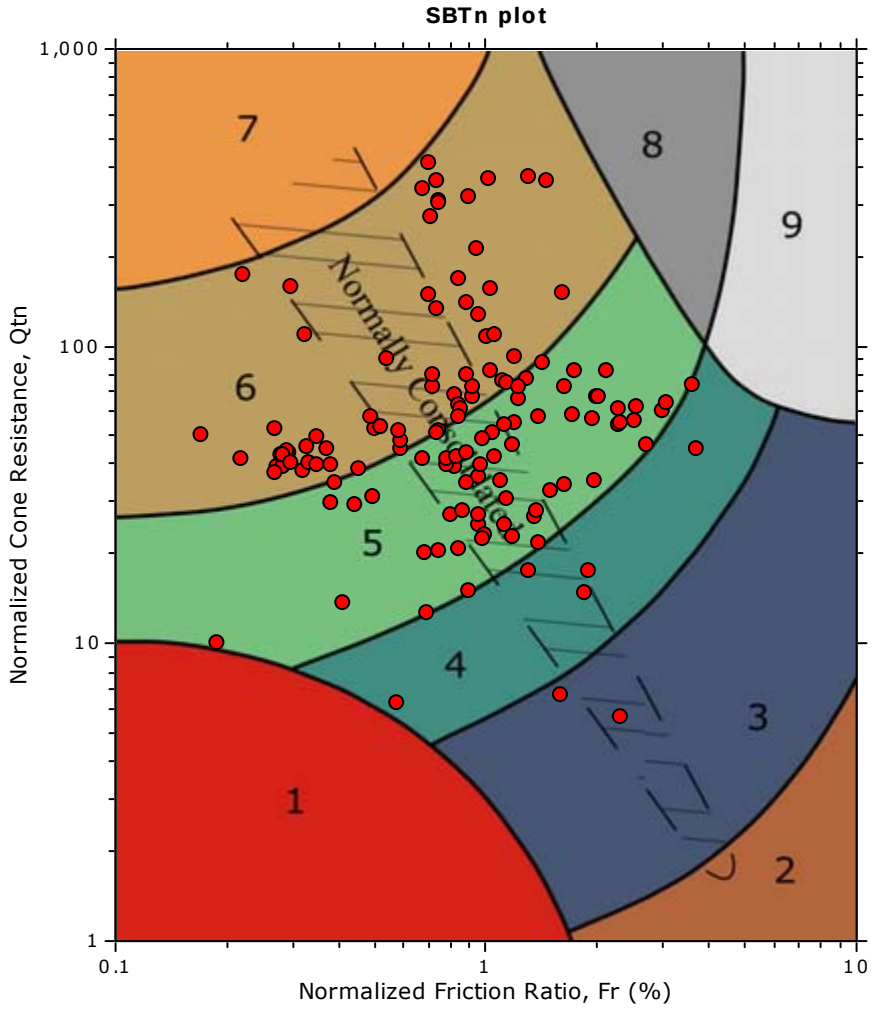
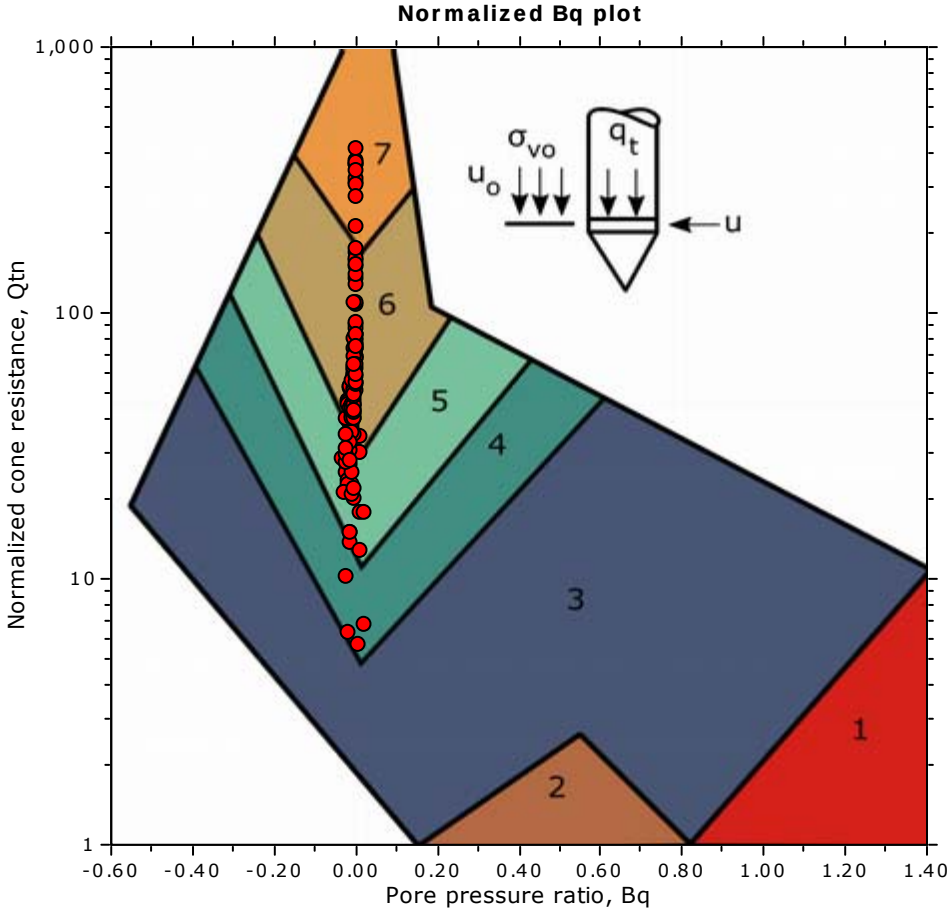
SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravelly sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

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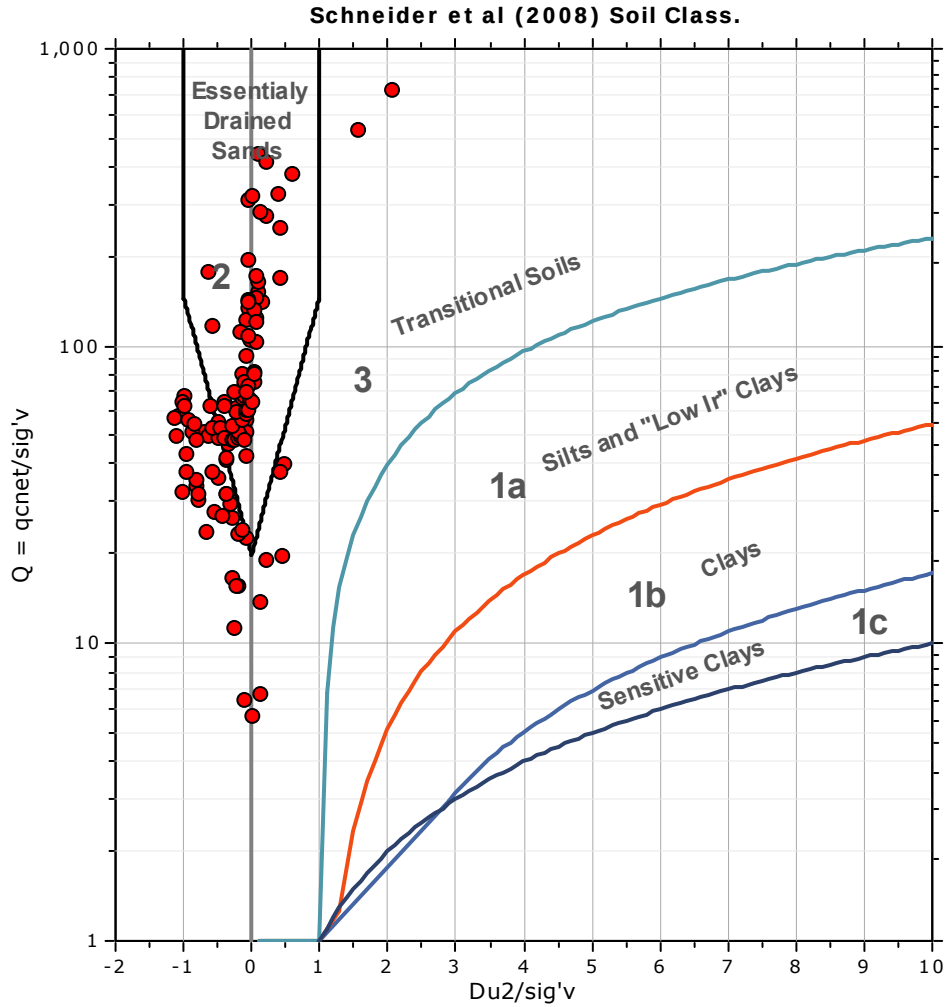
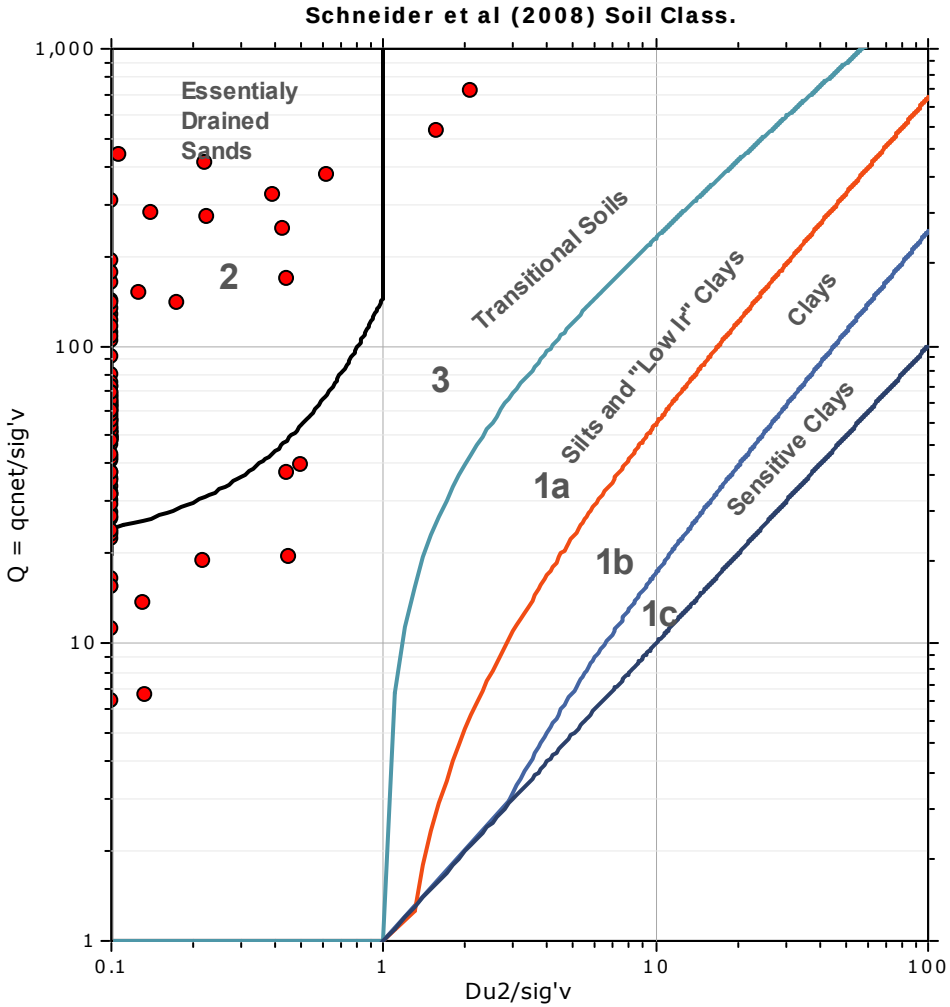
SCPT-GZ-38
Total depth: 22.51 ft

Bq plots (Schneider)





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SCPT-GZ-38
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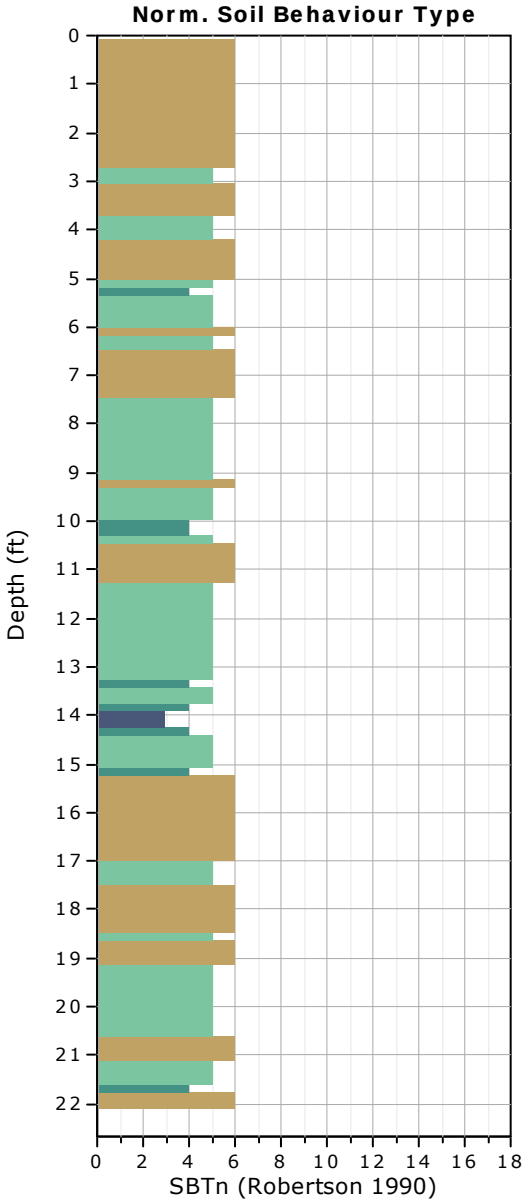

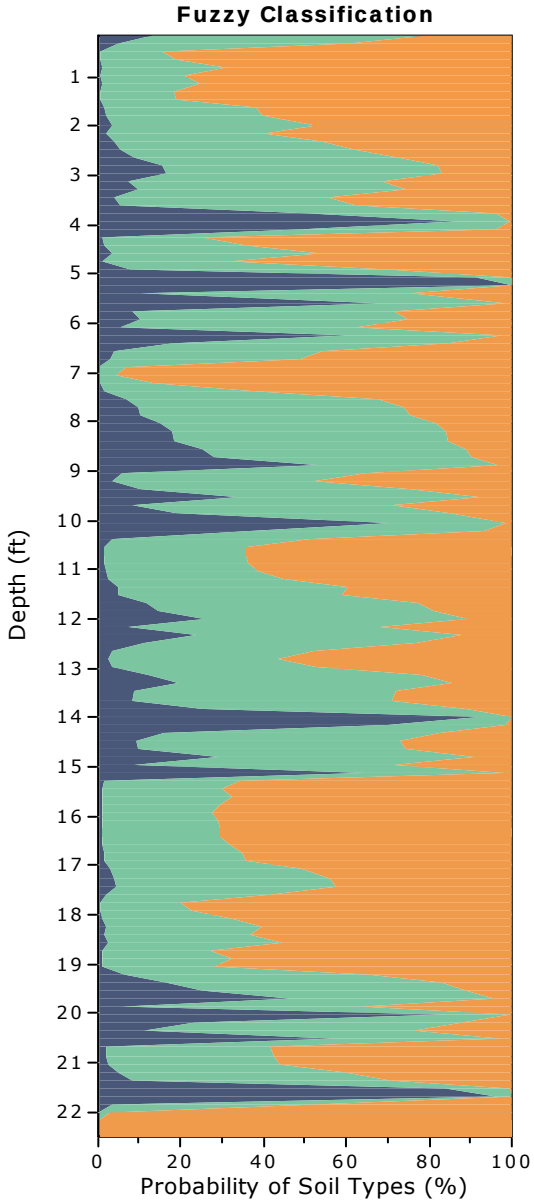

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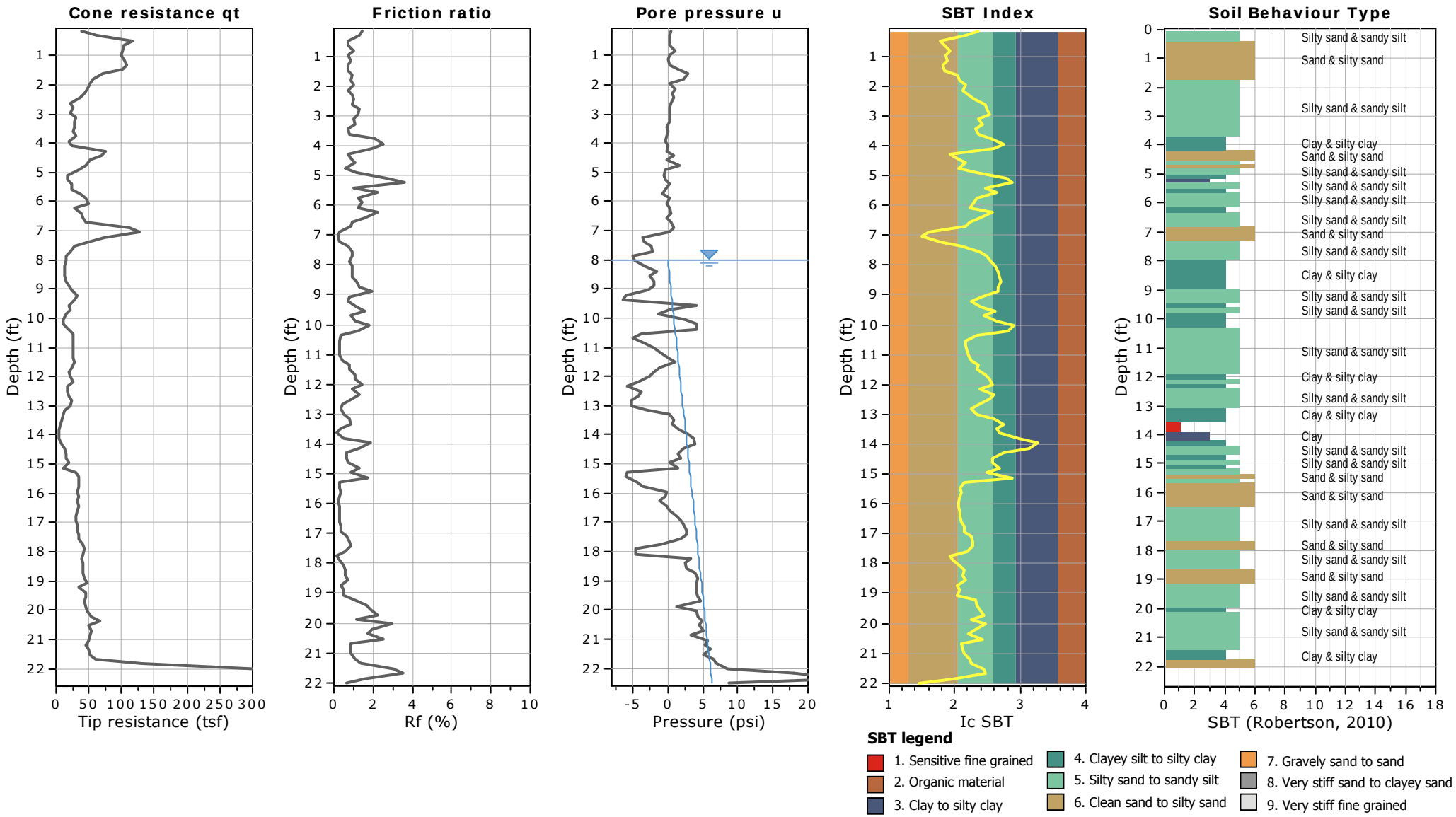

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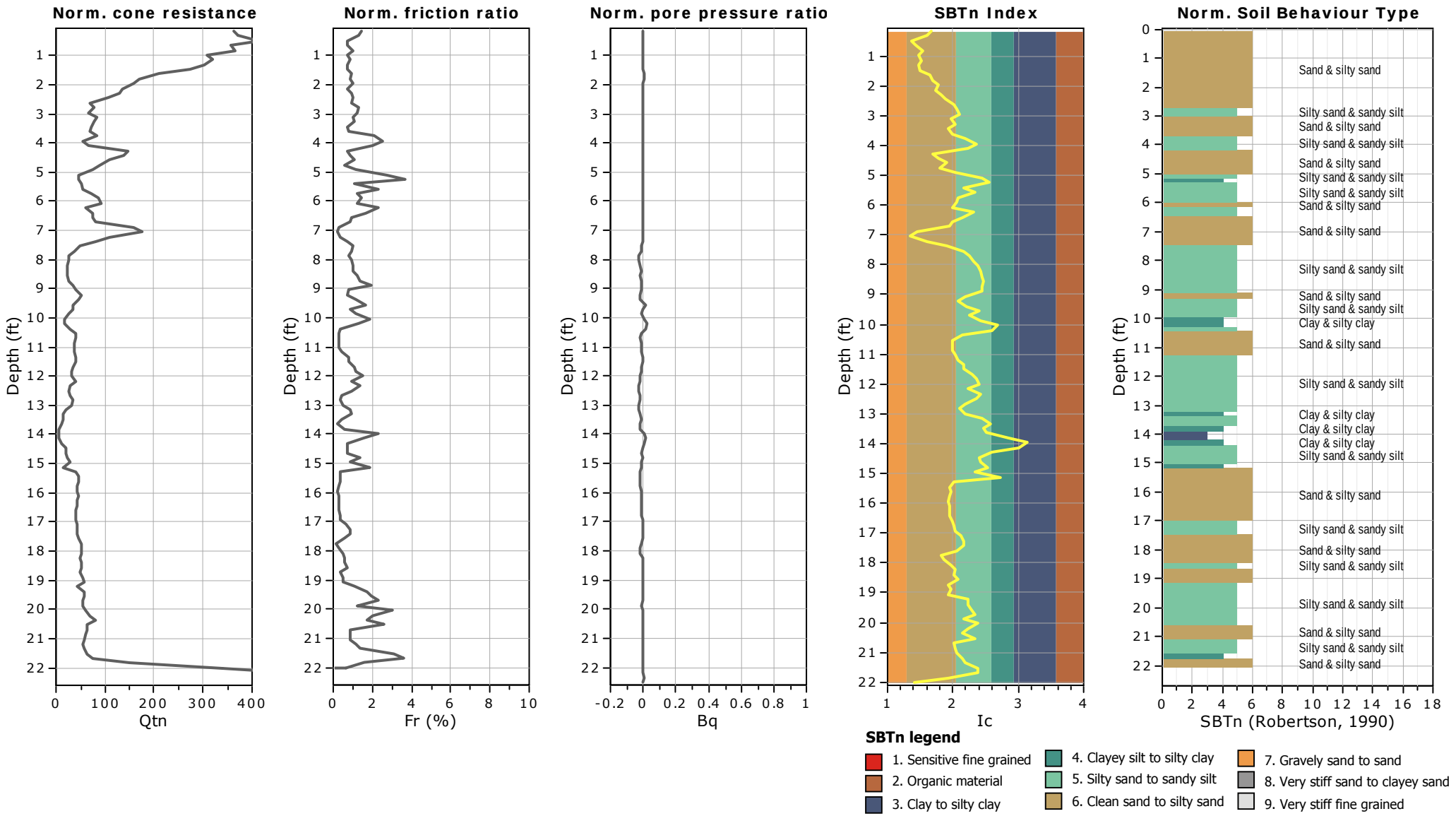

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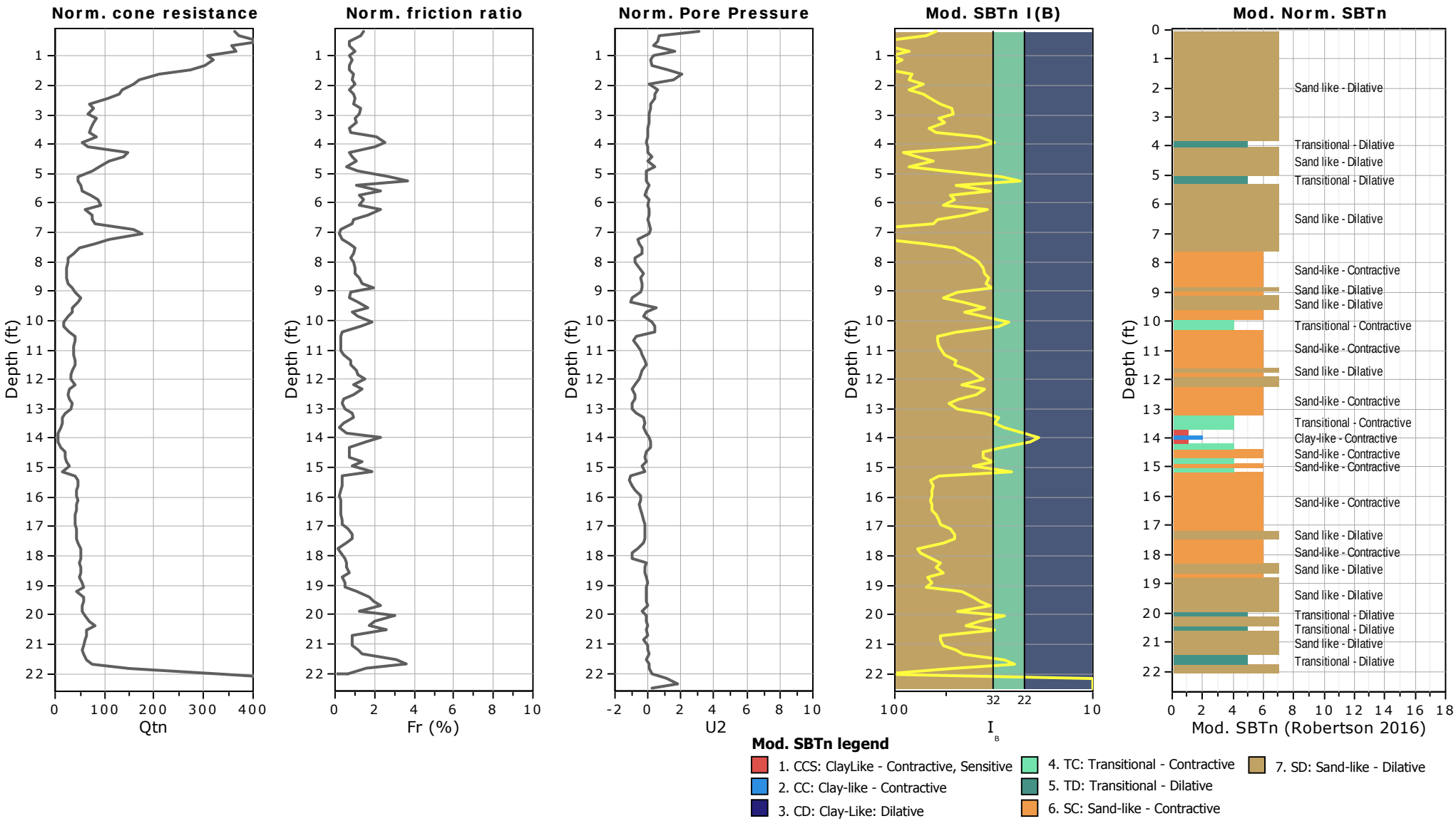

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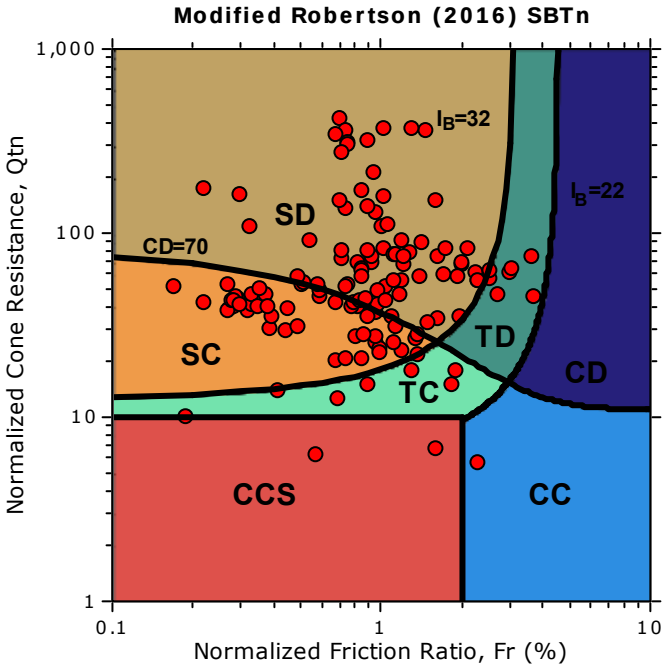
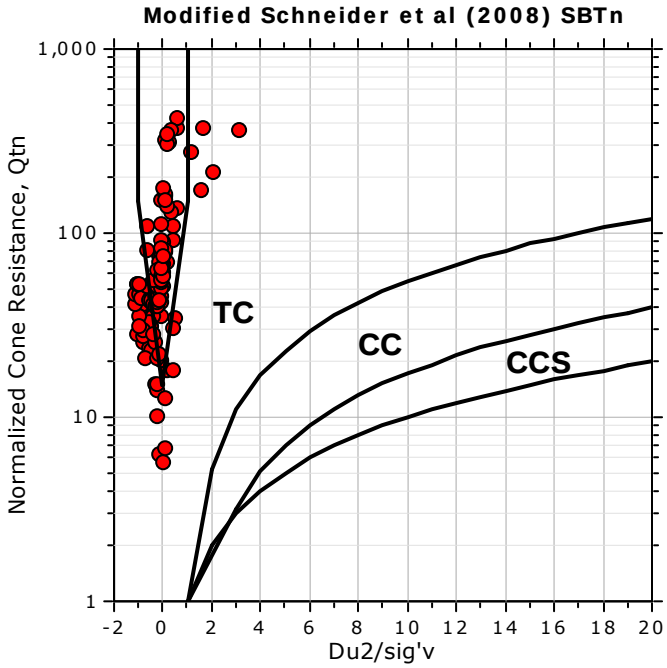
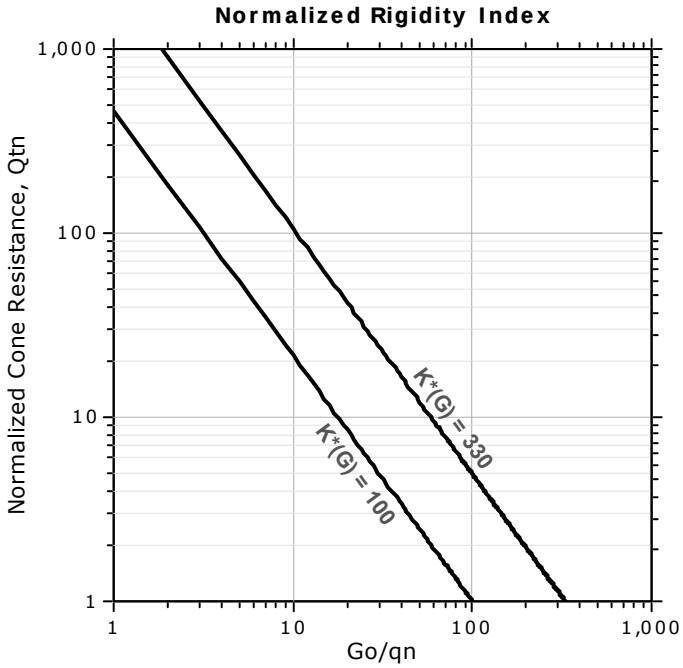
SCPT-GZ-38
Total depth: 22.51 ft

Updated SBTn plots







CCS: Clay-like - Contractive - Sensitive
CC: Clay-like - Contractive
CD: Clay-like - Dilative
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K(G) > 330: Soils with significant microstructure (e.g. age/cementation)

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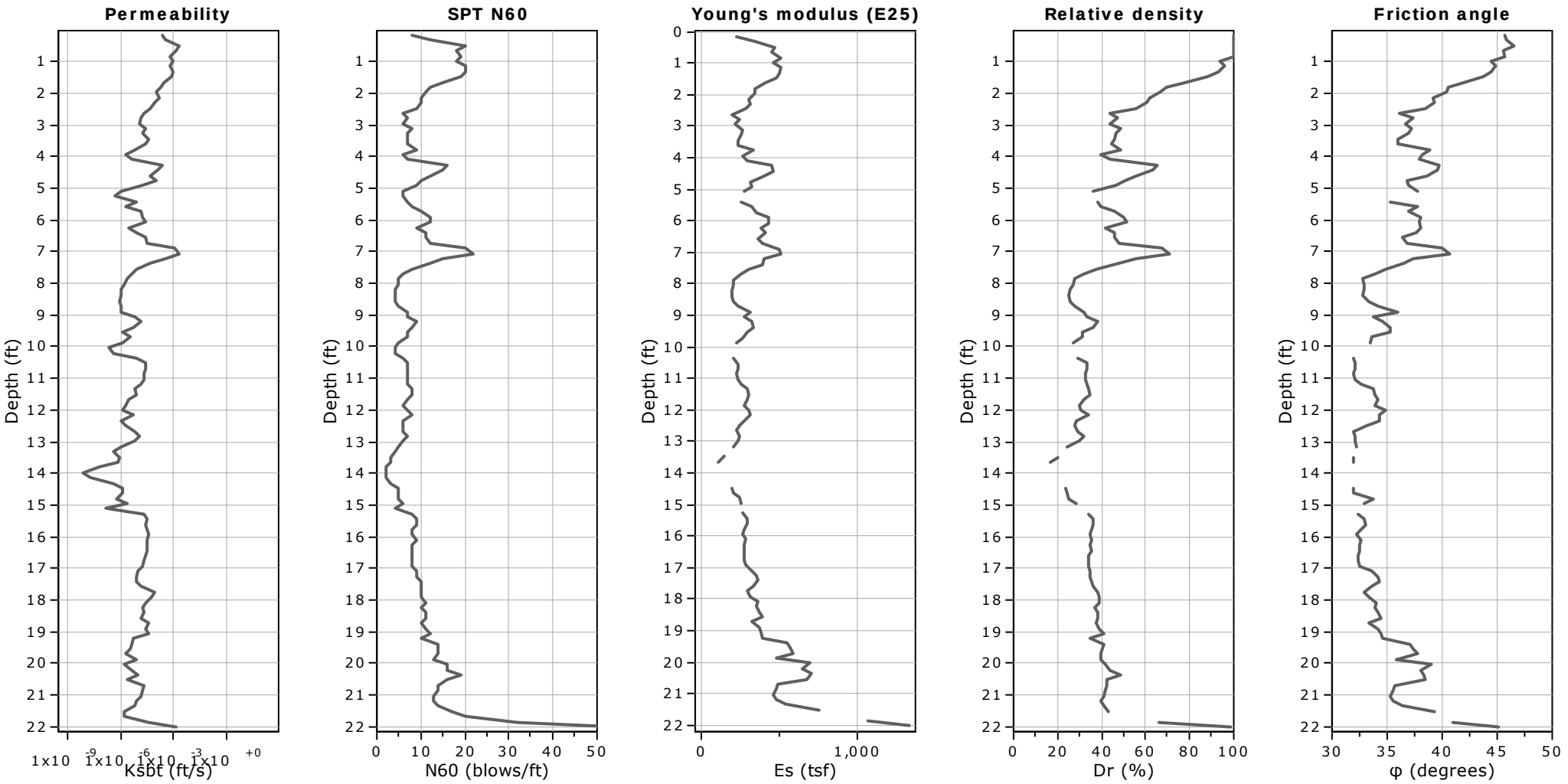

Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative density constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
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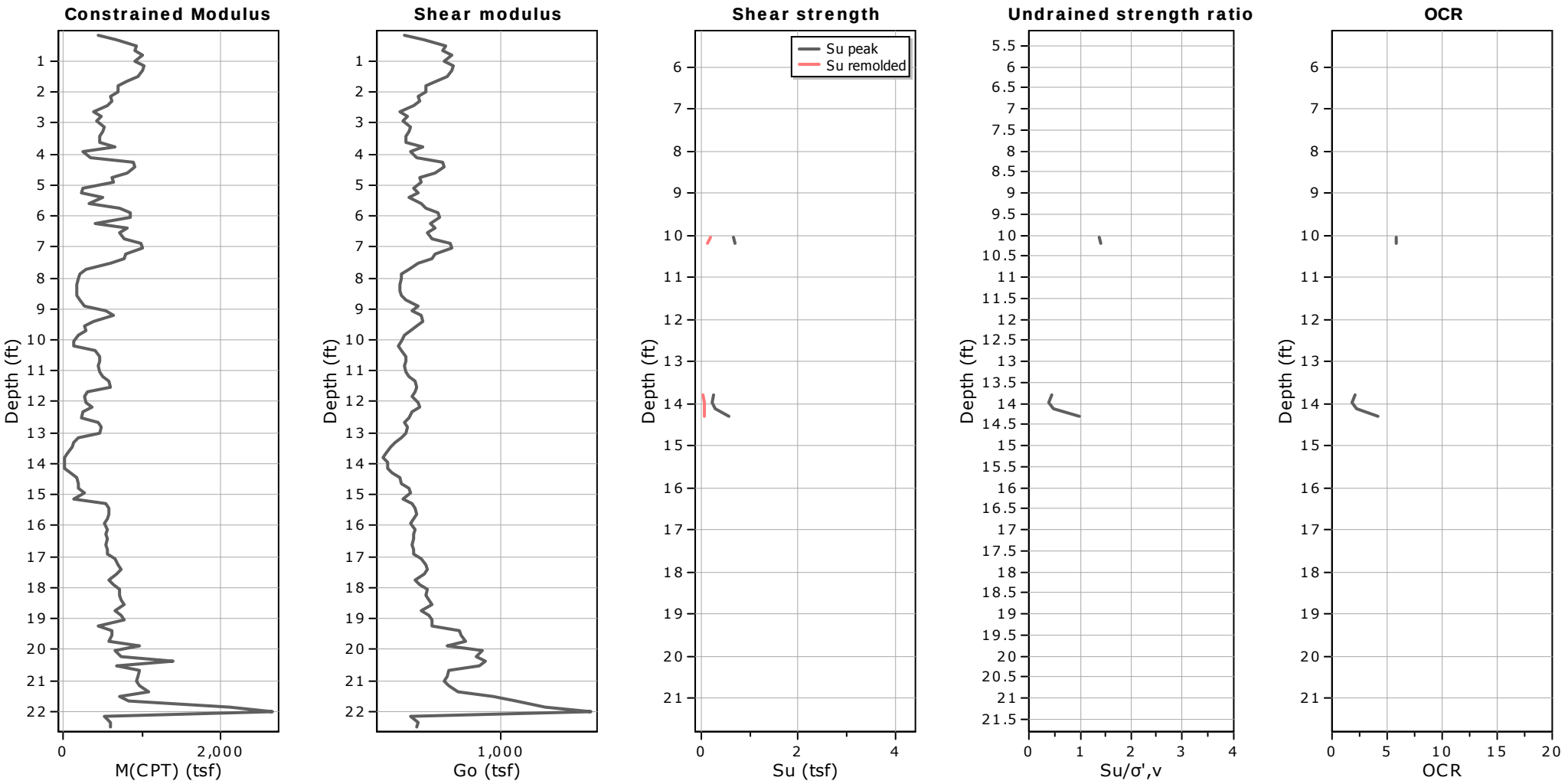

Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14

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Flat Dilatometer Test data

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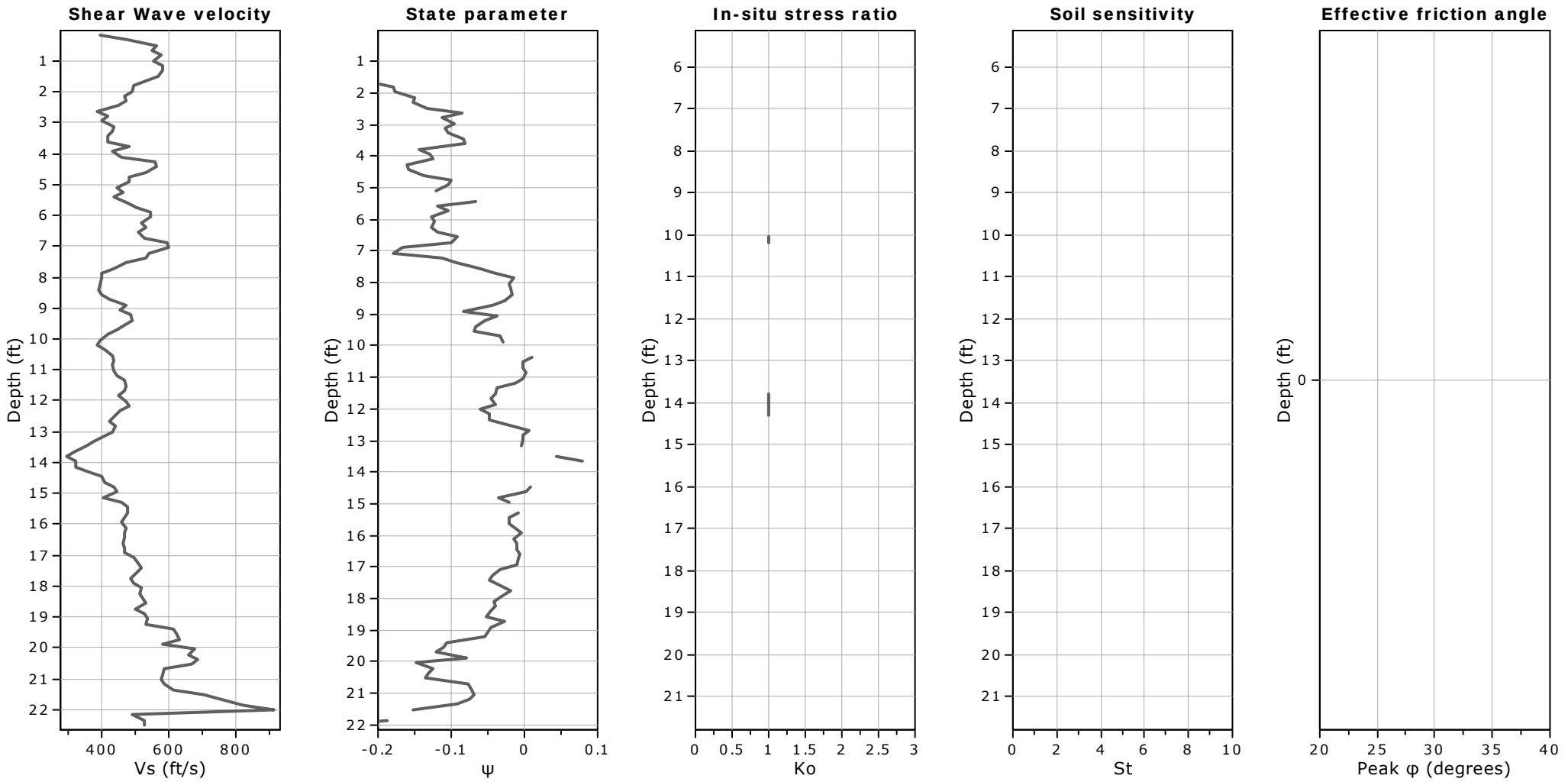

Calculation parameters

Soil Sensitivity factor, N_S: 350.00

User defined estimation data

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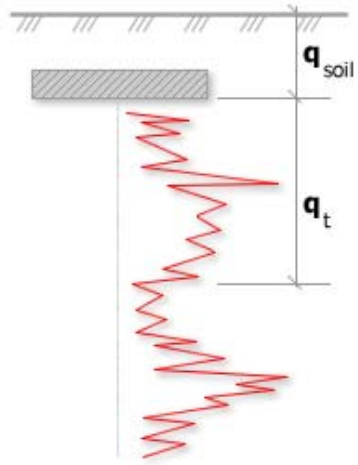
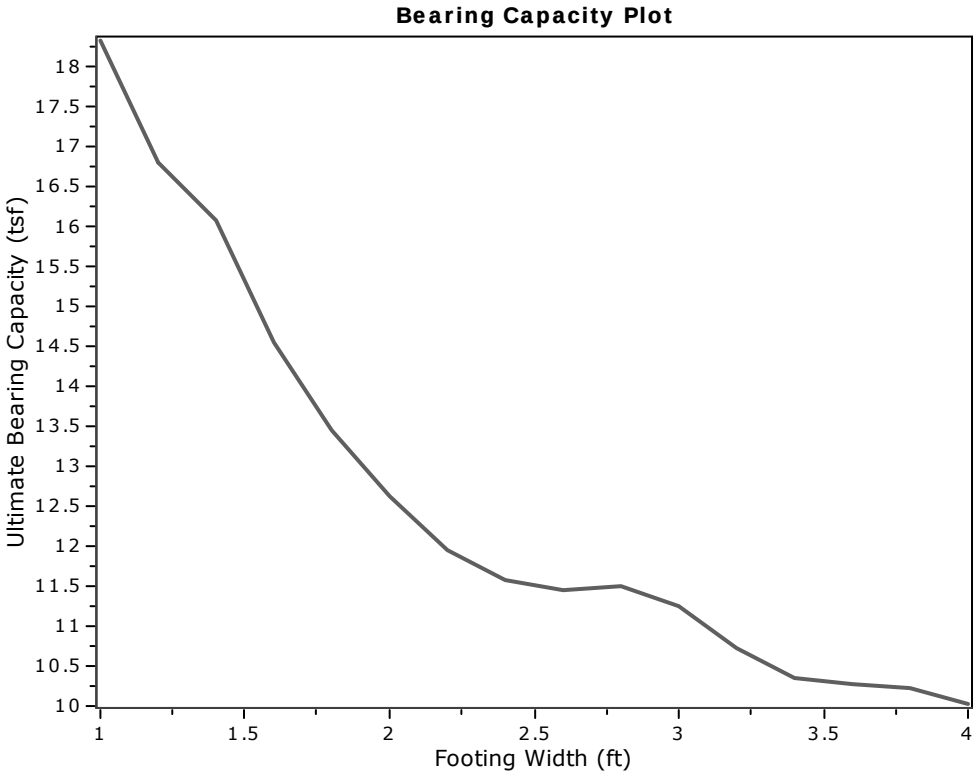


Bearing Capacity calculation is perfromed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:
R_k: Bearing capacity factor
q_t: Average corrected cone resistance over calculation depth
q_{soil}: Pressure applied by soil above footing



:: Tabular results ::

No	B (ft)	Start Depth (ft)	End Depth (ft)	Ave. q_t (tsf)	R_k	Soil Press. (tsf)	Ult. bearing cap. (tsf)
1	1.00	0.50	2.00	91.44	0.20	0.03	18.32
2	1.20	0.50	2.30	83.83	0.20	0.03	16.80
3	1.40	0.50	2.60	80.17	0.20	0.03	16.06
4	1.60	0.50	2.90	72.57	0.20	0.03	14.54
5	1.80	0.50	3.20	67.03	0.20	0.03	13.44
6	2.00	0.50	3.50	62.91	0.20	0.03	12.61
7	2.20	0.50	3.80	59.57	0.20	0.03	11.94
8	2.40	0.50	4.10	57.70	0.20	0.03	11.57
9	2.60	0.50	4.40	57.04	0.20	0.03	11.44
10	2.80	0.50	4.70	57.28	0.20	0.03	11.49
11	3.00	0.50	5.00	56.06	0.20	0.03	11.24
12	3.20	0.50	5.30	53.49	0.20	0.03	10.73
13	3.40	0.50	5.60	51.60	0.20	0.03	10.35
14	3.60	0.50	5.90	51.14	0.20	0.03	10.26
15	3.80	0.50	6.20	50.88	0.20	0.03	10.21
16	4.00	0.50	6.50	49.94	0.20	0.03	10.02

Presented below is a list of formulas used for the estimation of various soil properties. The formulas are presented in SI unit system and assume that all components are expressed in the same units.

:: Unit Weight, g (kN/m³) ::

$$g = g_w \cdot \left(0.27 \cdot \log(R_f) + 0.36 \cdot \log(\frac{q_t}{p_a}) + 1.236 \right)$$

where g_w = water unit weight

:: Permeability, k (m/s) ::

$I_c < 3.27$ and $I_c > 1.00$ then $k = 10^{0.952-3.04 \cdot I_c}$

$I_c \leq 4.00$ and $I_c > 3.27$ then $k = 10^{-4.52-1.37 \cdot I_c}$

:: N_{SPT} (blows per 30 cm) ::

$$N_{60} = \left(\frac{q_c}{P_a} \right) \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

$$N_{1(60)} = Q_{tn} \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

:: Young's Modulus, Es (MPa) ::

$(q_t - \sigma_v) \cdot 0.015 \cdot 10^{0.55 \cdot I_c + 1.68}$

(applicable only to $I_c < I_{c\_cutoff}$)

:: Relative Density, Dr (%) ::

$100 \cdot \sqrt{\frac{Q_{tn}}{k_{DR}}}$ (applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: State Parameter, ψ ::

$\psi = 0.56 - 0.33 \cdot \log(Q_{tn,cs})$

:: Drained Friction Angle, φ (°) ::

$\varphi = \varphi'_{cv} + 15.94 \cdot \log(Q_{tn,cs}) - 26.88$

(applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: 1-D constrained modulus, M (MPa) ::

If $I_c > 2.20$
$\alpha = 14$ for $Q_{tn} > 14$
$\alpha = Q_{tn}$ for $Q_{tn} \leq 14$
$M_{CPT} = \alpha \cdot (q_t - \sigma_v)$

If $I_c \geq 2.20$

$M_{CPT} = 0.03 \cdot (q_t - \sigma_v) \cdot 10^{0.55 \cdot I_c + 1.68}$

:: Small strain shear Modulus, Go (MPa) ::

$G_0 = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$

:: Shear Wave Velocity, Vs (m/s) ::

$$V_s = \left(\frac{G_0}{\rho} \right)^{0.50}$$

:: Undrained peak shear strength, Su (kPa) ::

$N_{kt} = 10.50 + 7 \cdot \log(F_r)$ or user defined

$$S_u = \frac{(q_t - \sigma_v)}{N_{kt}}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Remolded undrained shear strength, Su(rem) (kPa) ::

$S_{u(rem)} = f_s$ (applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Overconsolidation Ratio, OCR ::

$$k_{OCR} = \left[\frac{Q_{tn}^{0.20}}{0.25 \cdot (10.50 \cdot +7 \cdot \log(F_r))} \right]^{1.25}$$ or user defined

$OCR = k_{OCR} \cdot Q_{tn}$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: In situ Stress Ratio, Ko ::

$K_O = (1 - \sin\varphi') \cdot OCR^{\sin\varphi'}$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Soil Sensitivity, S_t ::

$$S_t = \frac{N_S}{F_r}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Peak Friction Angle, φ' (°) ::

$\varphi' = 29.5° \cdot B_q^{0.121} \cdot (0.256 + 0.336 \cdot B_q + \log Q_t)$

(applicable for $0.10 < B_q < 1.00$)

References

• Robertson, P.K., Cabal K.L., Guide to Cone Penetration Testing for Geotechnical Engineering, Gregg Drilling & Testing, Inc., 5th Edition, November 2012

• Robertson, P.K., Interpretation of Cone Penetration Tests - a unified approach., Can. Geotech. J. 46(11): 1337–1355 (2009)

APPENDIX D – SOIL LABORATORY TEST RESULTS

THIELSCH ENGINEERING
195 Frances Avenue
Cranston RI, 02910
Phone: (401)-467-6454
Fax: (401)-467-2398
thielsch.com
Let's Build a Solid Foundation

Client Information:
GZA GeoEnvironmental
New York, NY
PM: Dharmil Patel
Assigned By: Dharmil Patel
Collected By: Allan Amador

Project Information:
amplin Hudson Power Express - Astoria Converter Stat
Astoria, NY
GZA Project Number: 41.0163020.00
Summary Page: 1 of 1
Report Date: 06.07.22

LABORATORY TESTING DATA SHEET, Preliminary Report No.: 7422-E-167

Boring No.	Sample No.	Depth (ft)	Laboratory No.	Specimen Data						Compressive Strength Tests								Rock Formation or Description or Remarks
				Mohs Hard-ness	Diameter (in)	Length (in)	(1) Unit Weight (PCF)	(2) Wet Density (PCF)	Bulk G_s	(3) Other Tests	(4) Strength PSI	(5) Strain %	(6) E sec PSI EE+06	(7) Poisson's Ratio	στ PSI	Is_{50} PSI	(8) s_c PSI	
GZ-03	C-3	50.2-55.2	22-S-1977		1.964	4.572	169.2				9040							Grey Schist
Fresh Break																		
GZ-37	C-1	35.0-40.0	22-S-1978		1.968	4.624	174.2				5526							Grey Schist
Fresh break along foliation																		

(1) Volume Determined By Measuring Dimensions

(2) Determined by Measuring Dimensions and Weight of Saturated Sample

Notes

(3) PLD=Point Load (diametrical), PLA= Point Load (Axial) ST= Splitting Tensile U= Unconfined Compressive Strength

(4) Taken at Peak Deviator Stress

Notes

(5) Strain at Peak Deviator Stress

(6) Represents Secant Modulus at 50% of Total Failure Stress

(7) Represents Secant Poisson's Ratio at 50% of Total Failure Stress

(8) Estimated UCS from Table 1 of ASTM D5731 for NX cores (Is x 24)

Date Received: *05.27.22*

Reviewed By:

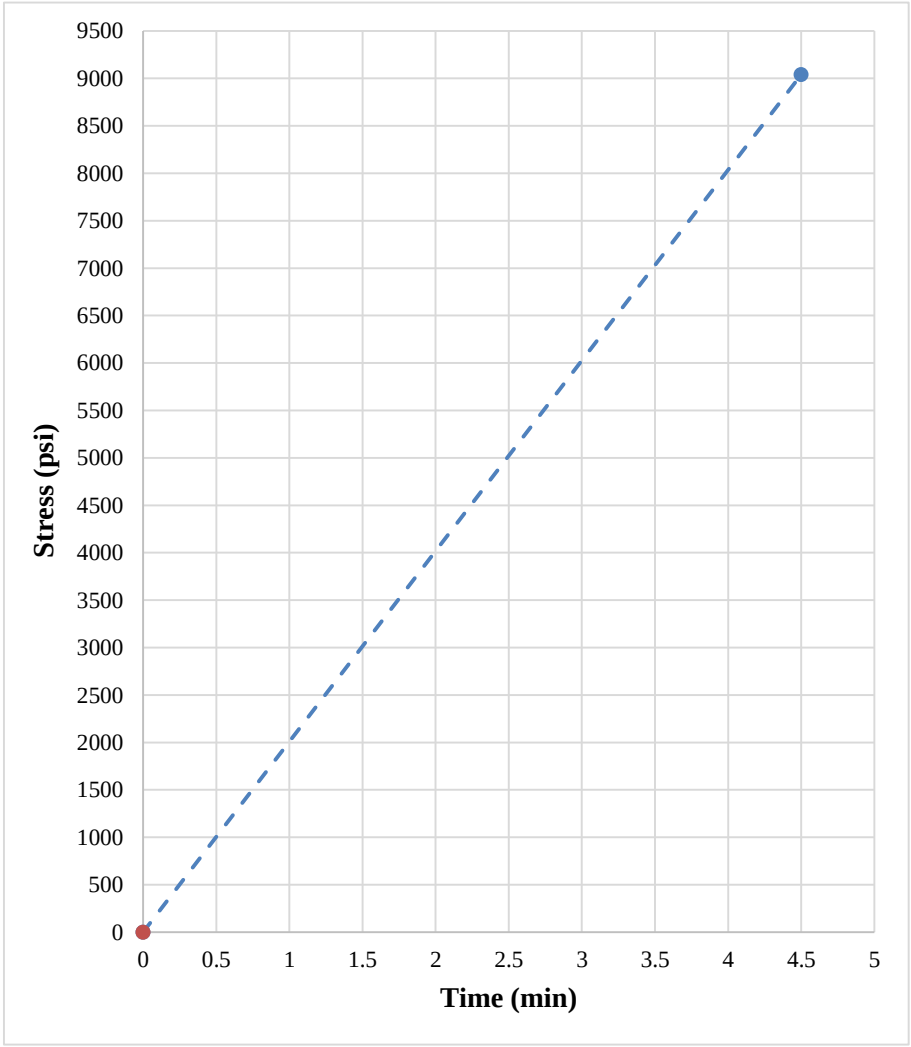
Date Reviewed: *06.07.22*

THIELSCH ENGINEERING
195 Frances Avenue
Cranston, Rhode Island 02910
Phone: (401) 467-6454
Fax: (401) 467-2398
www.thielsch.com
Let's Build a Solid Foundation

Client Information:	**Project Information:**
GZA GeoEnvironmental	Champlin Hudson Power Express
New York, NY	Astoria, NY
PM: Dharmil Patel	Project Number: 20216830.201A
Assigned by: Dharmil Patel	Technician: AV
Collected by: Allan Amador	Report Date: 06.06.22

ASTM D7012 Compressive Strength and Elastic Moduli of Intact Rock Core Specimens

Sample Information		**Compressive Test Information**	
Boring ID:	GZ-03	**Unit Weight (pcf):**	169.2
Sample No.:	C-3	**Failure Stress (psi):**	9,040
Depth (ft):	50.2-55.2	**Failure Mode:**	Fresh
Tested Depth (ft):		**Time to Failure (min):**	4.50
Rock Type:	Grey Schist		
Features:	Fresh Break		
Test Specimen Information		**Elastic Moduli Test Information**	
Diameter, D (in):	1.964	**Poisson's Ratio @ 50%:**	NA
Length, L (in):	4.572	**Strain %:**	NA
L:D Ratio:	2.33	**E sec PSI @ 50%:**	NA

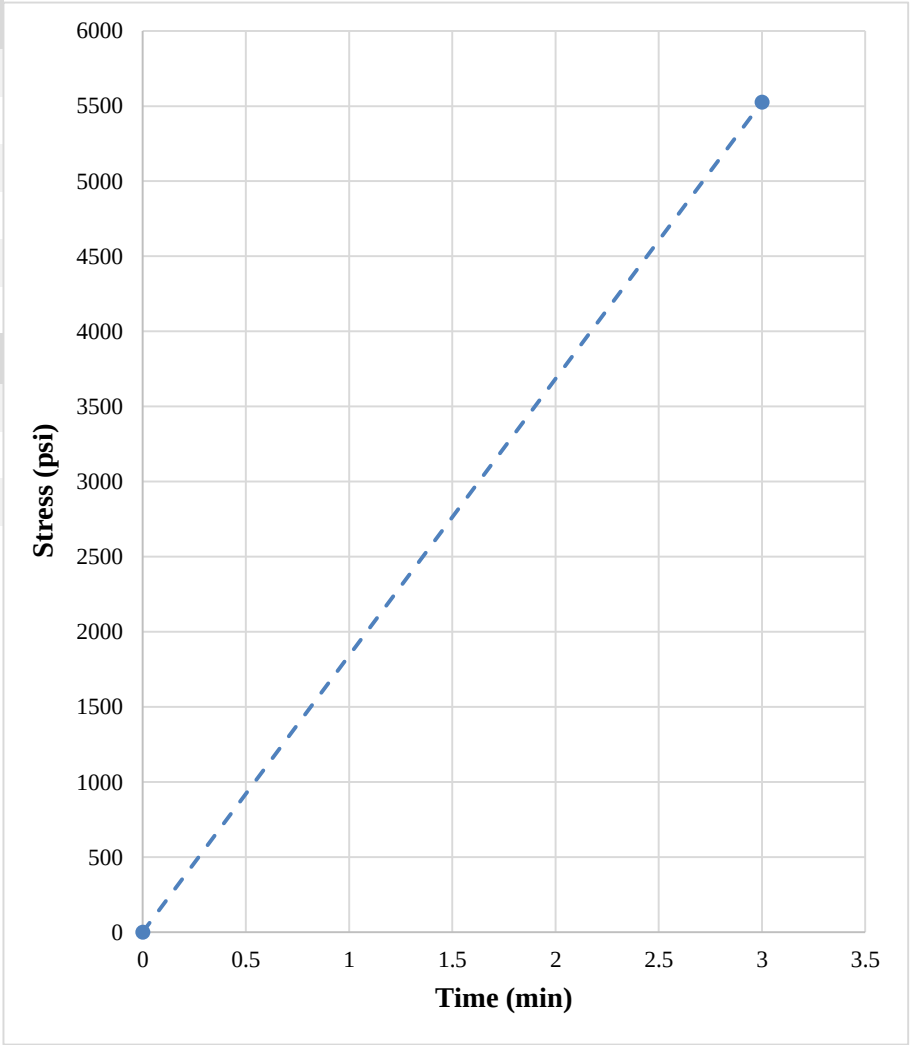


Testing Notes: Fresh break

THIELSCH ENGINEERING	195 Frances Avenue Cranston, Rhode Island 02910 Phone: (401) 467-6454 Fax: (401) 467-2398 www.thielsch.com *Let's Build a Solid Foundation*	**Client Information:** GZA GeoEnvironmental New York, NY PM: Dharmil Patel Assigned by: Dharmil Patel Collected by: Allan Amador	**Project Information:** Champlin Hudson Power Express Astoria, NY Project Number: 20216830.201A Technician: AV Report Date: 06.06.22

ASTM D7012 Compressive Strength and Elastic Moduli of Intact Rock Core Specimens

Sample Information		Compressive Test Information	
Boring ID:	GZ-37	**Unit Weight (pcf):**	174.2
Sample No.:	C-1	**Failure Stress (psi):**	5,526
Depth (ft):	35-40	**Failure Mode:**	Fresh
Tested Depth (ft):		**Time to Failure (min):**	3.00
Rock Type:	Grey Schist		
Features:	Broke along foliation		
Test Specimen Information		**Elastic Moduli Test Information**	
Diameter, D (in):	1.968	**Poisson's Ratio @ 50%:**	NA
Length, L (in):	4.624	**Strain %:**	NA
L:D Ratio:	2.35	**E sec PSI @ 50%:**	NA



Testing Notes: Fresh break along foliation

THIELSCH ENGINEERING
195 Frances Avenue
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thielsch.com
Let's Build a Solid Foundation

Client Information:
GZA GeoEnvironmental
New York, NY
PM: Dharmil Patel
Assigned By: Dharmil Patel
Collected By: Allan Amador

Project Information:
Champlin Hudson Power Express - Astoria Converter Station
Astoria, NY
GZA Project Number: 41.0163020.00
Summary Page: 1 of 1
Report Date: 05.25.22

LABORATORY TESTING DATA SHEET, Report No.: 7422-E-167

Boring No.	Sample No.	Depth (ft)	Laboratory No.	Identification Tests								Corrosivity Tests								Laboratory Log and Soil Description
				As Received Moisture Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	pH	ORP	Sulfate (mg/kg)	Chloride (mg/kg)	Sulfide (mg/kg)	Redox Potential (mv)	pH	Electrical Resist. As Received Ohm-cm @ 60°F	Electrical Resist. Saturated Ohm-cm @ 60°F	
				D2216	D4318		D6913			D2974	D4792	G200	EPA					G57		
GZ-04	S-4, S-5	6-8, 8-10	22-S-1667				0.0	79.0	21.0		5.89	104.3	17	89	ND			3270	3140	Brown f-m SAND, some Silt
GZ-04	S-9, S-10	20-22, 25-27	22-S-1668				9.0	66.5	24.5											Brown f-m SAND, some Silt, trace fine Gravel
GZ-05	S-10, S-11	25-27, 30-32	22-S-1669				21.1	66.2	12.7		8.45	183.1	26	27	ND			8910	8680	Brown f-m SAND, some f-c Gravel, little Silt
GZ-33	S-4, S-5	6-8, 8-10	22-S-1670				0.0	75.7	24.3		7.97	228.5	78	ND	ND			6450	6350	Brown fine SAND, some Silt
GZ-33	S-11	30-32	22-S-1671				72.8	23.7	3.5											Grey f-c GRAVEL, some f-c Sand, trace fines
GZ-41	S-6	10-12	22-S-1672	124.8	143	58				14.0										Dark Grey Organic Silt
GZ-41	S-8	14-16	22-S-1673							1.5										Unable to test material for safety reasons
GZ-41	S-9	20-22	22-S-1674							4.9										Insufficient Material for Testing

Sample S-1671 contained insufficient fine material to conduct Corrosivity Testing.
Sample Jar S-1673 broke during transportation, atterberg was not tested for safety reasons.
Sample S-1674 consited of 38g of material which is insufficient to run an atterberg and organic content.

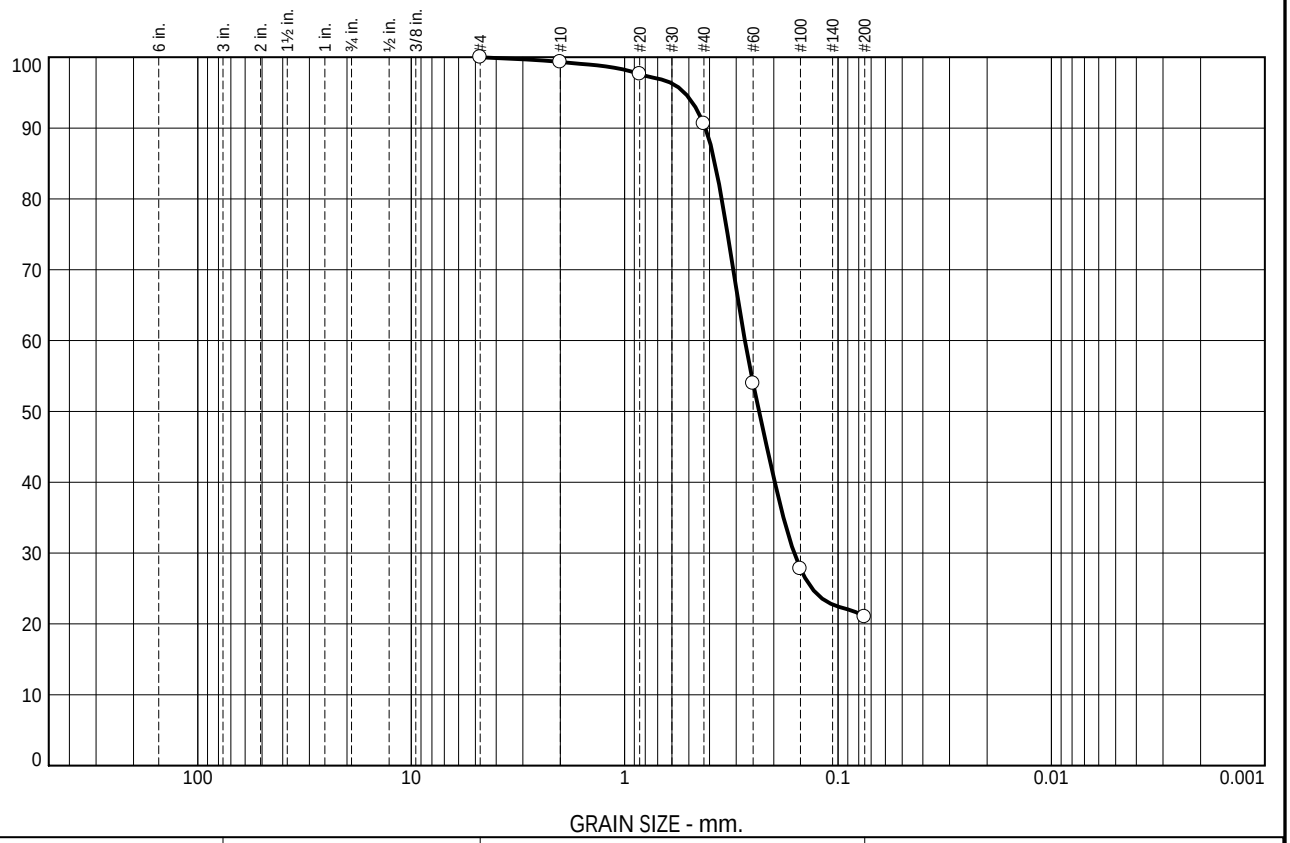
pH, ORP, and Resistivity tested by RR on 05.17.22.

Date Received: *05.16.22*

Reviewed By: RdRyk

Date Reviewed: *05.25.22*

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.7	8.7	69.6	21.0	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.3		
#20	97.6		
#40	90.6		
#60	53.9		
#100	27.8		
#200	21.0		

* (no specification provided)

Soil Description

Brown f-m SAND, some Silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.4171 D_{85}= 0.3772 D_{60}= 0.2732
D_{50}= 0.2343 D_{30}= 0.1606 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Source of Sample: Soil Depth: 6-8, 8-10
Sample Number: GZ-04, S-4 & S-5

Date: 05.18.22

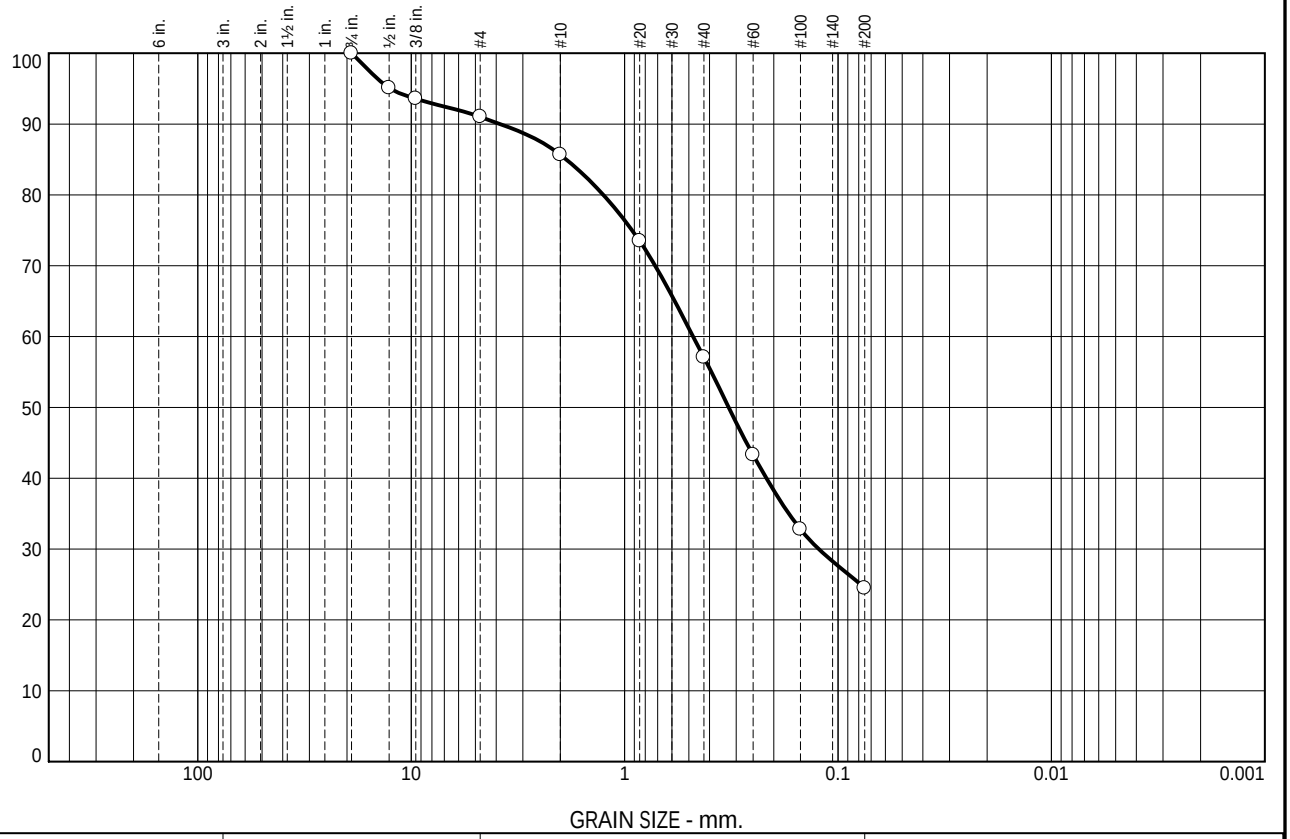
Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Champlin Hudson Power Express - Astoria Convertor Station
Astoria, NY
Project No: 41.0163020.00 Figure 22-S-1667

Tested By: JF / FR Checked By: Rebecca Roth

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.0	5.3	28.6	32.6	24.5	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	95.1		
3/8"	93.6		
#4	91.0		
#10	85.7		
#20	73.5		
#40	57.1		
#60	43.3		
#100	32.8		
#200	24.5		

* (no specification provided)

Soil Description

Brown f-m SAND, some Silt, trace fine Gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 3.8376 D_{85}= 1.8776 D_{60}= 0.4777
D_{50}= 0.3251 D_{30}= 0.1232 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Source of Sample: Soil Depth: 20-22, 25-27
Sample Number: GZ-04, S-9 & S-10

Date: 05.18.22

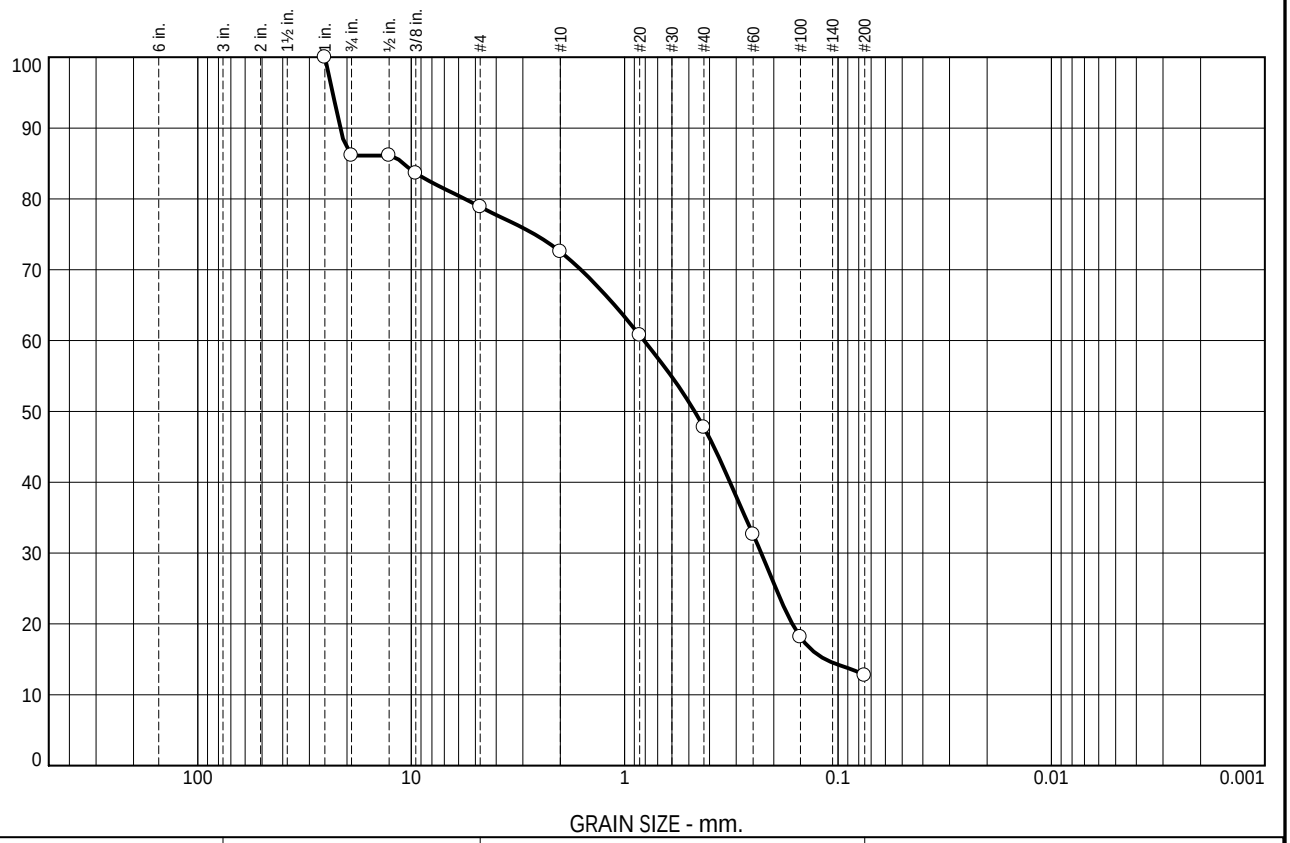
Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Champlin Hudson Power Express - Astoria Convertor Station
Astoria, NY
Project No: 41.0163020.00 Figure 22-S-1668

Tested By: JF / FR Checked By: Rebecca Roth

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.9	7.2	6.4	24.8	35.0	12.7	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	86.1		
1/2"	86.1		
3/8"	83.6		
#4	78.9		
#10	72.5		
#20	60.8		
#40	47.7		
#60	32.6		
#100	18.1		
#200	12.7		

* (no specification provided)

Soil Description

Brown f-m SAND, some f-c Gravel, little Silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 21.5016 D_{85}= 10.8669 D_{60}= 0.8112
D_{50}= 0.4696 D_{30}= 0.2290 D_{15}= 0.1147
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

Source of Sample: Soil Depth: 25-27, 30-32
Sample Number: GZ-05, S-10 & S-11

Date: 05.18.22

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Champlin Hudson Power Express - Astoria Convertor Station
Astoria, NY
Project No: 41.0163020.00 Figure 22-S-1669

Tested By: JF / FR Checked By: Rebecca Roth

Particle Size Distribution Report

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	5.2	70.3	24.3	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.8		
#20	99.2		
#40	94.6		
#60	78.0		
#100	53.0		
#200	24.3		

* (no specification provided)

Soil Description

Brown fine SAND, some Silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.3513 D_{85}= 0.3005 D_{60}= 0.1730
D_{50}= 0.1401 D_{30}= 0.0862 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Source of Sample: Soil Depth: 6-8, 8-10
Sample Number: GZ-33, S-4 & S-5

Date: 05.18.22

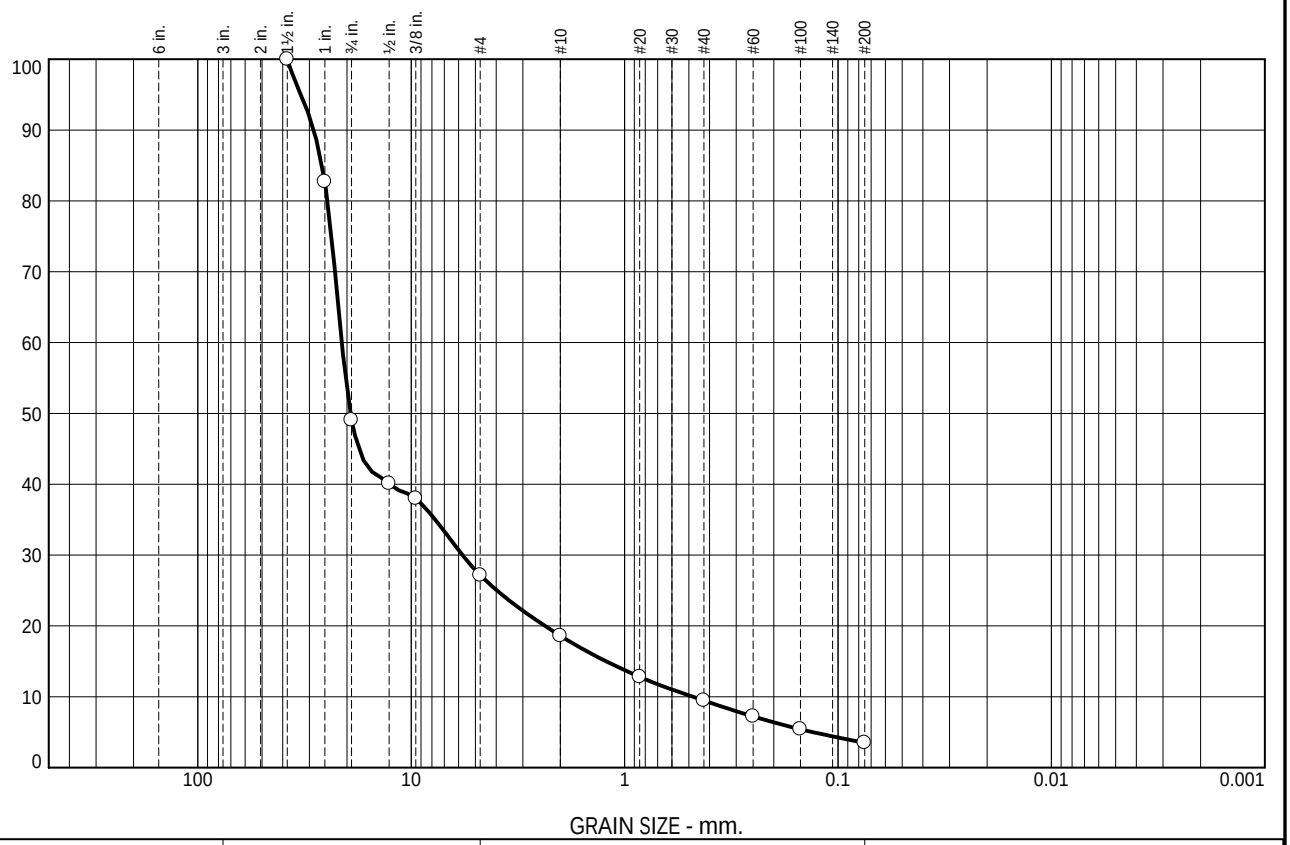
Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Champlin Hudson Power Express - Astoria Convertor Station
Astoria, NY
Project No: 41.0163020.00 Figure 22-S-1670

Tested By: JF / FR Checked By: Rebecca Roth

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	50.9	21.9	8.6	9.1	6.0	3.5	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	82.7		
3/4"	49.1		
1/2"	40.1		
3/8"	38.0		
#4	27.2		
#10	18.6		
#20	12.8		
#40	9.5		
#60	7.2		
#100	5.4		
#200	3.5		

* (no specification provided)

Soil Description

Grey f-c GRAVEL, some f-c Sand, trace fines

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 28.6221 D_{85}= 26.1994 D_{60}= 21.1546
D_{50}= 19.3056 D_{30}= 5.7505 D_{15}= 1.2192
D_{10}= 0.4788 C_u= 44.19 C_c= 3.26

Classification

USCS= GP AASHTO= A-1-a

Remarks

Source of Sample: Soil Depth: 30-32
Sample Number: GZ-33, S-11

Date: 05.18.22

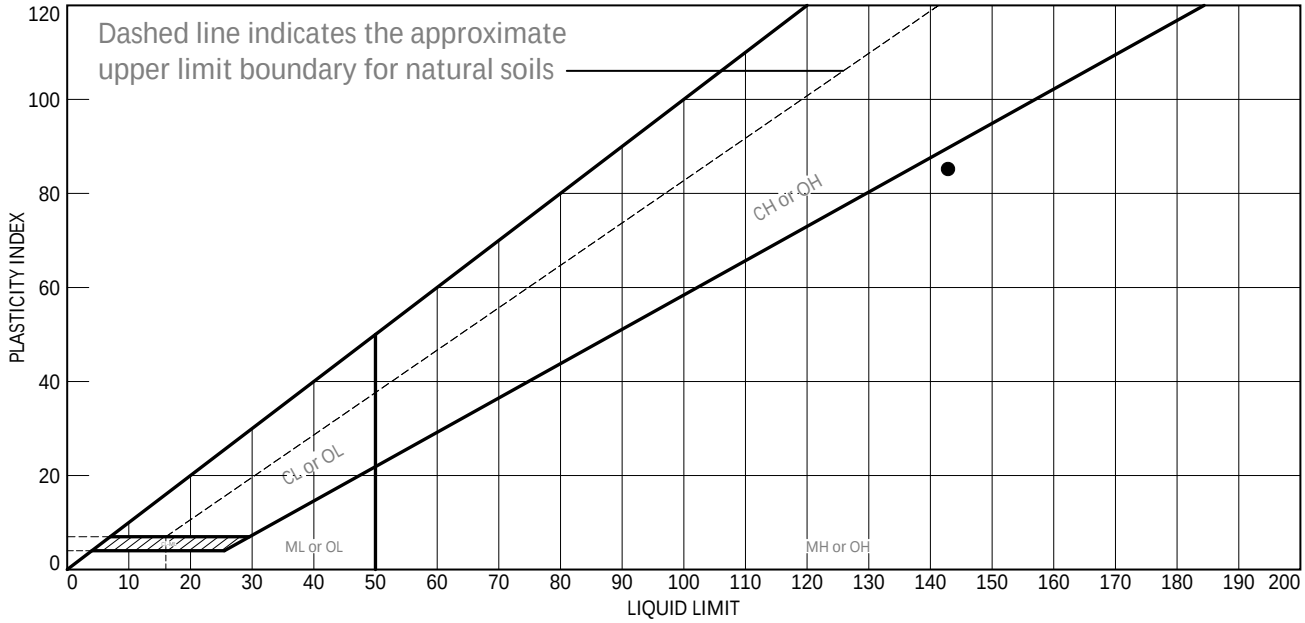
Thielsch Engineering Inc.

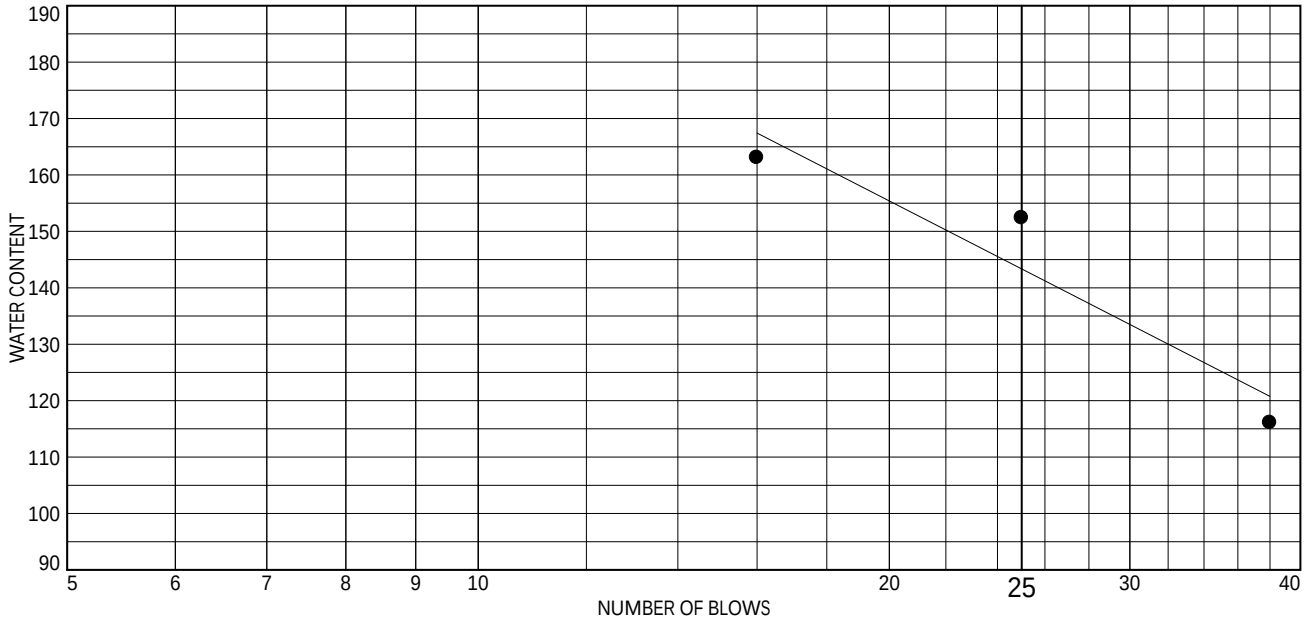
Cranston, RI

Client: GZA GeoEnvironmental
Project: Champlin Hudson Power Express - Astoria Convertor Station
Astoria, NY
Project No: 41.0163020.00 Figure 22-S-1671

Tested By: JF / FR Checked By: Rebecca Roth

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark Grey Organic Silt	143	58	85			

Project No. 41.0163020.00 Client: GZA GeoEnvironmental

Project: Champlin Hudson Power Express - Astoria Convertor Station

Astoria, NY

Source of Sample: Soil Depth: 10-12

Sample Number: GZ-41, S-6

Thielsch Engineering Inc.

Cranston, RI

Remarks:

●Sample contained large amounts of rushes.

Figure 22-L-1672

Tested By: RR Checked By:

CERTIFICATE OF ANALYSIS

Kristina Roland
Thielsch Engineering, Inc.
195 Frances Avenue
Cranston, RI 02910

RE: CHPE Astoria Converter Station - GZA GeoEnv (41.0163020.00)
ESS Laboratory Work Order Number: 22E0572

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 12:06 pm, May 23, 2022

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: CHPE Astoria Converter Station - GZA GeoEnv ESS Laboratory Work Order: 22E0572

SAMPLE RECEIPT

The following samples were received on May 16, 2022 for the analyses specified on the enclosed Chain of Custody Record.

The cooler temperature was not within the acceptance criteria of ≤6°C.

Lab Number	Sample Name	Matrix	Analysis
22E0572-01	GZ-04 S-4 S-5	Soil	9030B, D4327
22E0572-02	GZ-05 S-10 S-11	Soil	9030B, D4327
22E0572-03	GZ-33 S-4 S-5	Soil	9030B, D4327

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: CHPE Astoria Converter Station - GZA GeoEnv ESS Laboratory Work Order: 22E0572

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: CHPE Astoria Converter Station - GZA GeoEnv ESS Laboratory Work Order: 22E0572

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: CHPE Astoria Converter Station - GZA GeoEnv
Client Sample ID: GZ-04 S-4 S-5
Date Sampled: 05/16/22 15:14
Percent Solids: 82

ESS Laboratory Work Order: 22E0572
ESS Laboratory Sample ID: 22E0572-01
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Chloride	**WL 89** (6)		D4327		1	EEM	05/17/22 21:26	mg/kg dry	DE21711
Sulfate	**WL 17** (6)		D4327		1	EEM	05/17/22 21:26	mg/kg dry	DE21711
Sulfide	**WL** ND (0.6)		9030B		1	JLK	05/18/22 16:31	mg/kg dry	DE21828

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: CHPE Astoria Converter Station - GZA GeoEnv
Client Sample ID: GZ-05 S-10 S-11
Date Sampled: 05/16/22 15:19
Percent Solids: 86

ESS Laboratory Work Order: 22E0572
ESS Laboratory Sample ID: 22E0572-02
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Chloride	**WL 27** (6)		D4327		1	EEM	05/17/22 21:42	mg/kg dry	DE21711
Sulfate	**WL 26** (6)		D4327		1	EEM	05/17/22 21:42	mg/kg dry	DE21711
Sulfide	**WL** ND (0.6)		9030B		1	JLK	05/18/22 16:31	mg/kg dry	DE21828

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: CHPE Astoria Converter Station - GZA GeoEnv
Client Sample ID: GZ-33 S-4 S-5
Date Sampled: 05/16/22 15:20
Percent Solids: 80

ESS Laboratory Work Order: 22E0572
ESS Laboratory Sample ID: 22E0572-03
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Chloride	**WL** ND (6)		D4327		1	EEM	05/17/22 22:33	mg/kg dry	DE21711
Sulfate	**WL 78** (6)		D4327		1	EEM	05/17/22 22:33	mg/kg dry	DE21711
Sulfide	**WL** ND (0.6)		9030B		1	JLK	05/18/22 16:31	mg/kg dry	DE21828

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: CHPE Astoria Converter Station - GZA GeoEnv ESS Laboratory Work Order: 22E0572

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Classical Chemistry										
Batch DE21711 - General Preparation										
Blank										
Chloride	ND	5	mg/kg wet							
Sulfate	ND	5	mg/kg wet							
LCS										
Chloride	10		mg/L	10.00		96	85-115			
Sulfate	10		mg/L	10.00		95	80-120			
Batch DE21828 - General Preparation										
Blank										
Sulfide	ND	0.05	mg/kg wet							
LCS										
Sulfide	0.5		mg/L	0.5000		99	85-115			

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: CHPE Astoria Converter Station - GZA GeoEnv ESS Laboratory Work Order: 22E0572

Notes and Definitions

WL	Results obtained from a deionized water leach of the sample.
U	Analyte included in the analysis, but not detected
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probable Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: CHPE Astoria Converter Station - GZA GeoEnv ESS Laboratory Work Order: 22E0572

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Thielsch Engineering, Inc - ESS

Shipped/Delivered Via: Client

ESS Project ID: 22E0572
Date Received: 5/16/2022
Project Due Date: 5/23/2022
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
   Temp: 26.6 Iced with: None
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? Yes
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** Yes / No / NA
10. Were any analyses received outside of hold time? Yes / No

11. Any Subcontracting needed? Yes / No
    ESS Sample IDs:
    Analysis:
    TAT:
12. Were VOAs received? Yes / No
    a. Air bubbles in aqueous VOAs? Yes / No
    b. Does methanol cover soil completely? Yes / No / NA
13. Are the samples properly preserved? Yes / No
    a. If metals preserved upon receipt: Date: Time: By/Acid Lot#:
    b. Low Level VOA vials frozen: Date: Time: By:

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / No
    a. Was there a need to contact the client? Yes / No
    Who was contacted? Date: Time: By:

Resolution:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	292371	Yes	N/A	Yes	4 oz. Jar	NP	
2	292372	Yes	N/A	Yes	4 oz. Jar	NP	
3	292373	Yes	N/A	Yes	4 oz. Jar	NP	

2nd Review
Were all containers scanned into storage/lab? Initials TD
Are barcode labels on correct containers? Yes / No
Are all Flashpoint stickers attached/container ID # circled? Yes / No / NA
Are all Hex Chrome stickers attached? Yes / No / NA
Are all QC stickers attached? Yes / No / NA
Are VOA stickers attached if bubbles noted? Yes / No / NA

Completed By: Taylor Davis Date & Time: 5/16/22, 1546
Reviewed By: Date & Time: 5.16.22 1754

ESS Laboratory

Division of Thielsch Engineering, Inc.
185 Frances Avenue, Cranston, RI 02910-2211
Tel. (401) 461-7181 Fax (401) 461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS LAB PROJECT ID: 220572

Turn Time: Standard X Rush Approved By: _____

Reporting Limits -

State where samples were collected: NY

Is this project for any of the following: (please circle)
MA-MCP CT-RCP RGP DOD Other_____

Electonic Deliverable Yes_X_ No____
Format: Excel___ Access___ PDF_X_ Other_____

Project Manager: Kris Roland
Company: Thielsch Engineering
Address: 195 Frances Ave
Cranston, RI 02910

Project # 41.0163020.00

Project Name / Client Name:
CHPE Astoria Converter Station
GZA GeoEnvironmental

Contract Pricing __x___
Special Pricing WO#: _____

ESS Lab Sample ID	Date	Collection Time	Grab -G Composite-C	Matrix	Sample Identification	# of Container	Analysis: Sulfate D4327	Chloride D4327	Sulfide EPA							Comment #
	05.16.22	1514	C	S	GZ-04 S-4, S-5	1	X	X	X							
JF.	[redacted]		C	S	GZ-04 S-9, S10	1	X	X	X							
2	05.16.22	1519	C	S	GZ-05 S-10, S-11	1	X	X	X							
3	05.16.22	1520	C	S	GZ-33 S-4, S-5	1	X	X	X							
Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-_CH_3OH____							1	1	1							
Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA							AG	AG	AG							

Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present _____Yes ___No- ✓
Seals Intact _____ Yes _____No NA: _____
Cooler Temperature: 2o.Celsius

Sampled by : Rebecca Roth

Comments: Please send reports to kroland@thielsch.com, mcolman@thielsch.com, rroth@thielsch.com

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Jeff CTS	5.16.22 1536	[signature]			
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Please E-mail all changes to Chain of Custody in writing.

Page ____ of ____

THIELSCH ENGINEERING
195 Frances Avenue
Cranston RI, 02910
Phone: (401)-467-6454
Fax: (401)-467-2398
thielsch.com
Let's Build a Solid Foundation

Client Information:
GZA GeoEnvironmental
New York, NY
PM: Dharmil Patel
Assigned By: Dharmil Patel
Collected By: Allan Amador

Project Information:
Champlin Hudson Power Express - Astoria Converter Station
Astoria, NY
GZA Project Number: 41.0163020.00
Summary Page: 1 of 1
Report Date: 06.09.22

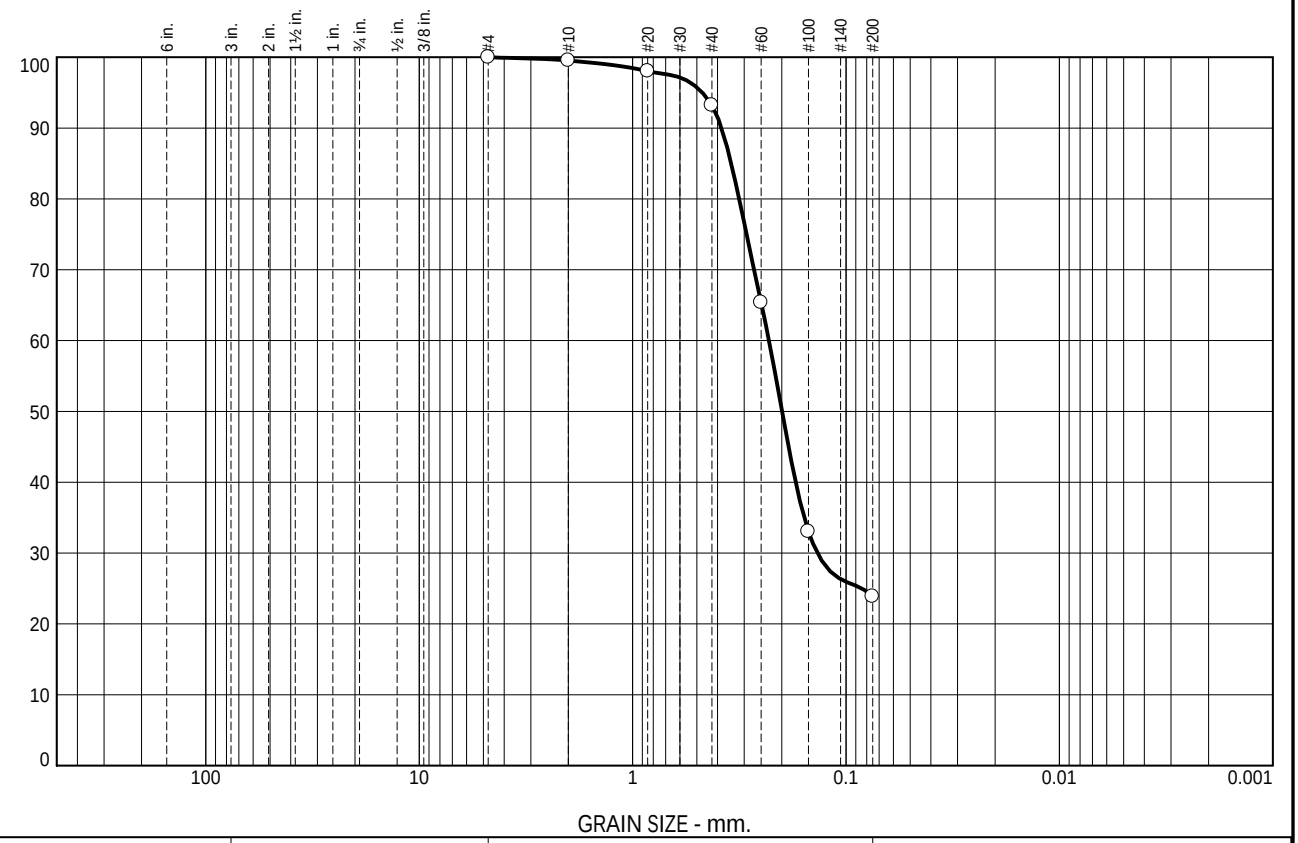
LABORATORY TESTING DATA SHEET, Report No.: 7422-F-230

Boring No.	Sample No.	Depth (ft)	Laboratory No.	Identification Tests						Corrosivity Tests								Laboratory Log and Soil Description
				As Received Moisture Content %	LL %	PL %	Gravel %	Sand %	Fines %	Resistivity (Mohms-cm)	Sulfate (mg/kg)	Chloride (mg/kg)	Sulfide (mg/kg)	Redox Potential (mv)	pH	Electrical Resist. As Received Ohm-cm @ 60°F	Electrical Resist. Saturated Ohm-cm @ 60°F	
				D2216	D4318		D6913			EPA	D4327	D4327	3030B	G200	G51	G57		
GZ-29	S-3	4-6	22-S-1964				0.0	76.1	23.9		8	22	ND	254.9	6.6	10100	9270	Red - Brown fine SAND, some Silt
GZ-29	S-4	6-8	22-S-1965															Sample not used
GZ-29	S-10	25-27	22-S-1966				27.0	60.9	12.1							11500	9920	Light Grey f-c SAND, some f-c Gravel, little Silt
GZ-29	S-7	12-14	22-S-1967				0.0	82.2	17.8							18400	15300	Grey f-m SAND, little Silt
GZ-29	S-8	14-16	22-S-1968															Sample not used
GZ-01	S-11	30-32	22-S-1969				0.0	95.1	4.9									Grey f-m SAND, trace Silt
GZ-01	S-18	65-67	22-S-1970	31.4	30	22												Dark Grey SILT & CLAY
GZ-01	S-19	70-72	22-S-1971	25.5	39	29												Dark Grey SILT & CLAY
GZ-37	S-3	4-6	22-S-1972				53.1	43.7	3.2							*Composited sample did not contain enough sub#4 material for sieve and resistivity		Very Dark Brown f-c GRAVEL and f-c SAND, trace Silt
GZ-37	S-4	6-8	22-S-1973															
GZ-37	S-7	12-14	22-S-1974	36.3	34	19										1210	1120	Dark Grey CLAY & SILT
GZ-37	S-8	14-16	22-S-1975															Sample not used
GZ-37	S-10	25-27	22-S-1976				5.6	70.3	24.1							2710	2460	Grey f-m SAND, some Silt, trace fine Gravel

Date Received: *05.27.22* Reviewed By: Date Reviewed: *06.09.22*

Organic content, pH , and Resistivity tested by SL

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.5	6.3	69.3	23.9	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.5		
#20	98.0		
#40	93.2		
#60	65.4		
#100	33.0		
#200	23.9		

* (no specification provided)

Soil Description

Red - Brown fine SAND, some Silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.3831 D_{85}= 0.3450 D_{60}= 0.2296
D_{50}= 0.1994 D_{30}= 0.1361 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Source of Sample: GZ-29 Depth: 4-6'
Sample Number: S-3

Date: 06.06.22

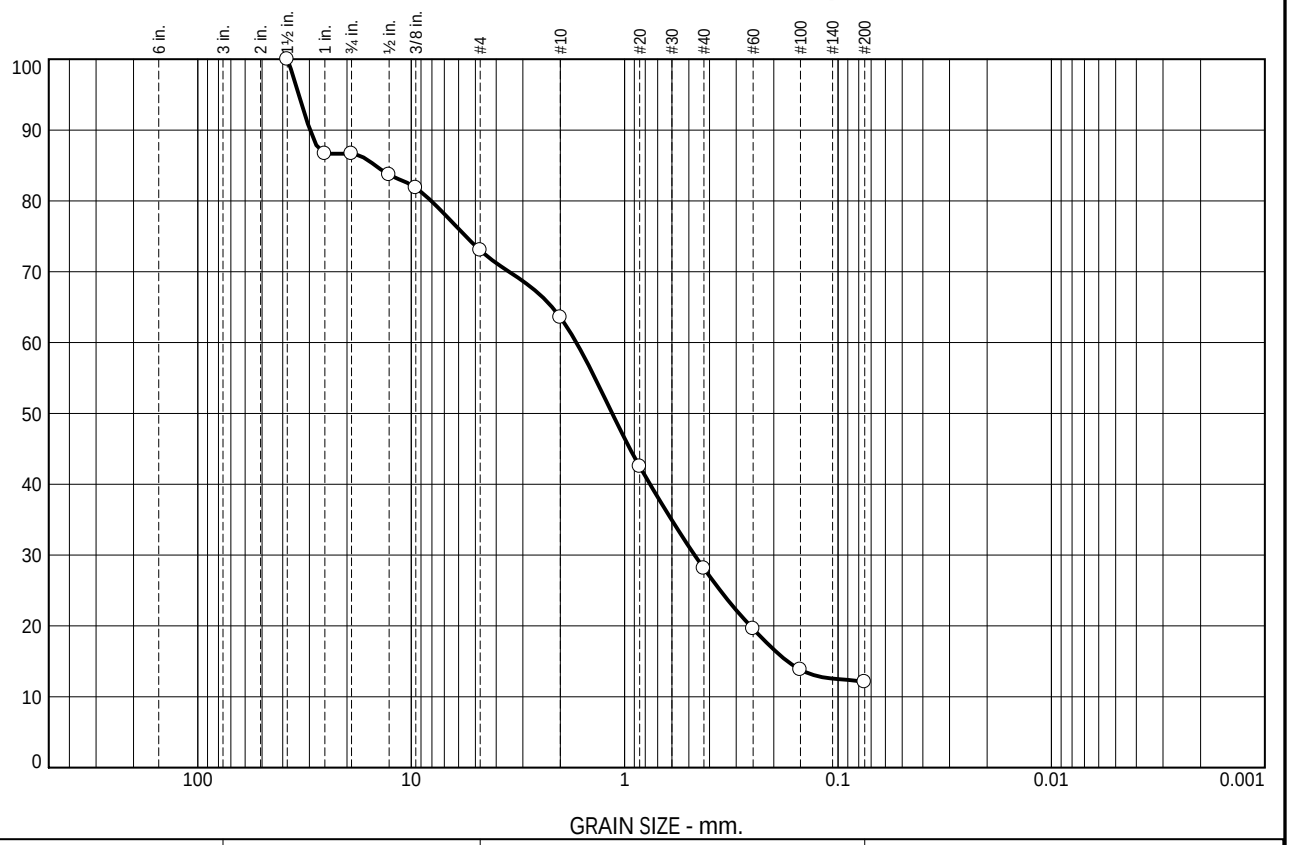
Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Champlin Hudson Power Express - Astoria Convertor Station
Astoria, NY
Project No: 41.0163020.00 Figure 22-S-1964

Tested By: SL / FR Checked By: Rebecca Roth

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.3	13.7	9.5	35.4	16.0	12.1	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	86.7		
3/4"	86.7		
1/2"	83.7		
3/8"	81.8		
#4	73.0		
#10	63.5		
#20	42.5		
#40	28.1		
#60	19.6		
#100	13.8		
#200	12.1		

* (no specification provided)

Soil Description

Light Grey f-c SAND, some f-c Gravel, little Silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 29.8104 D_{85}= 14.7286 D_{60}= 1.6833
D_{50}= 1.1430 D_{30}= 0.4698 D_{15}= 0.1725
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

Source of Sample: GZ-29 Depth: 25-27'
Sample Number: S-10

Date: 06.06.22

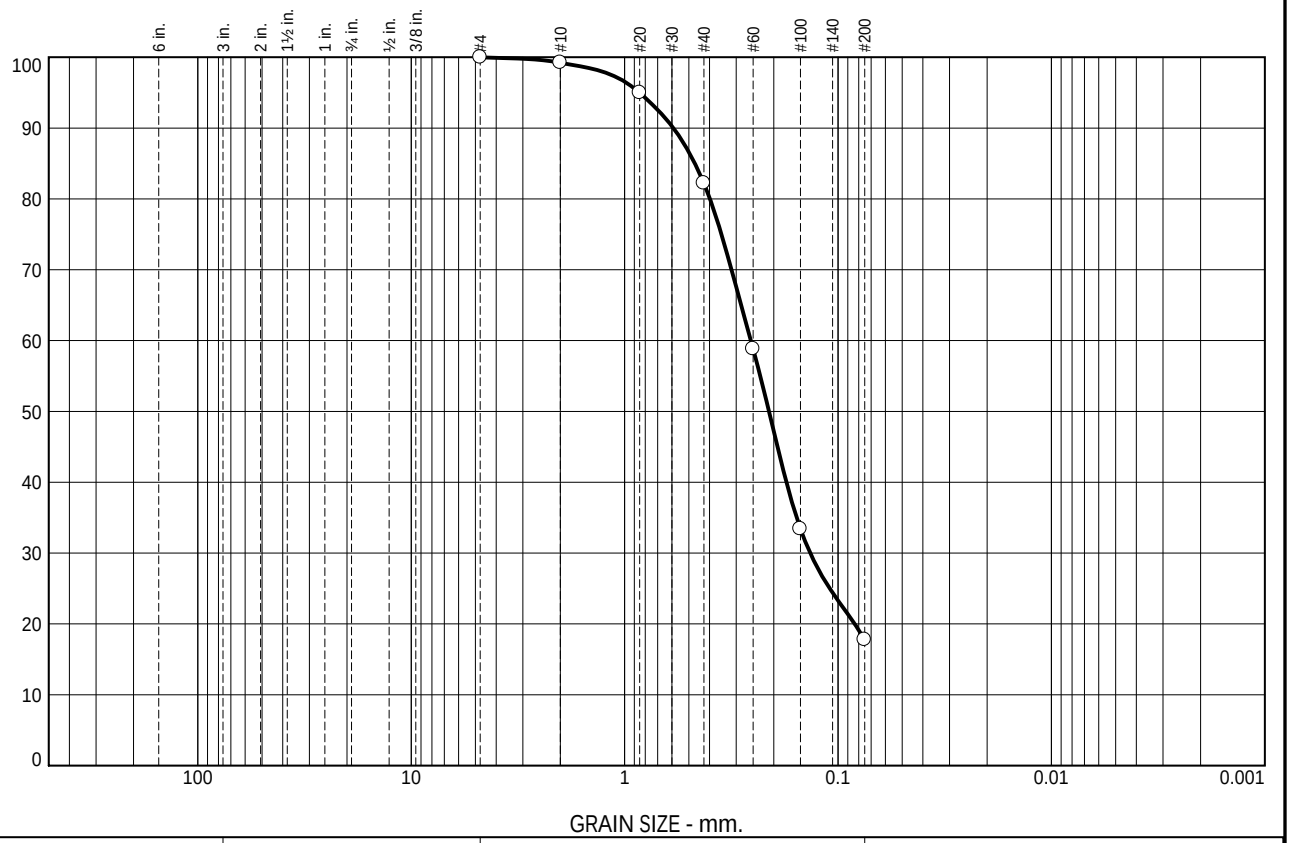
Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Champlin Hudson Power Express - Astoria Convertor Station
Astoria, NY
Project No: 41.0163020.00 Figure 22-S-1966

Tested By: SL / FR Checked By: Rebecca Roth

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.8	17.0	64.4	17.8	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.2		
#20	95.0		
#40	82.2		
#60	58.8		
#100	33.4		
#200	17.8		

* (no specification provided)

Soil Description

Grey f-m SAND, little Silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.5910 D_{85}= 0.4684 D_{60}= 0.2563
D_{50}= 0.2107 D_{30}= 0.1350 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Source of Sample: GZ-29 Depth: 12-14'
Sample Number: S-7

Date: 06.06.22

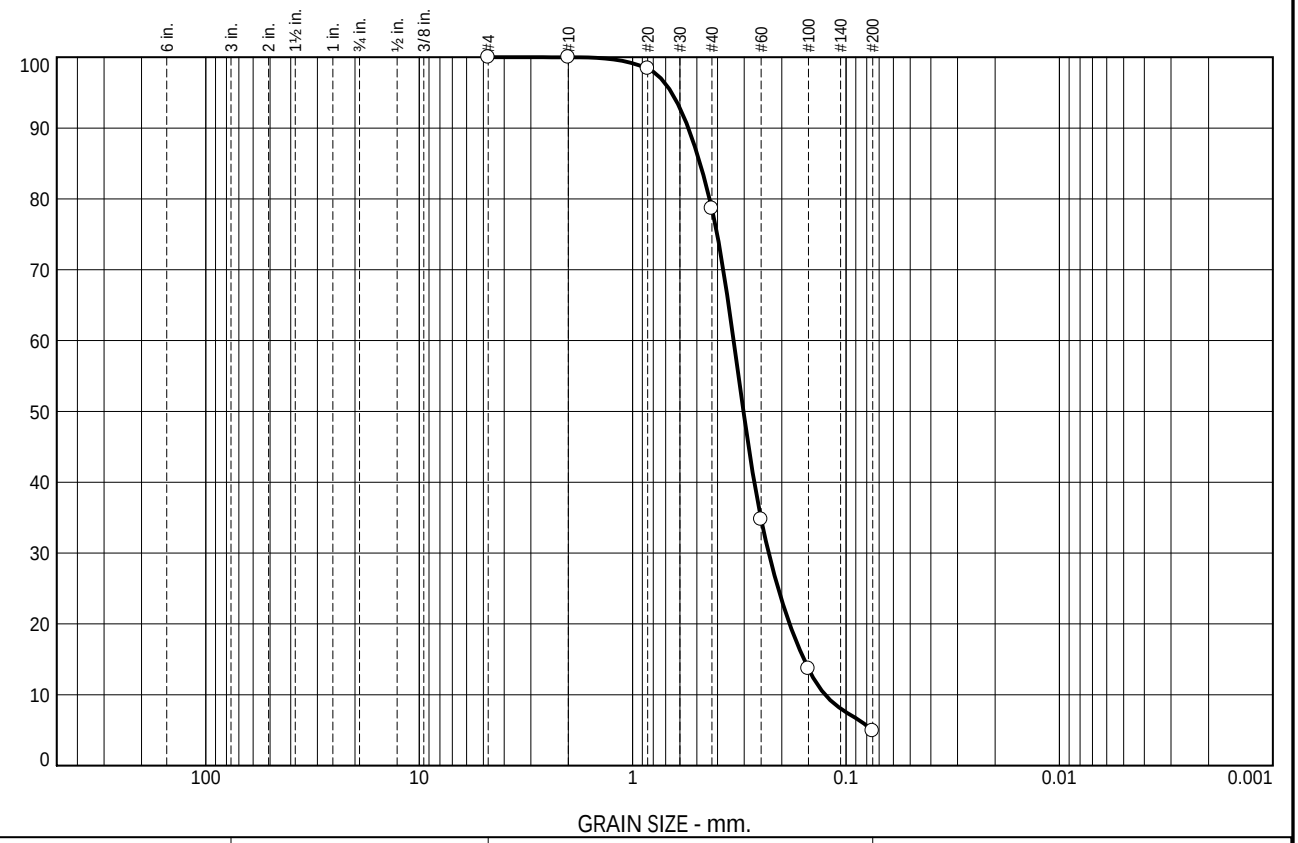
Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Champlin Hudson Power Express - Astoria Convertor Station
Astoria, NY
Project No: 41.0163020.00 Figure 22-S-1967

Tested By: SL / FR Checked By: Rebecca Roth

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	21.4	73.7	4.9	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	98.4		
#40	78.6		
#60	34.8		
#100	13.7		
#200	4.9		

* (no specification provided)

Soil Description

Grey f-m SAND, trace Silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.5480 D_{85}= 0.4827 D_{60}= 0.3361
D_{50}= 0.3022 D_{30}= 0.2302 D_{15}= 0.1573
D_{10}= 0.1254 C_u= 2.68 C_c= 1.26

Classification

USCS= SP AASHTO= A-3

Remarks

Source of Sample: GZ-01 Depth: 30-32'
Sample Number: S-11

Date: 06.06.22

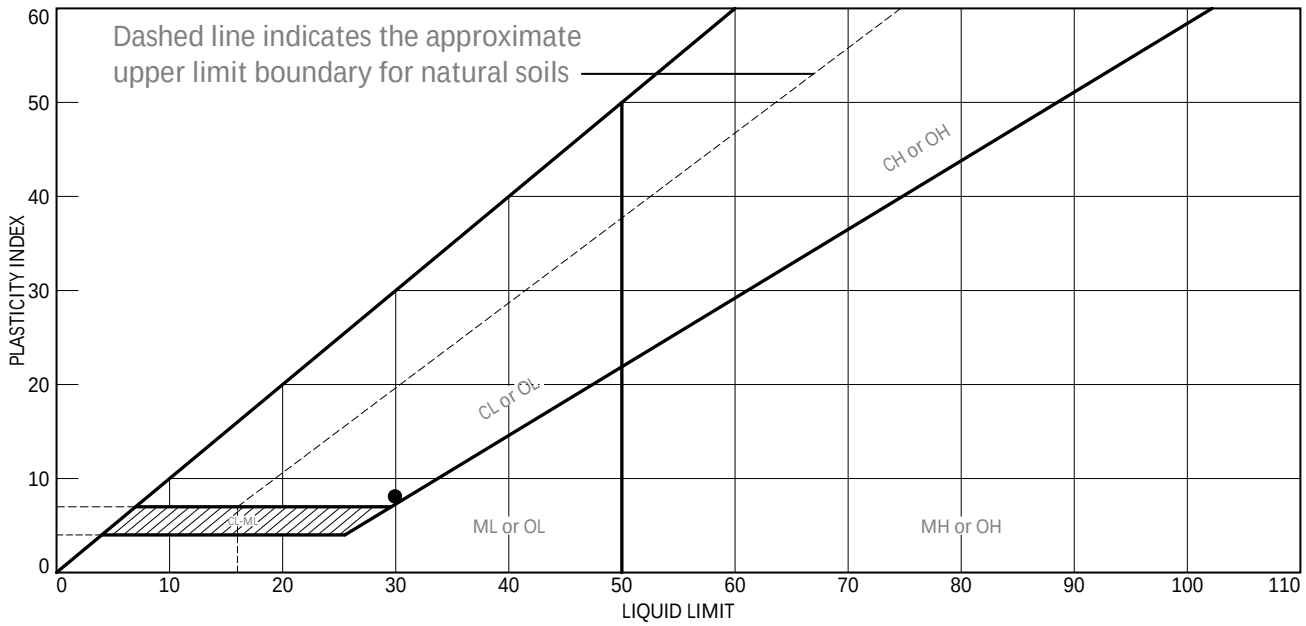
Thielsch Engineering Inc.

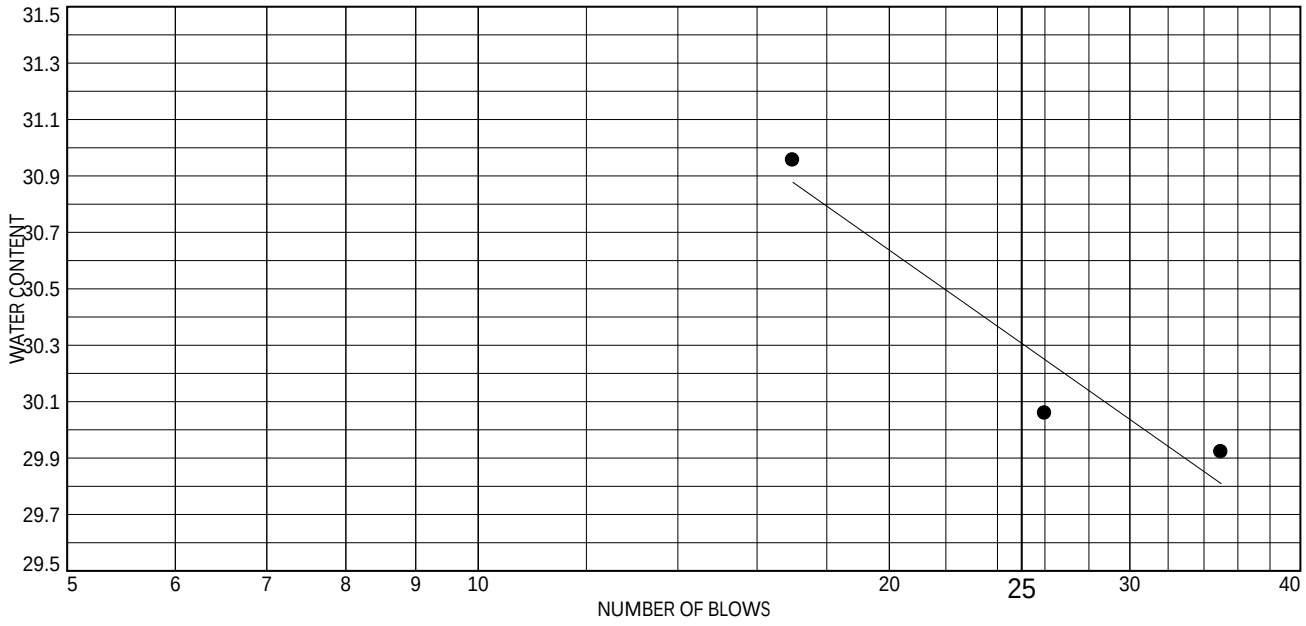
Cranston, RI

Client: GZA GeoEnvironmental
Project: Champlin Hudson Power Express - Astoria Convertor Station
Astoria, NY
Project No: 41.0163020.00 Figure 22-S-1969

Tested By: SL / FR Checked By: Rebecca Roth

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark Grey SILT & CLAY	30	22	8			

Project No. 41.0163020.00 Client: GZA GeoEnvironmental

Project: Champlin Hudson Power Express - Astoria Convertor Station

Astoria, NY

Source of Sample: GZ-01 Depth: 65-67'

Sample Number: S-18

Remarks:

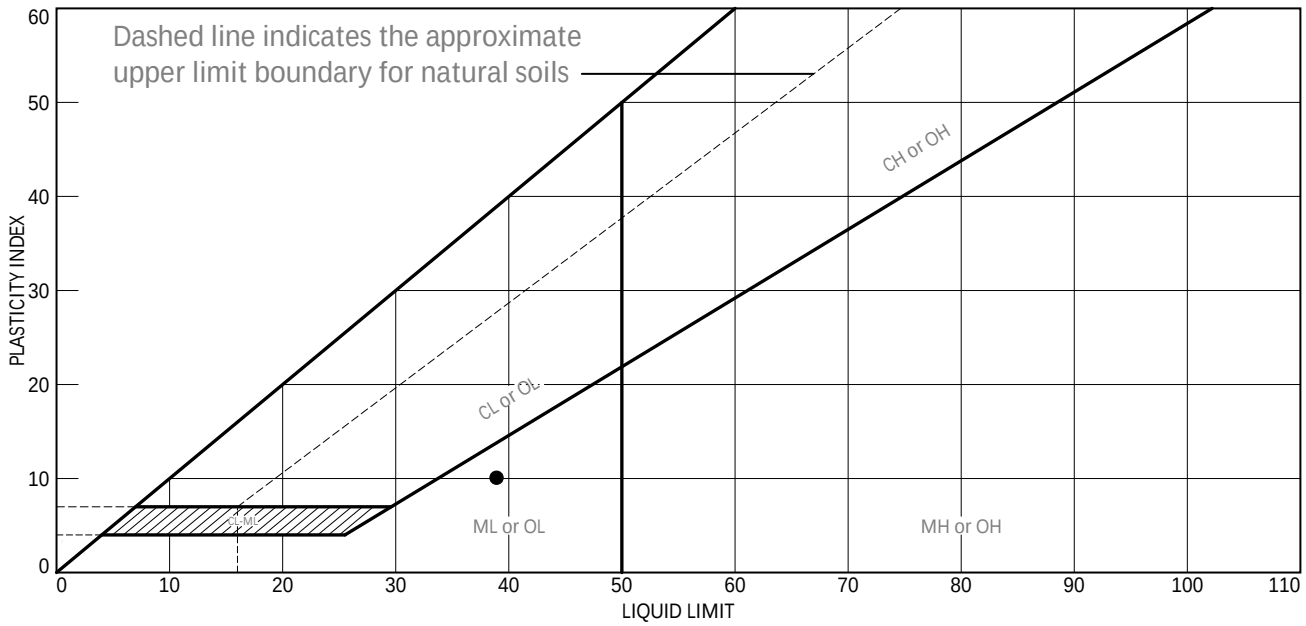
Thielsch Engineering Inc.

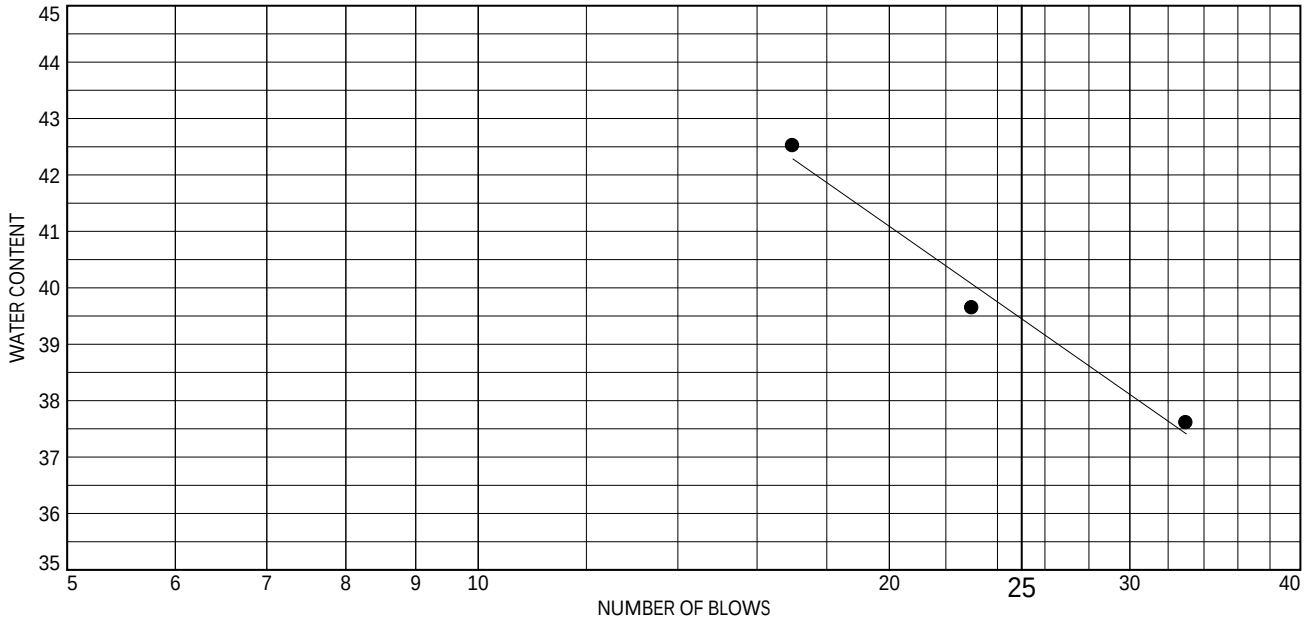
Cranston, RI

Figure 22-L-1970

Tested By: SL Checked By: Rebecca Roth

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark Grey SILT & CLAY	39	29	10			

Project No. 41.0163020.00 Client: GZA GeoEnvironmental

Project: Champlin Hudson Power Express - Astoria Convertor Station

Astoria, NY

Source of Sample: GZ-01 Depth: 70-72'

Sample Number: S-19

Remarks:

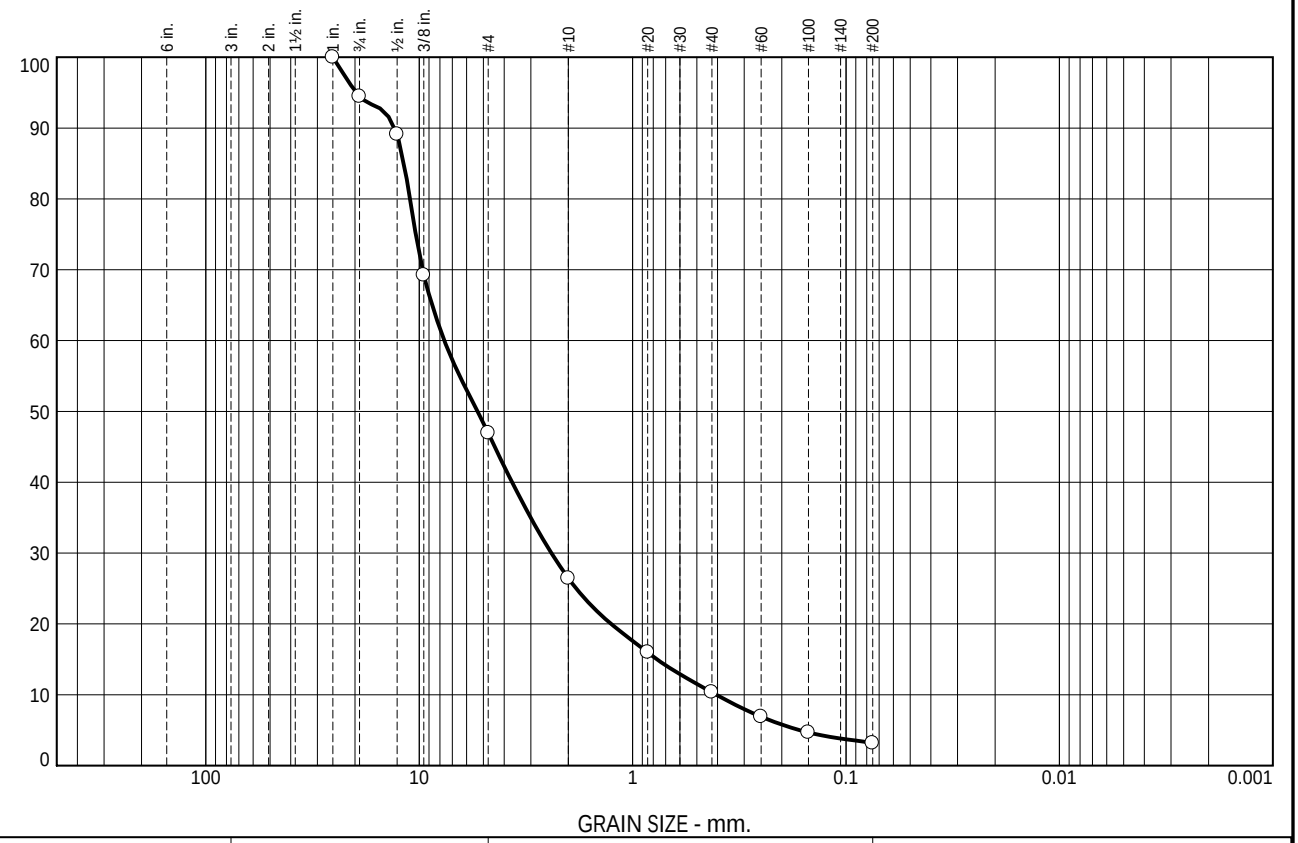
Thielsch Engineering Inc.

Cranston, RI

Figure 22-L-1971

Tested By: SL Checked By: Rebecca Roth

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.5	47.6	20.5	16.0	7.2	3.2	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	94.5		
1/2"	89.1		
3/8"	69.2		
#4	46.9		
#10	26.4		
#20	16.0		
#40	10.4		
#60	6.9		
#100	4.7		
#200	3.2		

* (no specification provided)

Soil Description

Very Dark Brown f-c GRAVEL and f-c SAND, trace Silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 13.0417 D_{85}= 11.7877 D_{60}= 7.6286
D_{50}= 5.3289 D_{30}= 2.4019 D_{15}= 0.7687
D_{10}= 0.4049 C_u= 18.84 C_c= 1.87

Classification

USCS= GW AASHTO= A-1-a

Remarks

Source of Sample: GZ-37 Depth: 4-8'
Sample Number: S-3 + S-4

Date: 06.06.22

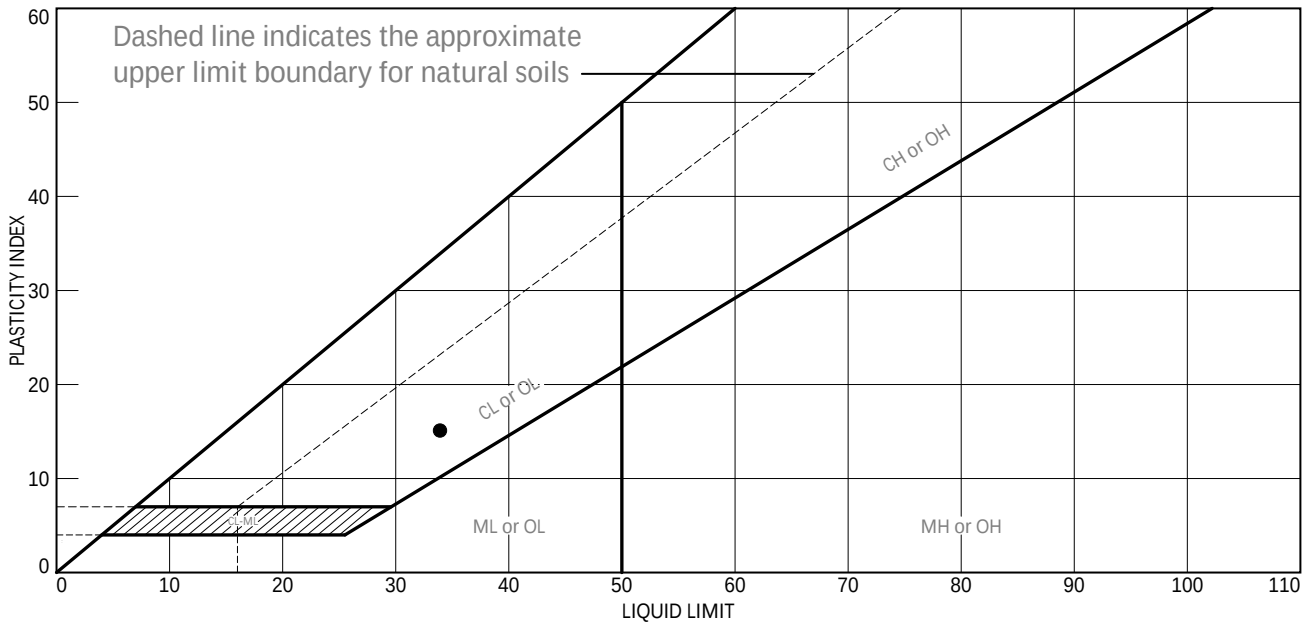
Thielsch Engineering Inc.

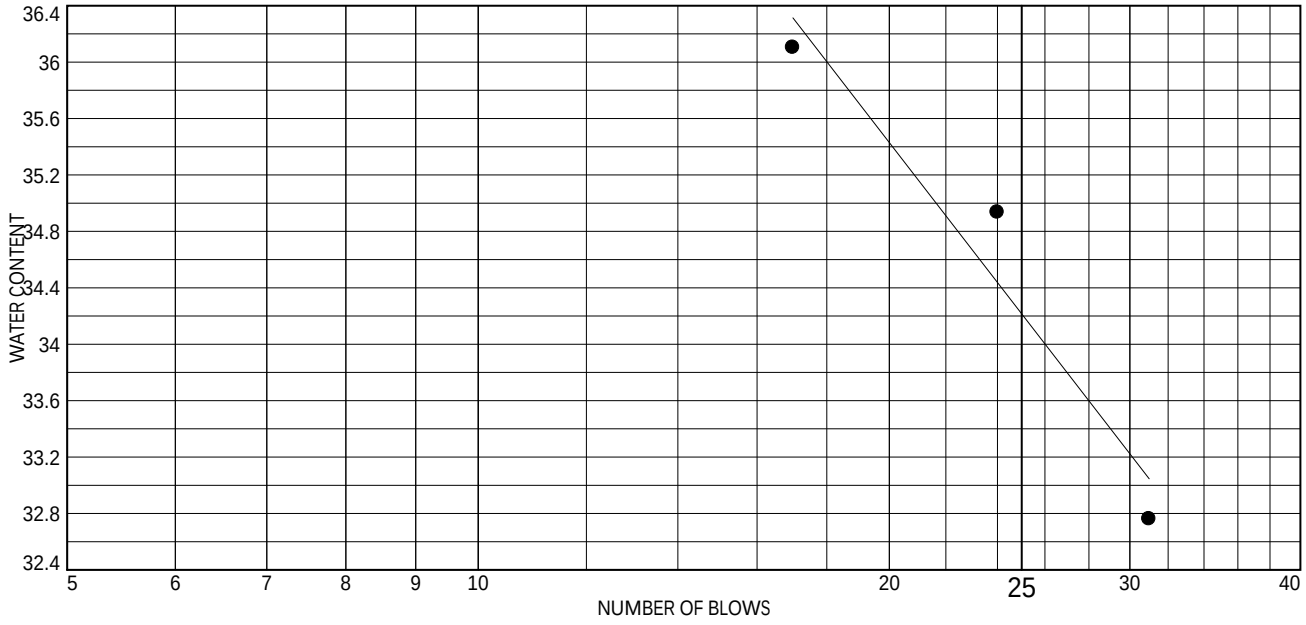
Cranston, RI

Client: GZA GeoEnvironmental
Project: Champlin Hudson Power Express - Astoria Convertor Station
Astoria, NY
Project No: 41.0163020.00 Figure 22-S-1972

Tested By: SL / FR Checked By: Rebecca Roth

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark Grey CLAY & SILT	34	19	15			

Project No. 41.0163020.00 Client: GZA GeoEnvironmental

Project: Champlin Hudson Power Express - Astoria Convertor Station

Astoria, NY

Source of Sample: GZ-37 Depth: 12-14'

Sample Number: S-7

Remarks:

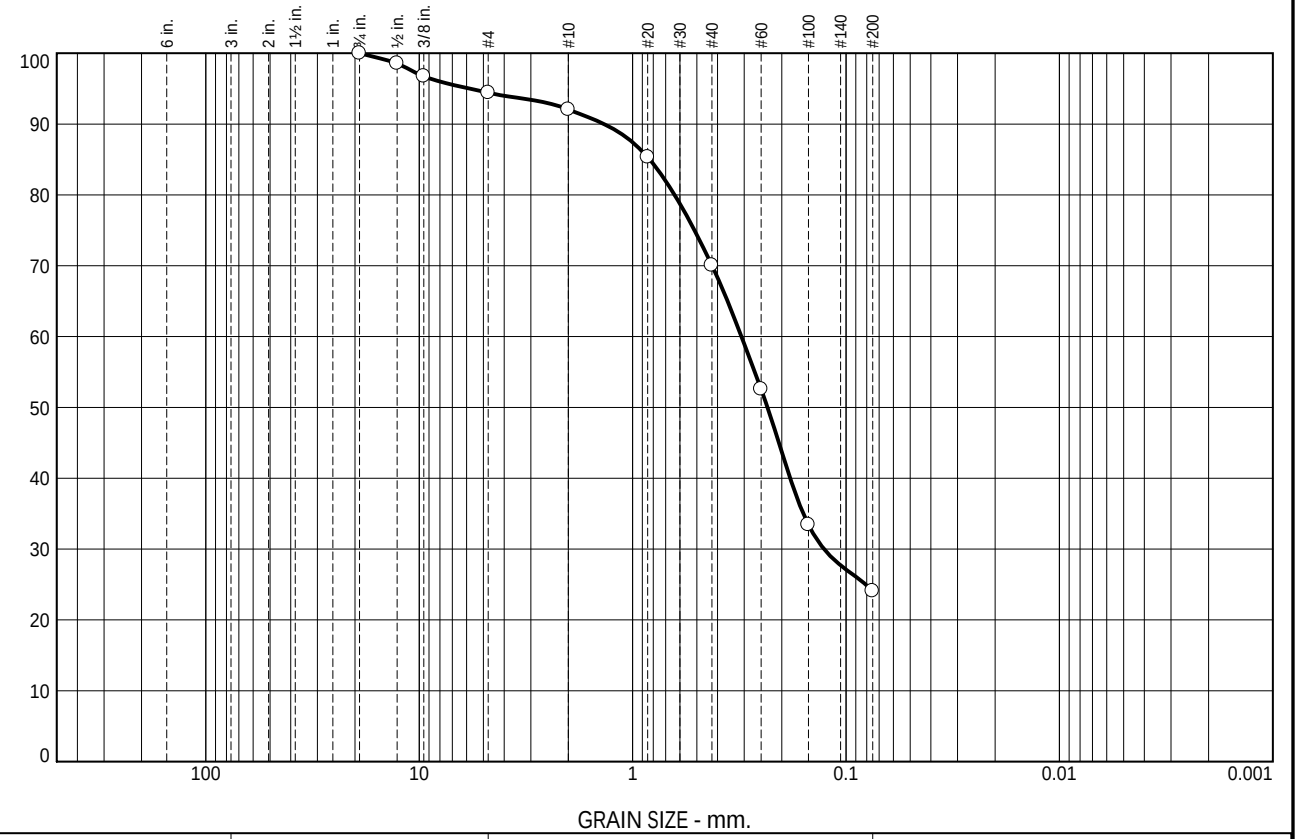
Thielsch Engineering Inc.

Cranston, RI

Figure 22-L-1974

Tested By: SL Checked By: Rebecca Roth

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.6	2.3	22.0	46.0	24.1	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	98.5		
3/8"	96.7		
#4	94.4		
#10	92.1		
#20	85.3		
#40	70.1		
#60	52.6		
#100	33.4		
#200	24.1		

* (no specification provided)

Soil Description

Grey f-m SAND, some Silt, trace fine Gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 1.3609 D_{85}= 0.8321 D_{60}= 0.3090
D_{50}= 0.2333 D_{30}= 0.1268 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Source of Sample: GZ-37 Depth: 25-27'
Sample Number: S-10

Date: 06.06.22

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Champlin Hudson Power Express - Astoria Convertor Station
Astoria, NY
Project No: 41.0163020.00 Figure 22-S-1976

Tested By: SL / FR Checked By: Rebecca Roth

CERTIFICATE OF ANALYSIS

Kristina Roland
Thielsch Engineering, Inc.
195 Frances Avenue
Cranston, RI 02910

RE: CHPE Astoria Converter Station - GZA GeoEnv (41.0163020.00)
ESS Laboratory Work Order Number: 22E1065

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 3:28 pm, Jun 06, 2022

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: CHPE Astoria Converter Station - GZA GeoEnv ESS Laboratory Work Order: 22E1065

SAMPLE RECEIPT

The following samples were received on May 27, 2022 for the analyses specified on the enclosed Chain of Custody Record.

The client did not deliver the samples in a cooler.

Lab Number	Sample Name	Matrix	Analysis
22E1065-01	GS-29 S-3 4-6ft	Soil	9030B, D4327

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: CHPE Astoria Converter Station - GZA GeoEnv ESS Laboratory Work Order: 22E1065

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: CHPE Astoria Converter Station - GZA GeoEnv ESS Laboratory Work Order: 22E1065

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: CHPE Astoria Converter Station - GZA GeoEnv
Client Sample ID: GS-29 S-3 4-6ft
Date Sampled: 05/27/22 14:45
Percent Solids: 86

ESS Laboratory Work Order: 22E1065
ESS Laboratory Sample ID: 22E1065-01
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Chloride	**WL 22** (6)		D4327		1	EEM	05/31/22 23:52	mg/kg dry	DE23121
Sulfate	**WL 8** (6)		D4327		1	EEM	05/31/22 23:52	mg/kg dry	DE23121
Sulfide	**WL** ND (0.6)		9030B		1	CCP	06/01/22 10:00	mg/kg dry	DF20110

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: CHPE Astoria Converter Station - GZA GeoEnv ESS Laboratory Work Order: 22E1065

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Classical Chemistry										
Batch DE23121 - General Preparation										
Blank										
Chloride	ND	5	mg/kg wet							
Sulfate	ND	5	mg/kg wet							
LCS										
Chloride	9		mg/L	10.00		94	85-115			
Sulfate	9		mg/L	10.00		94	80-120			
Batch DF20110 - General Preparation										
Blank										
Sulfide	ND	0.05	mg/kg wet							
LCS										
Sulfide	0.5	0.05	mg/kg wet	0.5000		99	85-115			

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: CHPE Astoria Converter Station - GZA GeoEnv ESS Laboratory Work Order: 22E1065

Notes and Definitions

WL	Results obtained from a deionized water leach of the sample.
U	Analyte included in the analysis, but not detected
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probable Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: CHPE Astoria Converter Station - GZA GeoEnv ESS Laboratory Work Order: 22E1065

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Thielsch Engineering, Inc - ESS

Shipped/Delivered Via: Client

ESS Project ID: 22E1065
Date Received: 5/27/2022
Project Due Date: 6/6/2022
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? No
   Temp: 24.9 Iced with: None
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? Yes
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** Yes / No / NA
10. Were any analyses received outside of hold time? Yes / No

11. Any Subcontracting needed? Yes / No
    ESS Sample IDs:
    Analysis:
    TAT:
12. Were VOAs received? Yes / No
    a. Air bubbles in aqueous VOAs? Yes / No
    b. Does methanol cover soil completely? Yes / No / NA

13. Are the samples properly preserved? Yes / No
    a. If metals preserved upon receipt: Date: Time: By/Acid Lot#:
    b. Low Level VOA vials frozen: Date: Time: By:

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / No
    a. Was there a need to contact the client? Yes / No
    Who was contacted? Date: Time: By:

Resolution:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	298259	Yes	N/A	Yes	8 oz jar	NP	

2nd Review
Were all containers scanned into storage/lab? Initials Yes / No
Are barcode labels on correct containers? Yes / No / NA
Are all Flashpoint stickers attached/container ID # circled? Yes / No / NA
Are all Hex Chrome stickers attached? Yes / No / NA
Are all QC stickers attached? Yes / No / NA
Are VOA stickers attached if bubbles noted? Yes / No / NA

Completed By: Date & Time: 1535 5/27/22
Reviewed By: Date & Time: 5/27/22 1542

ESS Laboratory

Division of Thielsch Engineering, Inc.
185 Frances Avenue, Cranston, RI 02910-2211
Tel. (401) 461-7181 Fax (401) 461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS LAB PROJECT ID: 22E0225E1065

Turn Time: Standard X Rush Approved By: _____

Reporting Limits -

State where samples were collected: NY

Is this project for any of the following: (please circle)
MA-MCP CT-RCP RGP DOD Other_____

Electonic Deliverable Yes X No____
Format: Excel___ Access___ PDF X Other____

Project Manager: Kris Roland
Company: Thielsch Engineering
Address: 195 Frances Ave
Cranston, RI 02910

Project # 41.0163020.00

Project Name / Client Name:
Champlin Hudson Power Express-Astoria Convertor
GZA GeoEnviaronmental of New York

Contract Pricing __x___
Special Pricing WO#: _____

ESS Lab Sample ID	Date	Collection Time	Grab -G Composite-C	Matrix	Sample Identification	# of Container	Analysis: Sulfate (ASTM D4327)	Chloride (ASTM D4327)	Sulfide (EPA)							Comment #
1	05.27.2022	1445	G	S	GS-29, S-3, (4'-6')	1	X	X	X							

Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-_CH_3OH____ — 1

Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA — G

Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present _____Yes ___No
Seals Intact _____ Yes _____No NA: _____
Cooler Temperature: 24.9

Sampled by : S.Lefoley

Comments: Please send reports to kroland@thielsch.com, mcolman@thielsch.com, rroth@thielsch.com

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Sarah Lefoley (CTS)	5/27/22 14:51				
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Please E-mail all changes to Chain of Custody in writing.

Page ____ of ____

APPENDIX E – AS-DRILLED BORING LOCATIONS AND ELEVATIONS

Phone: (732) 764-0100
Fax: (732) 764-0990
Email: jheiser@dpkconsulting.net

DPK LAND SURVEYING

200 Metroplex Drive
Suite 285
Edison, NJ, 08817

For: GZA GEOENVIRONMENTAL INC.

Site: 3101 20th Avenue, Astoria Queens New York

Date of Survey: May 24, 2022

Project #: 22-9574

Date: May 26, 2022

Horizontal Datum: NEW YORK LONG ISLAND STATE PLANE COORDINATE GRID NAD 83

Vertical Datum: NAVD 88

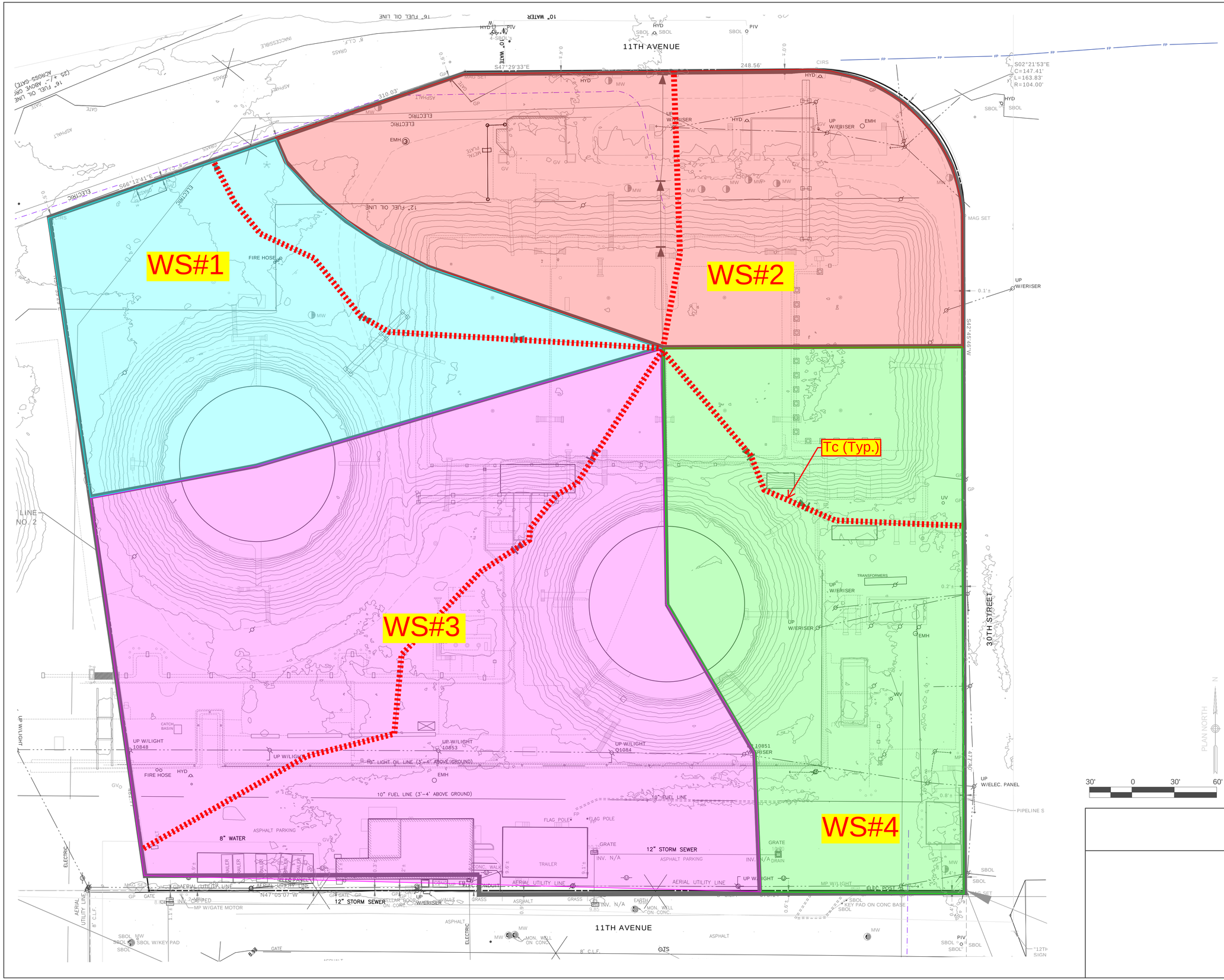
BENCHMARK: NYBP BATTERY PARK ELEV. = 57.21'

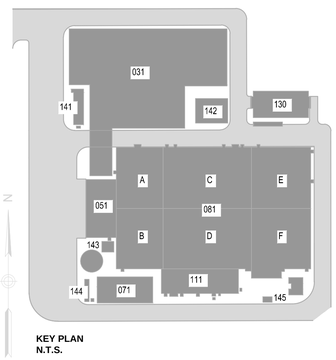
Additional Comments:

AS-SURVEYED SOIL BORINGS	ELEVATIONS	COORDINATES			
		NORTHING	EASTING	LATITUDE (N)	LONGITUDE (W)
SB GZ-01	13.25'	226218.94	1011906.42	N040°47'15.19"	W073°54'00.46"
SB GZ-02	12.74'	226105.17	1012010.97	N040°47'14.06"	W073°53'59.10"
SB GZ-03	11.95'	226064.48	1012062.50	N040°47'13.66"	W073°53'58.43"
SB GZ-04	11.83'	226025.80	1012105.07	N040°47'13.27"	W073°53'57.88"
SB GZ-05	10.88'	225958.25	1012161.73	N040°47'12.61"	W073°53'57.14"
SB GZ-15	22.79'	226093.95	1011800.11	N040°47'13.95"	W073°54'01.84"
SB GZ-19	12.05'	225765.51	1012027.77	N040°47'10.70"	W073°53'58.89"
SB GZ-20	12.25'	225994.96	1011735.97	N040°47'12.97"	W073°54'02.68"
SB GZ-29	10.01'	225980.65	1011674.55	N040°47'12.83"	W073°54'03.48"
SB GZ-33	12.61'	225746.15	1011914.06	N040°47'10.51"	W073°54'00.37"
SB GZ-35	9.13'	225961.14	1011546.31	N040°47'12.64"	W073°54'05.14"
SB GZ-37	10.56'	225865.77	1011649.40	N040°47'11.70"	W073°54'03.80"
SB GZ-38	11.72'	225721.40	1011803.12	N040°47'10.27"	W073°54'01.81"
SB GZ-39	11.27'	226099.56	1012123.15	N040°47'14.00"	W073°53'57.64"
SB GZ-40	11.74'	225790.00	1012053.15	N040°47'10.95"	W073°53'58.56"
SB GZ-41	11.27'	225618.72	1011839.18	N040°47'09.26"	W073°54'01.34"
SB GZ-42	10.64'	225749.24	1011693.03	N040°47'10.55"	W073°54'03.24"
SB GZ-43	9.48'	225971.03	1011471.47	N040°47'12.74"	W073°54'06.12"

GZA GeoEnvironmental of New York

Appendix J - Stormwater Modeling and Calculations





KEY PLAN
N.T.S.

Engineering and Land Surveying, P.C.
370 7th Avenue
SUITE 1604
New York, NY 10001

SOWINSKI SULLIVAN ARCHITECTURE+ENGINEERING
25 Mohawk Avenue
Sparta, NJ 07871

REV	DESCRIPTION	DRW BY	CHK BY	DATE

Kiewit
470 Chestnut Ridge Rd # 2,
Woodcliff Lake, NJ 07677

Hitachi Energy
901 Main Campus Drive
Raleigh, North Carolina 27606

PROJECT

CHPE
Champlain Hudson Power Express

Astoria HVDC Converter Station

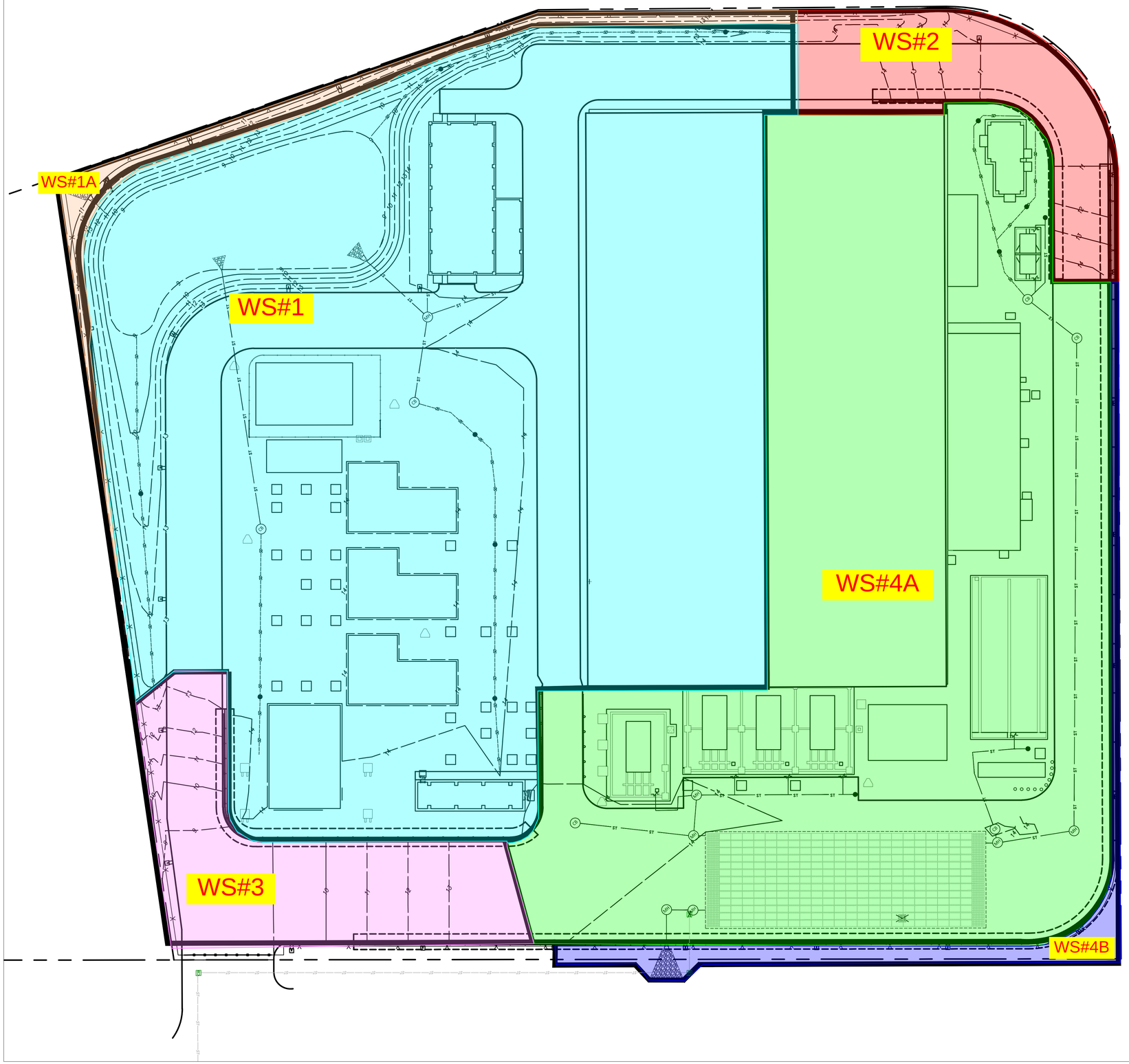
31-45 20th Avenue, Astoria, Queens NY 11105
Block #850 - Lot #310 - BIN #4624437

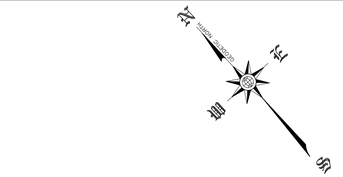
EXISTING DRAINAGE AREA MAP

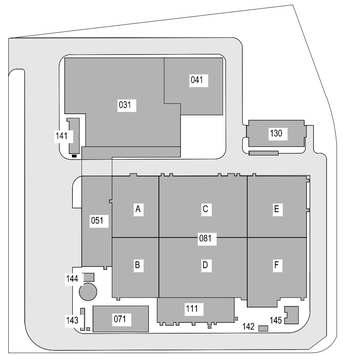
0 20 40
Scale in feet

DATE	
PROJECT NO	
DRAWING BY	
CHECKED BY	
DRAWING NO	
CADD FILE N0	

Xref ..\..\..\20_Engineering_CAD_Files\ny_common\01_KCE\Ref_Files\CHPE TITLEBLOCK - 24x36.dwg







KEY PLAN
N.T.S.

PLAN NORTH
N

PLAN NORTH
N
30' 0 30' 60'

Engineering and Land Surveying, P.C.
370 7th Avenue
SUITE 1604
New York, NY 10001

SOWINSKI SULLIVAN
ARCHITECTURE+ENGINEERING
25 Mohawk Avenue
Sparta, NJ 07871

REV	DESCRIPTION	DRW BY	CHK BY	DATE

Kiewit
470 Chestnut Ridge Rd # 2,
Woodcliff Lake, NJ 07677

Hitachi Energy
901 Main Campus Drive
Raleigh, North Carolina 27606

PROJECT

CHPE
Champlain Hudson Power Express

Astoria HVDC Converter Station

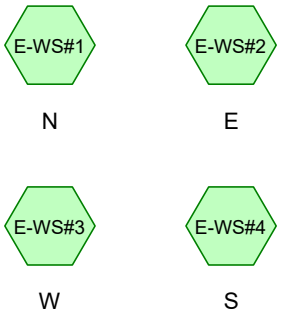
31-45 20th Avenue, Astoria, Queens NY 11105
Block #850 - Lot #310 - BIN #4624437

PROPOSED DRAINAGE AREA MAP

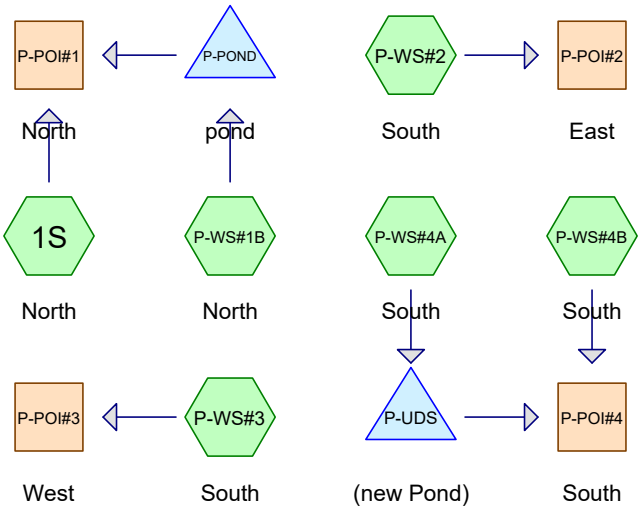
0 20 40
Scale in feet

DATE
PROJECT NO
DRAWING BY
CHECKED BY
DRAWING NO
CADD FILE N0

EXISTING



PROPOSED



Subcat Reach Pond Link

Routing Diagram for Drainage SCS 20220920
Prepared by KC Engineering & Land Surveying, Printed 9/29/2022

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: North Runoff Area=0.110 ac 0.00% Impervious Runoff Depth>1.62"
Tc=6.0 min CN=89 Runoff=0.23 cfs 0.015 af

SubcatchmentE-WS#1: N Runoff Area=1.310 ac 32.06% Impervious Runoff Depth>1.20"
Tc=6.0 min CN=83 Runoff=2.12 cfs 0.131 af

SubcatchmentE-WS#2: E Runoff Area=1.710 ac 18.71% Impervious Runoff Depth>1.02"
Tc=6.0 min CN=80 Runoff=2.36 cfs 0.145 af

SubcatchmentE-WS#3: W Runoff Area=3.100 ac 31.61% Impervious Runoff Depth>1.62"
Tc=6.0 min CN=89 Runoff=6.59 cfs 0.418 af

SubcatchmentE-WS#4: S Runoff Area=1.650 ac 33.33% Impervious Runoff Depth>1.40"
Tc=6.0 min CN=86 Runoff=3.08 cfs 0.192 af

SubcatchmentP-WS#1B: North Runoff Area=3.890 ac 53.98% Impervious Runoff Depth>2.04"
Tc=6.0 min CN=94 Runoff=9.89 cfs 0.662 af

SubcatchmentP-WS#2: South Runoff Area=0.310 ac 74.19% Impervious Runoff Depth>2.22"
Tc=6.0 min CN=96 Runoff=0.83 cfs 0.057 af

SubcatchmentP-WS#3: South Runoff Area=0.440 ac 86.36% Impervious Runoff Depth>2.31"
Tc=6.0 min CN=97 Runoff=1.21 cfs 0.085 af

SubcatchmentP-WS#4A: South Runoff Area=2.860 ac 79.72% Impervious Runoff Depth>2.22"
Flow Length=125' Slope=0.0100 '/' Tc=14.9 min CN=96 Runoff=5.79 cfs 0.529 af

SubcatchmentP-WS#4B: South Runoff Area=0.160 ac 0.00% Impervious Runoff Depth>1.62"
Tc=6.0 min CN=89 Runoff=0.34 cfs 0.022 af

Reach P-POI#1: North Inflow=0.23 cfs 0.015 af
Outflow=0.23 cfs 0.015 af

Reach P-POI#2: East Inflow=0.83 cfs 0.057 af
Outflow=0.83 cfs 0.057 af

Reach P-POI#3: West Inflow=1.21 cfs 0.085 af
Outflow=1.21 cfs 0.085 af

Reach P-POI#4: South Inflow=0.98 cfs 0.193 af
Outflow=0.98 cfs 0.193 af

Pond P-POND: pond Peak Elev=10.41' Storage=0.479 af Inflow=9.89 cfs 0.662 af
Discarded=0.20 cfs 0.186 af Primary=0.00 cfs 0.000 af Outflow=0.20 cfs 0.186 af

Pond P-UDS: (new Pond) Peak Elev=11.28' Storage=0.261 af Inflow=5.79 cfs 0.529 af
Discarded=0.15 cfs 0.164 af Primary=0.94 cfs 0.171 af Outflow=1.09 cfs 0.335 af

Total Runoff Area = 15.540 ac Runoff Volume = 2.257 af Average Runoff Depth = 1.74"
53.28% Pervious = 8.280 ac 46.72% Impervious = 7.260 ac

Summary for Subcatchment 1S: North

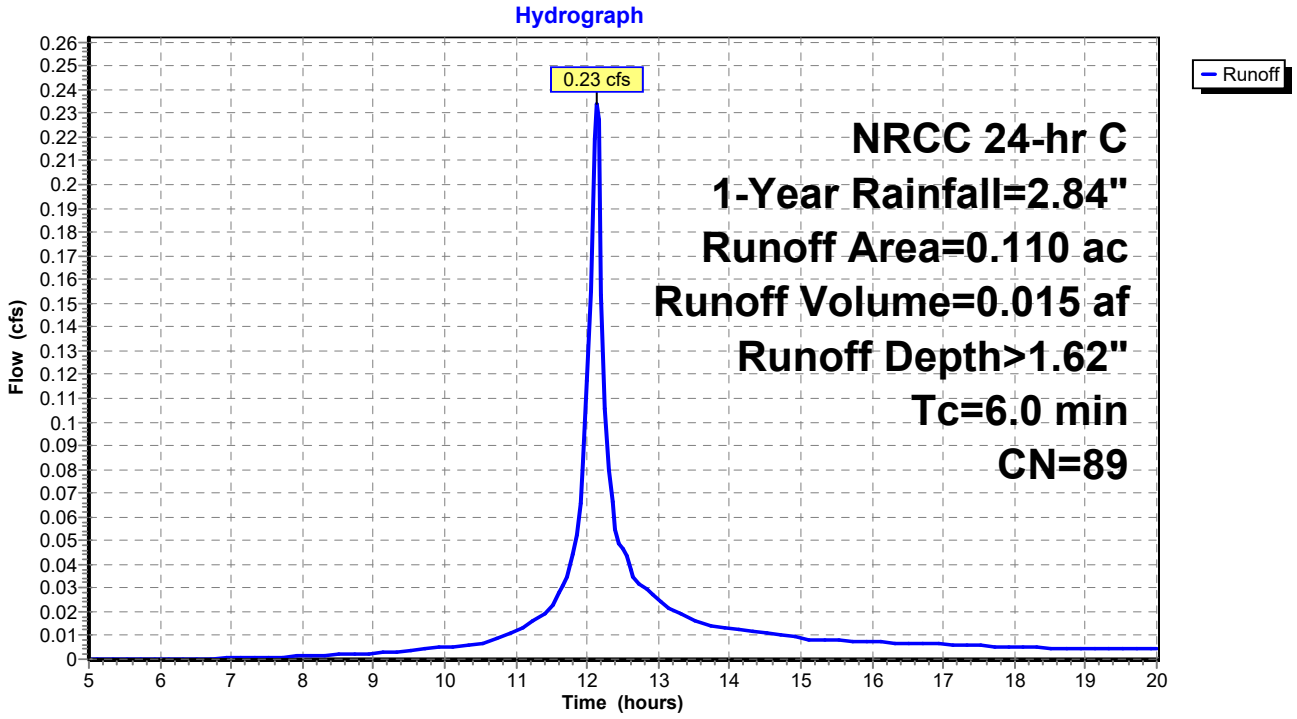
Runoff = 0.23 cfs @ 12.13 hrs, Volume= 0.015 af, Depth> 1.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.84"

Area (ac)	CN	Description
0.110	89	Gravel roads, HSG C
0.110		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 1S: North



Summary for Subcatchment E-WS#1: N

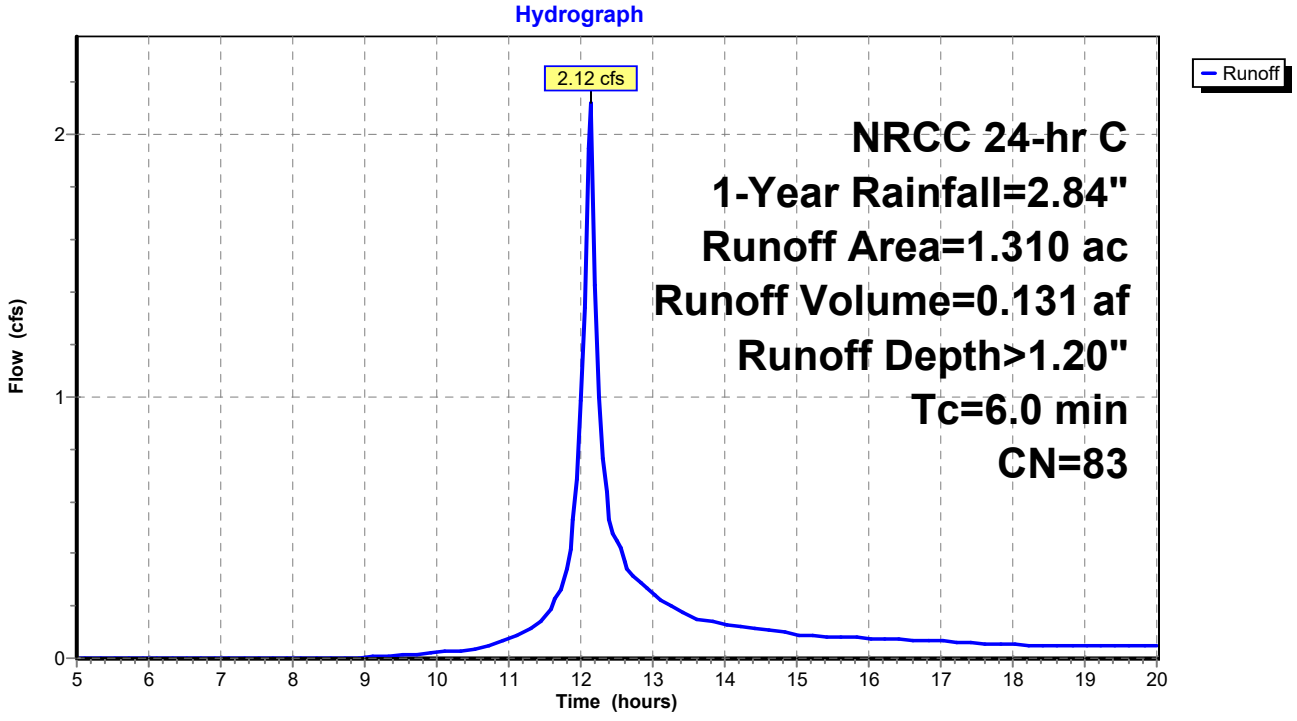
Runoff = 2.12 cfs @ 12.13 hrs, Volume= 0.131 af, Depth> 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.84"

Area (ac)	CN	Description
0.790	74	>75% Grass cover, Good, HSG C
0.420	98	Paved parking, HSG C
0.100	89	Gravel roads, HSG C
1.310	83	Weighted Average
0.890		67.94% Pervious Area
0.420		32.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-WS#1: N



Summary for Subcatchment E-WS#2: E

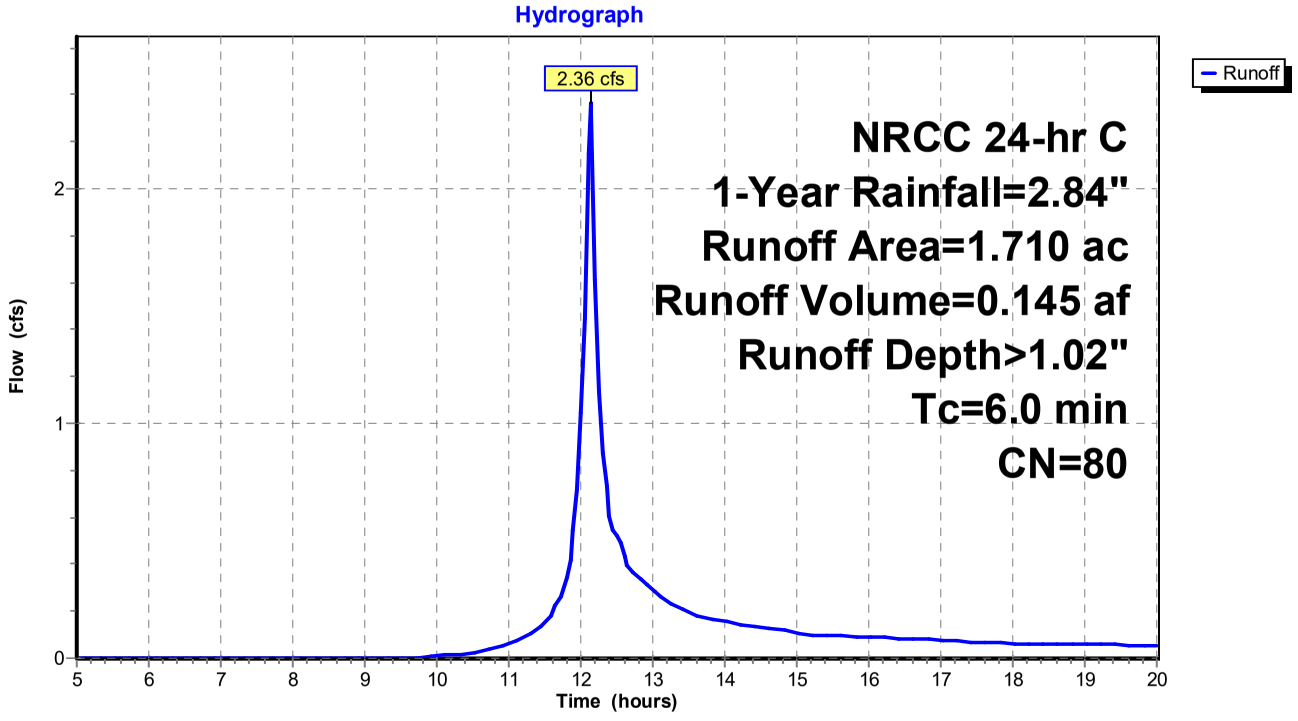
Runoff = 2.36 cfs @ 12.13 hrs, Volume= 0.145 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.84"

Area (ac)	CN	Description
1.270	74	>75% Grass cover, Good, HSG C
0.320	98	Paved parking, HSG C
0.120	89	Gravel roads, HSG C
1.710	80	Weighted Average
1.390		81.29% Pervious Area
0.320		18.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-WS#2: E



Summary for Subcatchment E-WS#3: W

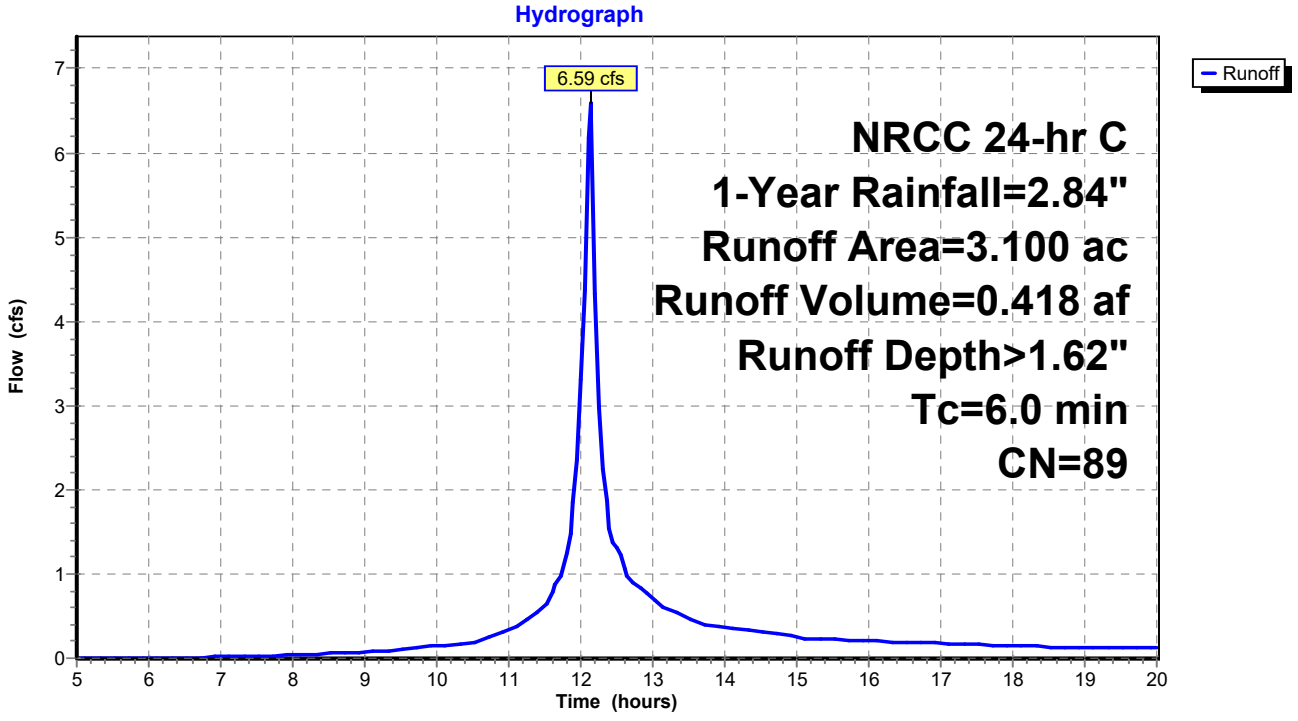
Runoff = 6.59 cfs @ 12.13 hrs, Volume= 0.418 af, Depth> 1.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.84"

Area (ac)	CN	Description
0.650	74	>75% Grass cover, Good, HSG C
0.980	98	Paved parking, HSG C
1.470	89	Gravel roads, HSG C
3.100	89	Weighted Average
2.120		68.39% Pervious Area
0.980		31.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-WS#3: W



Summary for Subcatchment E-WS#4: S

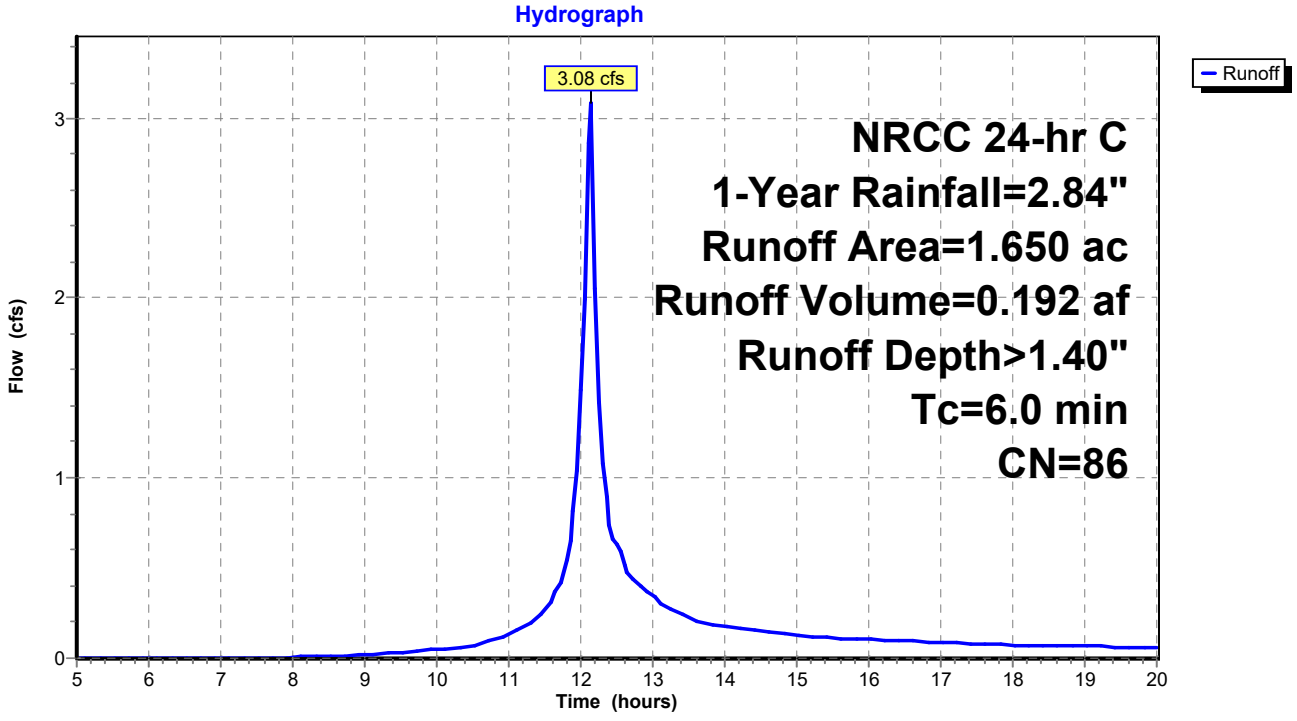
Runoff = 3.08 cfs @ 12.13 hrs, Volume= 0.192 af, Depth> 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.84"

Area (ac)	CN	Description
0.700	74	>75% Grass cover, Good, HSG C
0.550	98	Paved parking, HSG C
0.400	89	Gravel roads, HSG C
1.650	86	Weighted Average
1.100		66.67% Pervious Area
0.550		33.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-WS#4: S



Summary for Subcatchment P-WS#1B: North

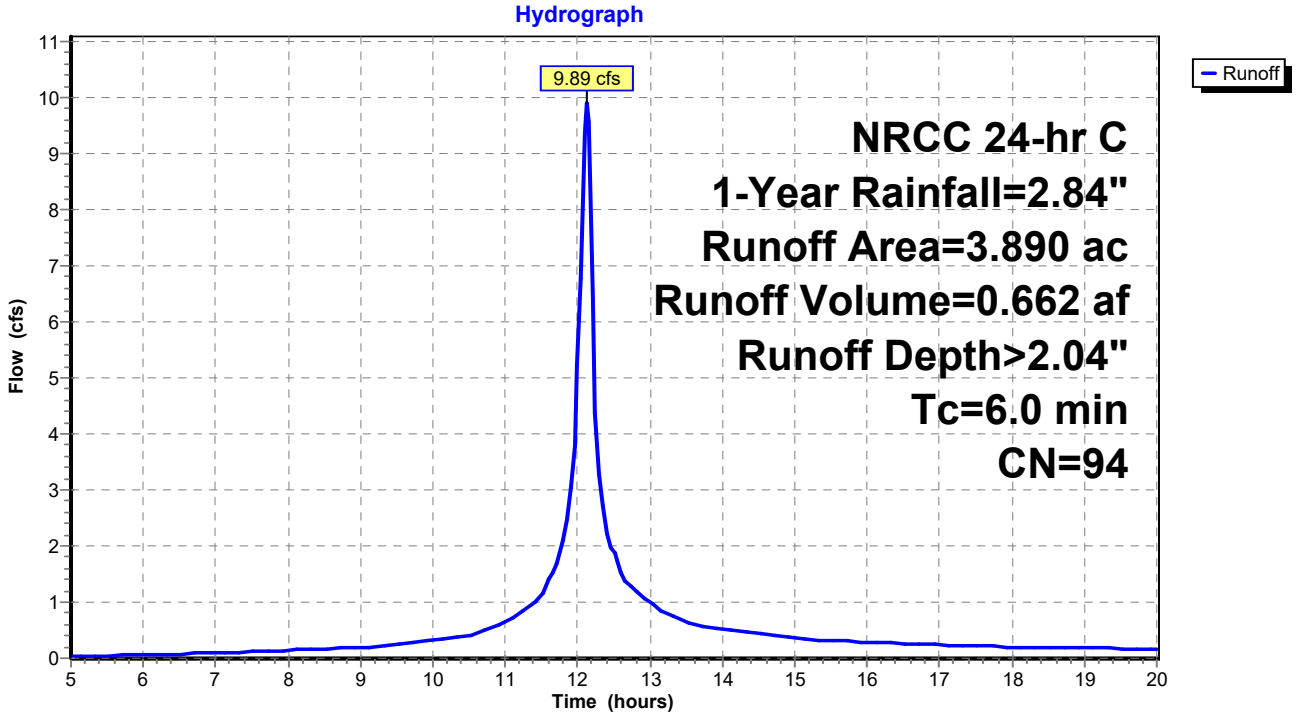
Runoff = 9.89 cfs @ 12.13 hrs, Volume= 0.662 af, Depth> 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.84"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG C
1.790	89	Gravel roads, HSG C
1.370	98	Roofs, HSG C
3.890	94	Weighted Average
1.790		46.02% Pervious Area
2.100		53.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-WS#1B: North



Summary for Subcatchment P-WS#2: South

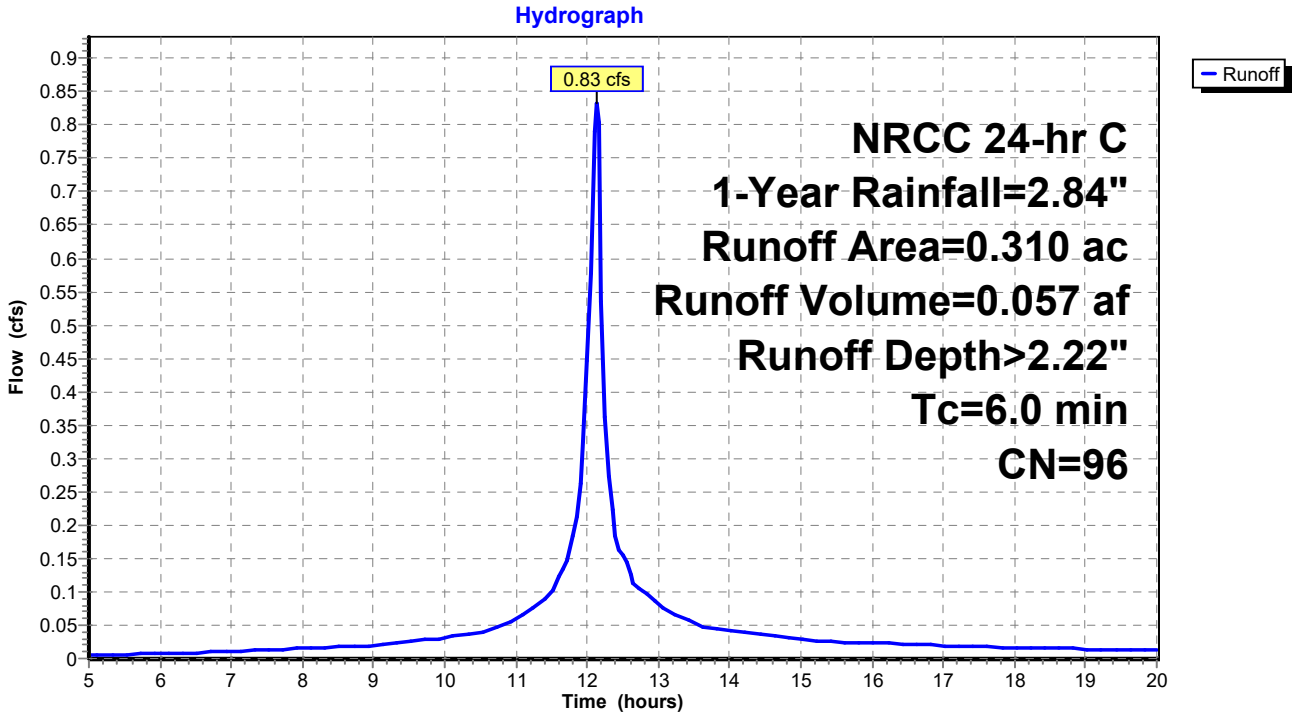
Runoff = 0.83 cfs @ 12.13 hrs, Volume= 0.057 af, Depth> 2.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.84"

Area (ac)	CN	Description
0.230	98	Paved parking, HSG C
0.080	89	Gravel roads, HSG C
0.310	96	Weighted Average
0.080		25.81% Pervious Area
0.230		74.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-WS#2: South



Summary for Subcatchment P-WS#3: South

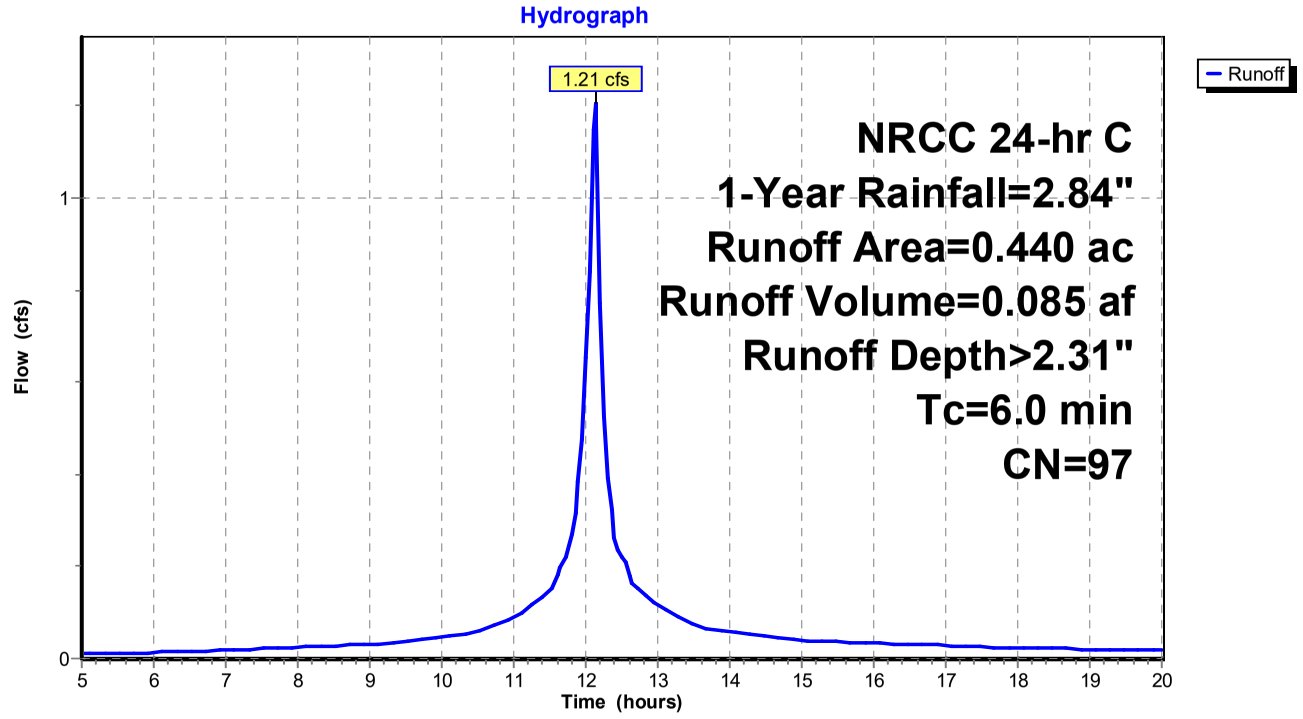
Runoff = 1.21 cfs @ 12.13 hrs, Volume= 0.085 af, Depth> 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.84"

Area (ac)	CN	Description
0.060	89	Gravel roads, HSG C
0.380	98	Paved parking, HSG C
0.440	97	Weighted Average
0.060		13.64% Pervious Area
0.380		86.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-WS#3: South



Summary for Subcatchment P-WS#4A: South

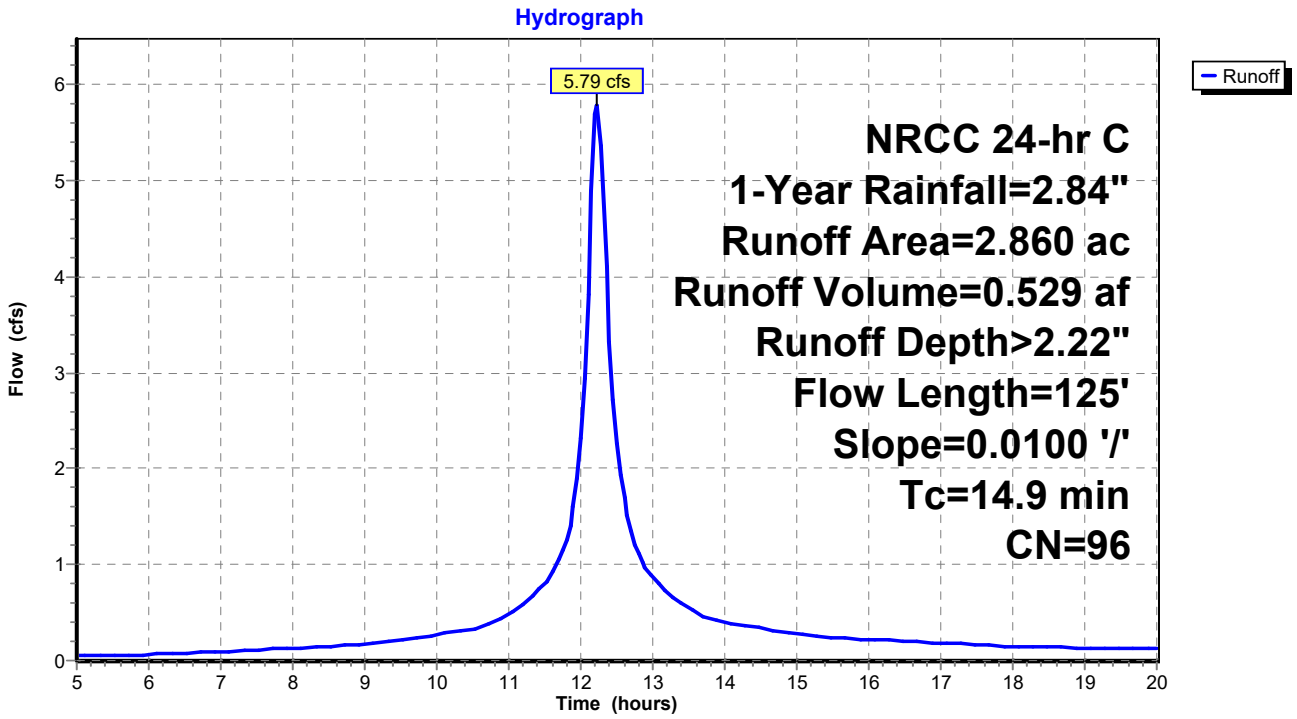
Runoff = 5.79 cfs @ 12.23 hrs, Volume= 0.529 af, Depth> 2.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.84"

Area (ac)	CN	Description
0.980	98	Paved parking, HSG C
0.580	89	Gravel roads, HSG C
1.300	98	Roofs, HSG C
2.860	96	Weighted Average
0.580		20.28% Pervious Area
2.280		79.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	125	0.0100	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.45"

Subcatchment P-WS#4A: South



Summary for Subcatchment P-WS#4B: South

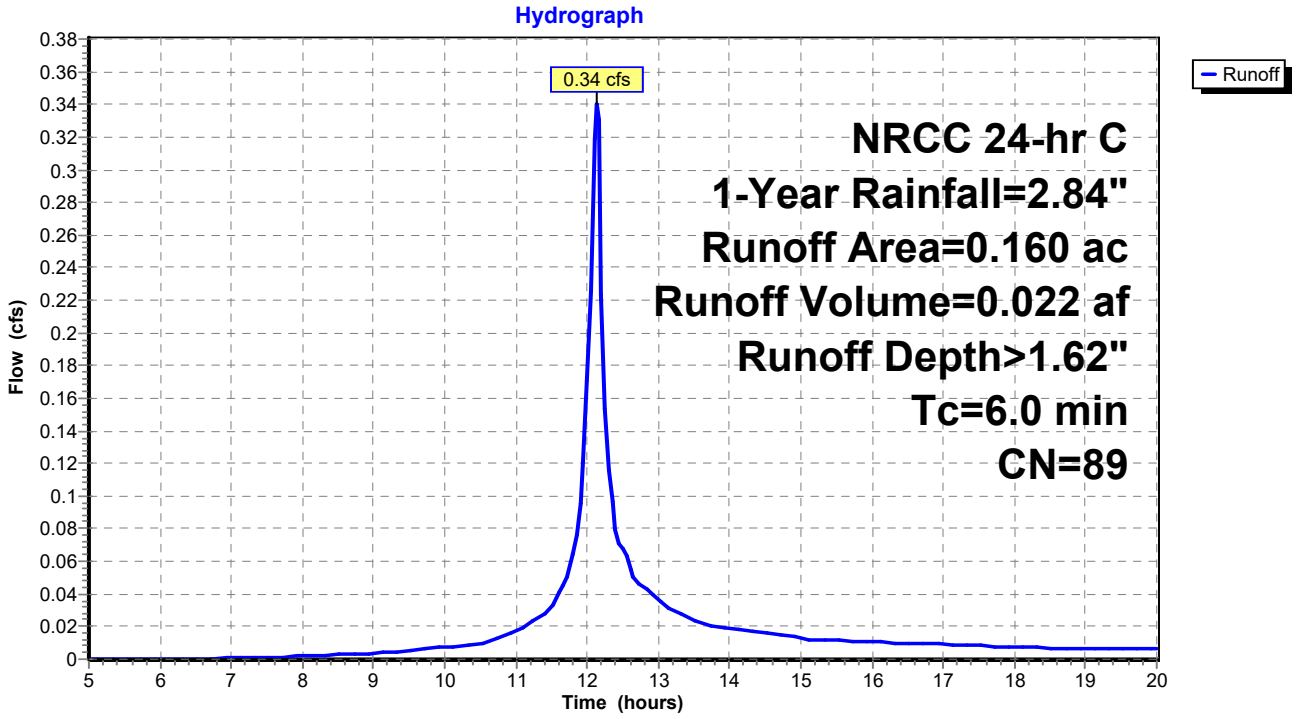
Runoff = 0.34 cfs @ 12.13 hrs, Volume= 0.022 af, Depth> 1.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 1-Year Rainfall=2.84"

Area (ac)	CN	Description
0.160	89	Gravel roads, HSG C
0.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-WS#4B: South

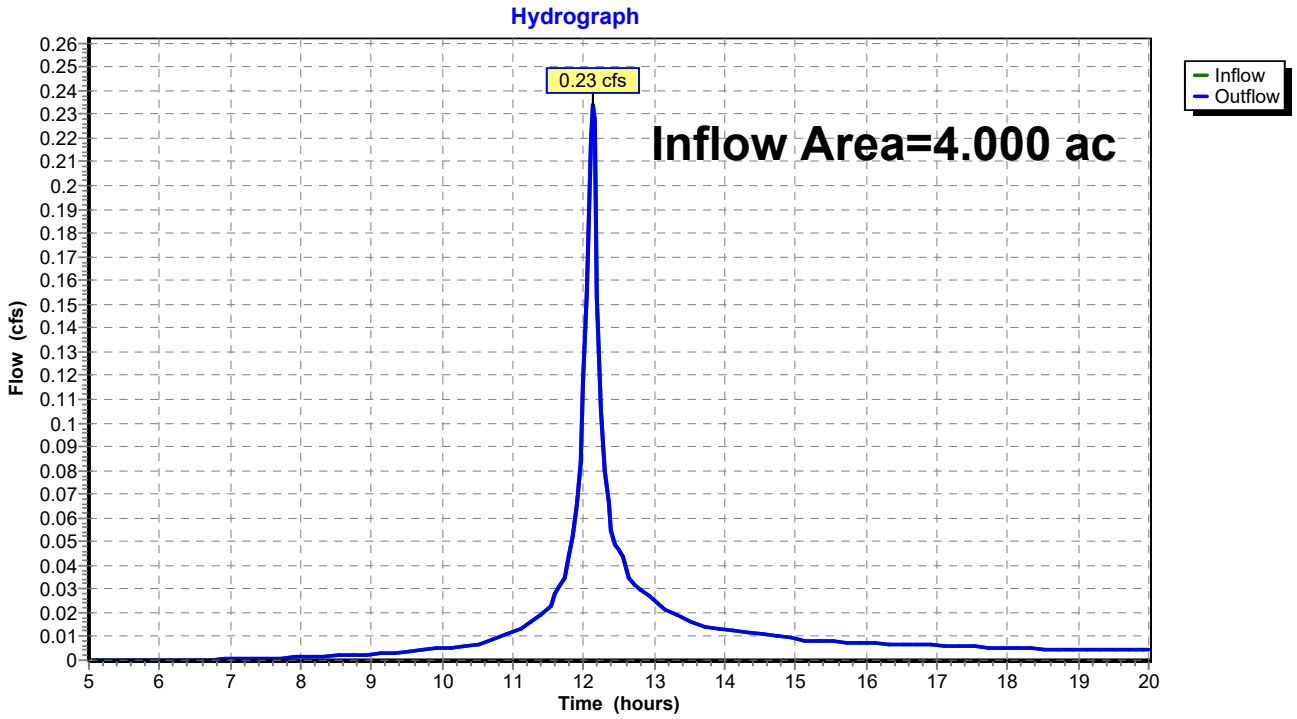


Summary for Reach P-POI#1: North

Inflow Area = 4.000 ac, 52.50% Impervious, Inflow Depth > 0.04" for 1-Year event
Inflow = 0.23 cfs @ 12.13 hrs, Volume= 0.015 af
Outflow = 0.23 cfs @ 12.13 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach P-POI#1: North

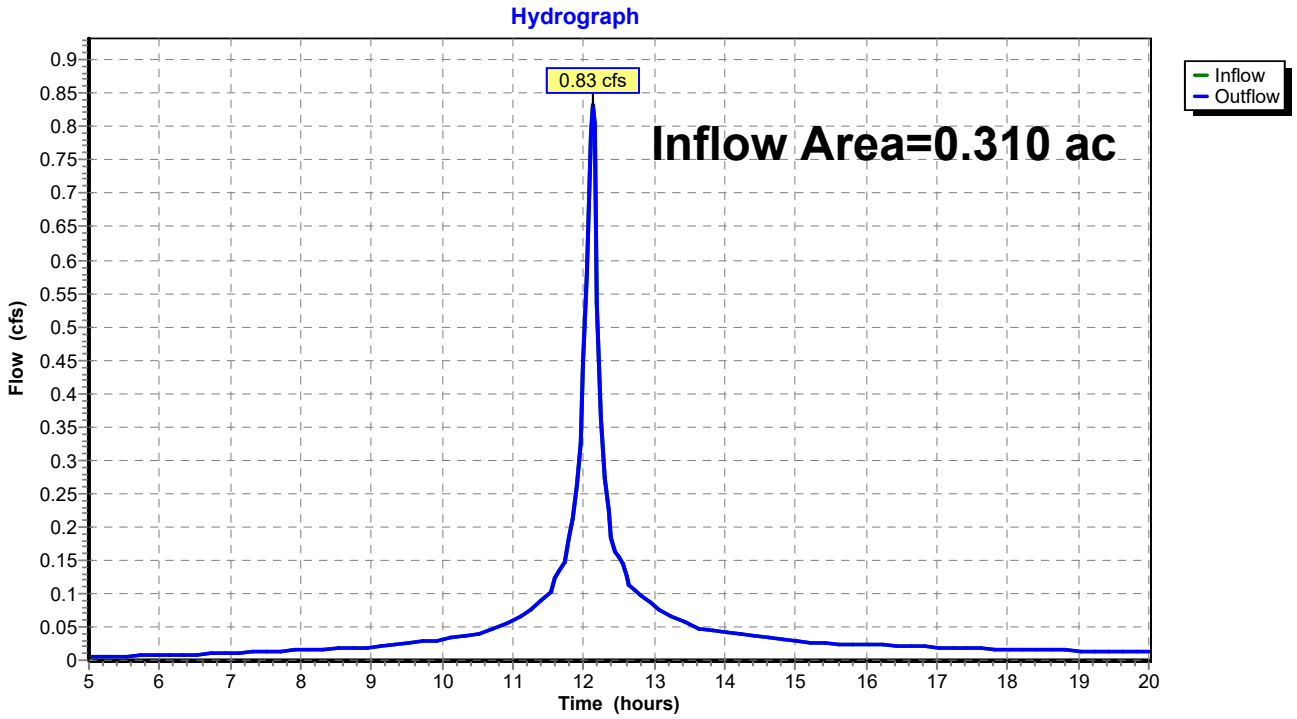


Summary for Reach P-POI#2: East

Inflow Area = 0.310 ac, 74.19% Impervious, Inflow Depth > 2.22" for 1-Year event
Inflow = 0.83 cfs @ 12.13 hrs, Volume= 0.057 af
Outflow = 0.83 cfs @ 12.13 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach P-POI#2: East

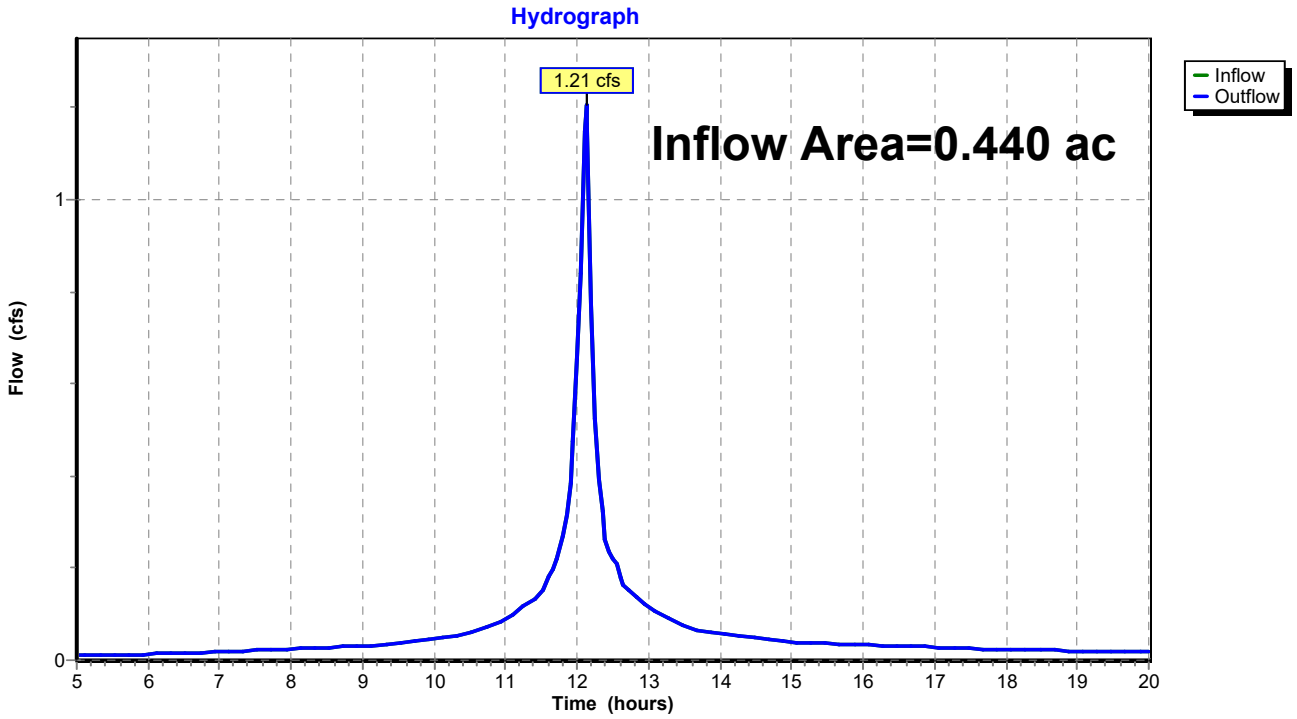


Summary for Reach P-POI#3: West

Inflow Area = 0.440 ac, 86.36% Impervious, Inflow Depth > 2.31" for 1-Year event
Inflow = 1.21 cfs @ 12.13 hrs, Volume= 0.085 af
Outflow = 1.21 cfs @ 12.13 hrs, Volume= 0.085 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach P-POI#3: West

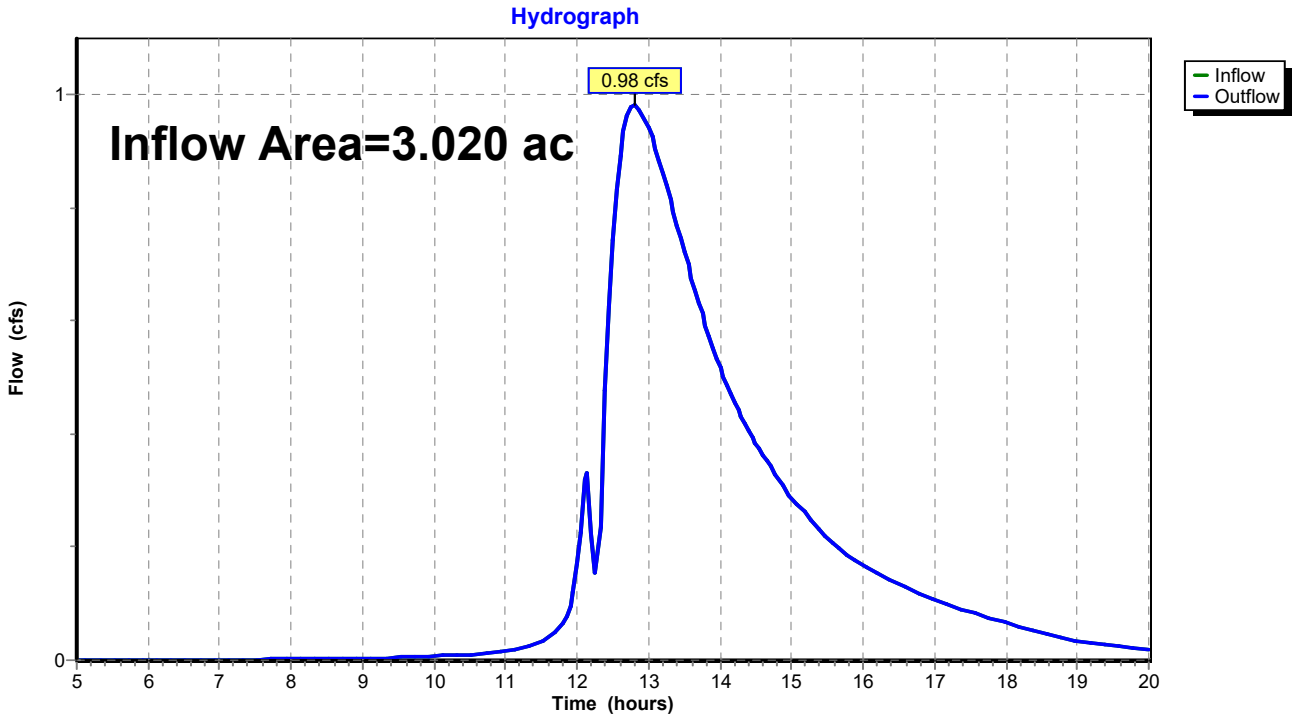


Summary for Reach P-POI#4: South

Inflow Area = 3.020 ac, 75.50% Impervious, Inflow Depth > 0.77" for 1-Year event
Inflow = 0.98 cfs @ 12.80 hrs, Volume= 0.193 af
Outflow = 0.98 cfs @ 12.80 hrs, Volume= 0.193 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach P-POI#4: South



Summary for Pond P-POND: pond

Inflow Area = 3.890 ac, 53.98% Impervious, Inflow Depth > 2.04" for 1-Year event
Inflow = 9.89 cfs @ 12.13 hrs, Volume= 0.662 af
Outflow = 0.20 cfs @ 17.93 hrs, Volume= 0.186 af, Atten= 98%, Lag= 348.2 min
Discarded = 0.20 cfs @ 17.93 hrs, Volume= 0.186 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 10.41' @ 17.93 hrs Surf.Area= 0.389 ac Storage= 0.479 af

Plug-Flow detention time= 214.6 min calculated for 0.186 af (28% of inflow)
Center-of-Mass det. time= 81.2 min (841.9 - 760.7)

Volume	Invert	Avail.Storage	Storage Description
#1	9.00'	1.966 af	**Custom Stage Data (Pyramidal)** Listed below (Recalc)

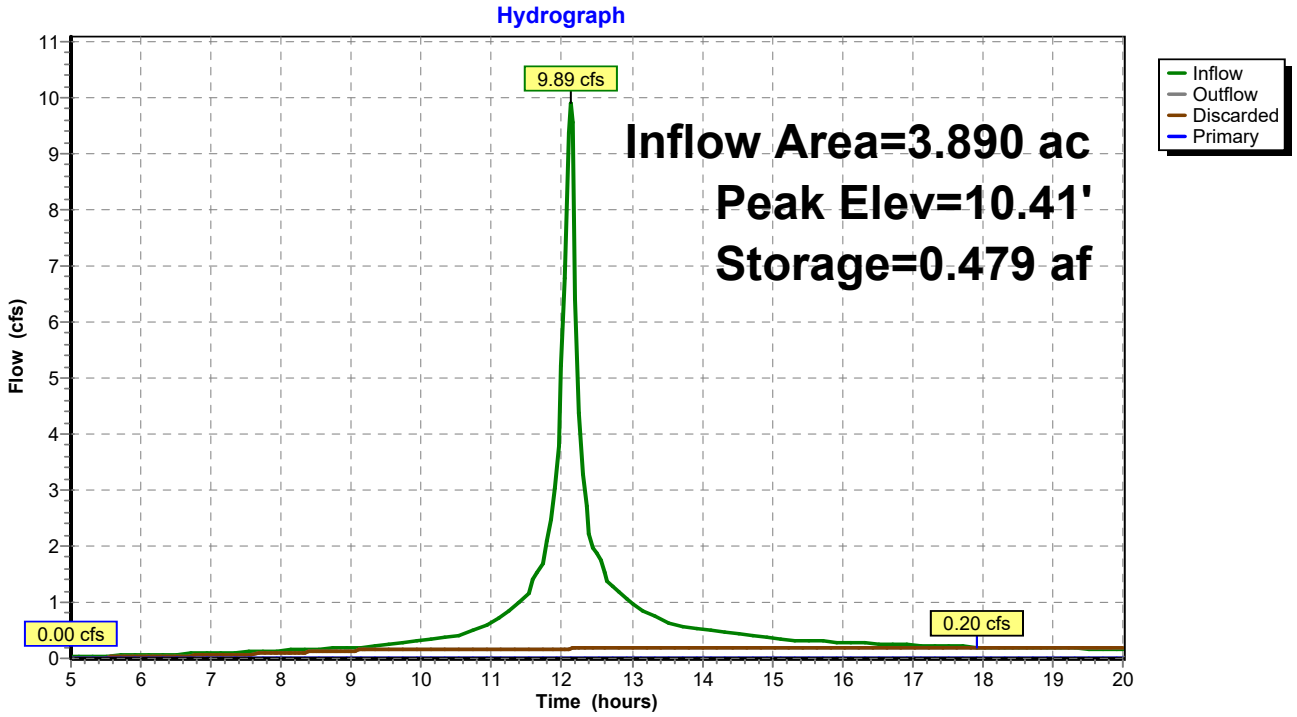
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
9.00	0.291	0.000	0.000	0.291
11.00	0.434	0.720	0.720	0.436
12.50	0.577	0.756	1.476	0.580
13.25	0.733	0.490	1.966	0.737

Device	Routing	Invert	Outlet Devices
#1	Discarded	9.00'	**0.500 in/hr Exfiltration over Surface area**
#2	Primary	11.00'	**18.0" Round Culvert** L= 14.0' Ke= 0.500 Inlet / Outlet Invert= 11.00' / 10.72' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Discarded OutFlow Max=0.20 cfs @ 17.93 hrs HW=10.41' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.20 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=9.00' (Free Discharge)
↑—**2=Culvert** (Controls 0.00 cfs)

Pond P-POND: pond



Stage-Area-Storage for Pond P-POND: pond

Elevation (feet)	Surface (acres)	Storage (acre-feet)
9.00	0.291	0.000
9.05	0.294	0.015
9.10	0.297	0.029
9.15	0.301	0.044
9.20	0.304	0.059
9.25	0.307	0.075
9.30	0.311	0.090
9.35	0.314	0.106
9.40	0.317	0.122
9.45	0.321	0.138
9.50	0.324	0.154
9.55	0.327	0.170
9.60	0.331	0.186
9.65	0.334	0.203
9.70	0.338	0.220
9.75	0.341	0.237
9.80	0.345	0.254
9.85	0.348	0.271
9.90	0.352	0.289
9.95	0.355	0.307
10.00	0.359	0.324
10.05	0.363	0.342
10.10	0.366	0.361
10.15	0.370	0.379
10.20	0.373	0.398
10.25	0.377	0.416
10.30	0.381	0.435
10.35	0.384	0.454
10.40	0.388	0.474
10.45	0.392	0.493
10.50	0.396	0.513
10.55	0.399	0.533
10.60	0.403	0.553
10.65	0.407	0.573
10.70	0.411	0.594
10.75	0.415	0.614
10.80	0.418	0.635
10.85	0.422	0.656
10.90	0.426	0.677
10.95	0.430	0.699
11.00	0.434	0.720
11.05	0.438	0.742
11.10	0.443	0.764
11.15	0.447	0.786
11.20	0.452	0.809
11.25	0.456	0.832
11.30	0.461	0.854
11.35	0.466	0.878
11.40	0.470	0.901
11.45	0.475	0.925
11.50	0.479	0.949
11.55	0.484	0.973
11.60	0.489	0.997
11.65	0.493	1.021
11.70	0.498	1.046
11.75	0.503	1.071
11.80	0.508	1.097
11.85	0.513	1.122
11.90	0.517	1.148
11.95	0.522	1.174
12.00	0.527	1.200
12.05	0.532	1.227
12.10	0.537	1.253
12.15	0.542	1.280
12.20	0.547	1.307
12.25	0.552	1.335
12.30	0.557	1.363
12.35	0.562	1.391
12.40	0.567	1.419
12.45	0.572	1.447
12.50	0.577	1.476
12.55	0.587	1.505
12.60	0.597	1.535
12.65	0.607	1.565
12.70	0.617	1.595
12.75	0.627	1.626
12.80	0.637	1.658
12.85	0.647	1.690
12.90	0.658	1.723
12.95	0.668	1.756
13.00	0.679	1.790
13.05	0.690	1.824
13.10	0.700	1.859
13.15	0.711	1.894
13.20	0.722	1.930
13.25	**0.733**	**1.966**

Summary for Pond P-UDS: (new Pond)

Inflow Area = 2.860 ac, 79.72% Impervious, Inflow Depth > 2.22" for 1-Year event
Inflow = 5.79 cfs @ 12.23 hrs, Volume= 0.529 af
Outflow = 1.09 cfs @ 12.82 hrs, Volume= 0.335 af, Atten= 81%, Lag= 35.4 min
Discarded = 0.15 cfs @ 8.75 hrs, Volume= 0.164 af
Primary = 0.94 cfs @ 12.82 hrs, Volume= 0.171 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 11.28' @ 12.82 hrs Surf.Area= 0.295 ac Storage= 0.261 af

Plug-Flow detention time= 142.7 min calculated for 0.335 af (63% of inflow)
Center-of-Mass det. time= 65.9 min (823.1 - 757.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	10.00'	0.221 af	**72.17'W x 178.00'L x 3.21'H Field A** 0.946 af Overall - 0.393 af Embedded = 0.554 af x 40.0% Voids
#2A	10.50'	0.393 af	**Cultec R-280HD** x 400 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 16 rows
		0.614 af	Total Available Storage

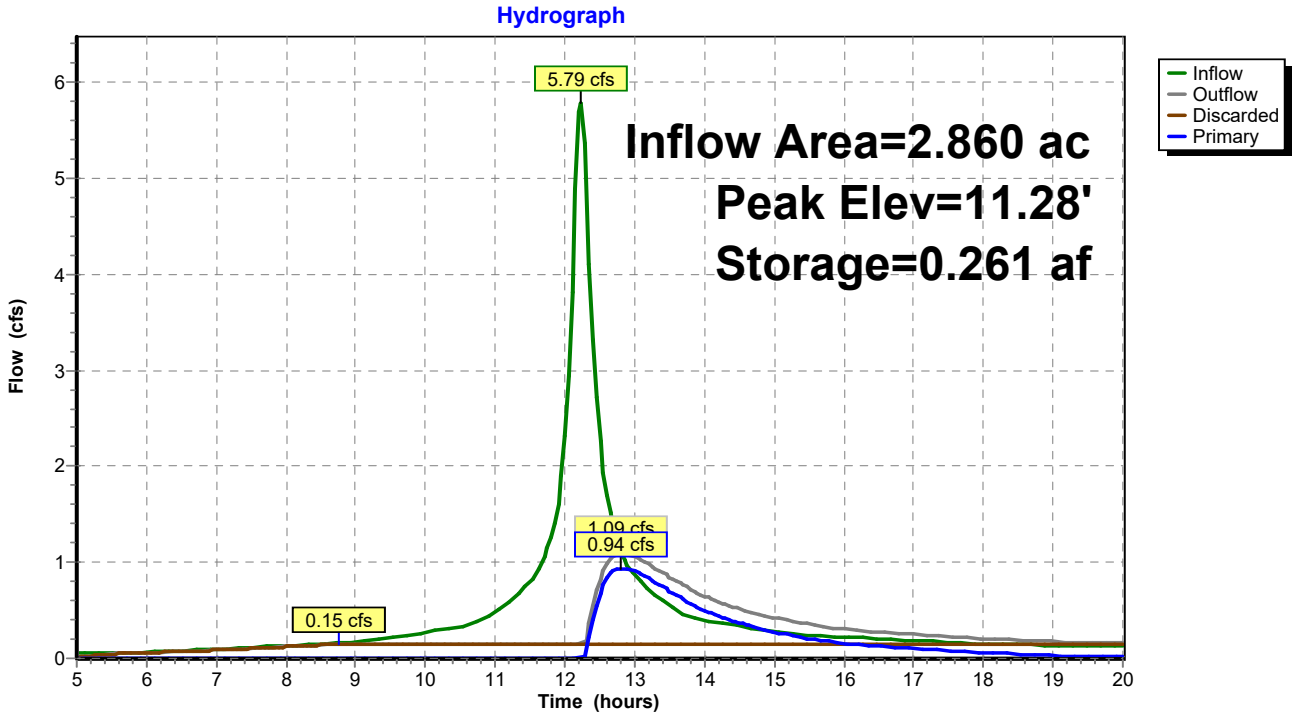
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	**0.500 in/hr Exfiltration over Surface area**
#2	Primary	10.00'	**30.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 10.00' / 9.50' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#3	Device 2	11.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.15 cfs @ 8.75 hrs HW=10.03' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=0.94 cfs @ 12.82 hrs HW=11.28' (Free Discharge)
└**2=Culvert** (Passes 0.94 cfs of 8.90 cfs potential flow)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.94 cfs @ 1.73 fps)

Pond P-UDS: (new Pond)



Stage-Area-Storage for Pond P-UDS: (new Pond)

Elevation (feet)	Surface (acres)	Storage (acre-feet)
10.00	**0.295**	0.000
10.05	0.295	0.006
10.10	0.295	0.012
10.15	0.295	0.018
10.20	0.295	0.024
10.25	0.295	0.029
10.30	0.295	0.035
10.35	0.295	0.041
10.40	0.295	0.047
10.45	0.295	0.053
10.50	0.295	0.059
10.55	0.295	0.072
10.60	0.295	0.086
10.65	0.295	0.099
10.70	0.295	0.112
10.75	0.295	0.125
10.80	0.295	0.138
10.85	0.295	0.151
10.90	0.295	0.164
10.95	0.295	0.177
11.00	0.295	0.190
11.05	0.295	0.203
11.10	0.295	0.216
11.15	0.295	0.229
11.20	0.295	0.241
11.25	0.295	0.254
11.30	0.295	0.266
11.35	0.295	0.278
11.40	0.295	0.291
11.45	0.295	0.303
11.50	0.295	0.315
11.55	0.295	0.327
11.60	0.295	0.339
11.65	0.295	0.351
11.70	0.295	0.363
11.75	0.295	0.375
11.80	0.295	0.386
11.85	0.295	0.398
11.90	0.295	0.409
11.95	0.295	0.420
12.00	0.295	0.431
12.05	0.295	0.442
12.10	0.295	0.453
12.15	0.295	0.463
12.20	0.295	0.473
12.25	0.295	0.483
12.30	0.295	0.493
12.35	0.295	0.502
12.40	0.295	0.511
12.45	0.295	0.520
12.50	0.295	0.528
12.55	0.295	0.535
12.60	0.295	0.542
12.65	0.295	0.548
12.70	0.295	0.554
12.75	0.295	0.560
12.80	0.295	0.566
12.85	0.295	0.572
12.90	0.295	0.578
12.95	0.295	0.583
13.00	0.295	0.589
13.05	0.295	0.595
13.10	0.295	0.601
13.15	0.295	0.607
13.20	0.295	**0.613**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: North Runoff Area=0.110 ac 0.00% Impervious Runoff Depth>3.59"
Tc=6.0 min CN=89 Runoff=0.49 cfs 0.033 af

SubcatchmentE-WS#1: N Runoff Area=1.310 ac 32.06% Impervious Runoff Depth>3.01"
Tc=6.0 min CN=83 Runoff=5.14 cfs 0.328 af

SubcatchmentE-WS#2: E Runoff Area=1.710 ac 18.71% Impervious Runoff Depth>2.73"
Tc=6.0 min CN=80 Runoff=6.19 cfs 0.389 af

SubcatchmentE-WS#3: W Runoff Area=3.100 ac 31.61% Impervious Runoff Depth>3.59"
Tc=6.0 min CN=89 Runoff=13.94 cfs 0.927 af

SubcatchmentE-WS#4: S Runoff Area=1.650 ac 33.33% Impervious Runoff Depth>3.30"
Tc=6.0 min CN=86 Runoff=6.97 cfs 0.453 af

SubcatchmentP-WS#1B: North Runoff Area=3.890 ac 53.98% Impervious Runoff Depth>4.07"
Tc=6.0 min CN=94 Runoff=18.96 cfs 1.320 af

SubcatchmentP-WS#2: South Runoff Area=0.310 ac 74.19% Impervious Runoff Depth>4.25"
Tc=6.0 min CN=96 Runoff=1.54 cfs 0.110 af

SubcatchmentP-WS#3: South Runoff Area=0.440 ac 86.36% Impervious Runoff Depth>4.33"
Tc=6.0 min CN=97 Runoff=2.21 cfs 0.159 af

SubcatchmentP-WS#4A: South Runoff Area=2.860 ac 79.72% Impervious Runoff Depth>4.25"
Flow Length=125' Slope=0.0100 '/' Tc=14.9 min CN=96 Runoff=10.79 cfs 1.012 af

SubcatchmentP-WS#4B: South Runoff Area=0.160 ac 0.00% Impervious Runoff Depth>3.59"
Tc=6.0 min CN=89 Runoff=0.72 cfs 0.048 af

Reach P-POI#1: North Inflow=0.76 cfs 0.315 af
Outflow=0.76 cfs 0.315 af

Reach P-POI#2: East Inflow=1.54 cfs 0.110 af
Outflow=1.54 cfs 0.110 af

Reach P-POI#3: West Inflow=2.21 cfs 0.159 af
Outflow=2.21 cfs 0.159 af

Reach P-POI#4: South Inflow=5.38 cfs 0.672 af
Outflow=5.38 cfs 0.672 af

Pond P-POND: pond Peak Elev=11.38' Storage=0.891 af Inflow=18.96 cfs 1.320 af
Discarded=0.24 cfs 0.234 af Primary=0.73 cfs 0.283 af Outflow=0.97 cfs 0.517 af

Pond P-UDS: (new Pond) Peak Elev=11.92' Storage=0.413 af Inflow=10.79 cfs 1.012 af
Discarded=0.15 cfs 0.182 af Primary=5.23 cfs 0.624 af Outflow=5.38 cfs 0.805 af

Total Runoff Area = 15.540 ac Runoff Volume = 4.780 af Average Runoff Depth = 3.69"
53.28% Pervious = 8.280 ac 46.72% Impervious = 7.260 ac

Summary for Subcatchment 1S: North

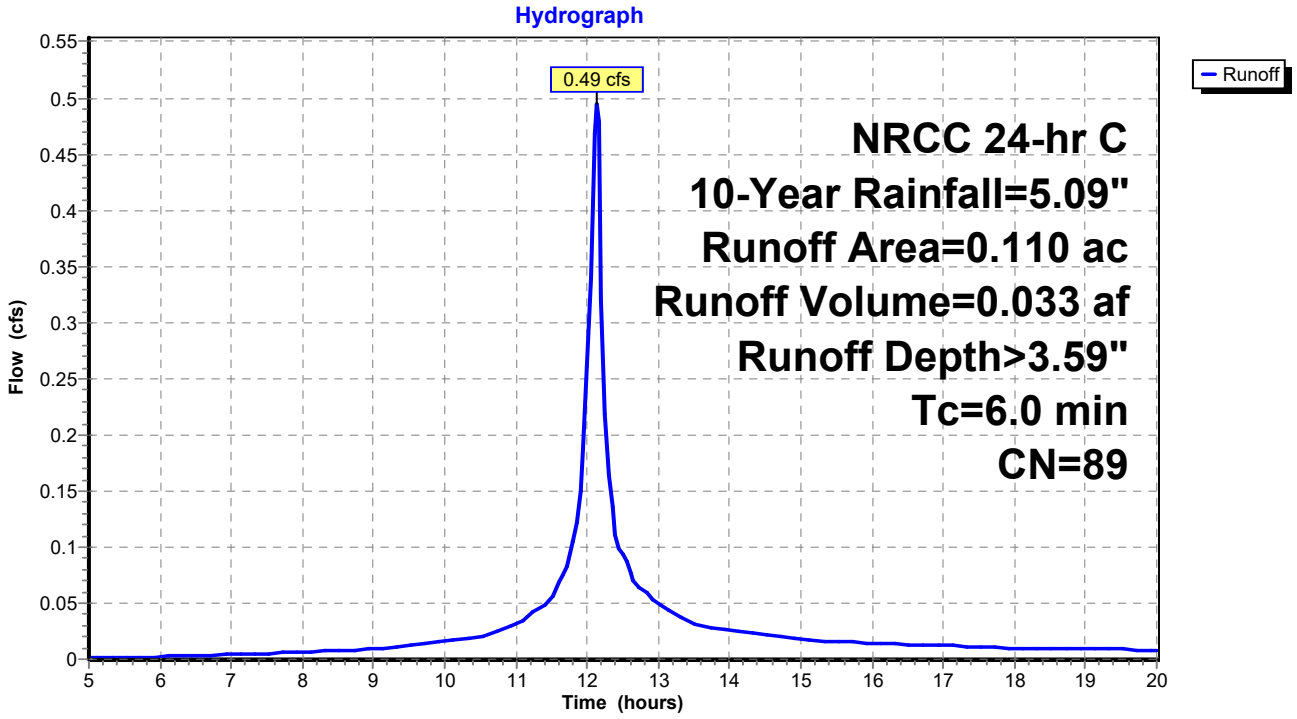
Runoff = 0.49 cfs @ 12.13 hrs, Volume= 0.033 af, Depth> 3.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=5.09"

Area (ac)	CN	Description
0.110	89	Gravel roads, HSG C
0.110		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 1S: North



Summary for Subcatchment E-WS#1: N

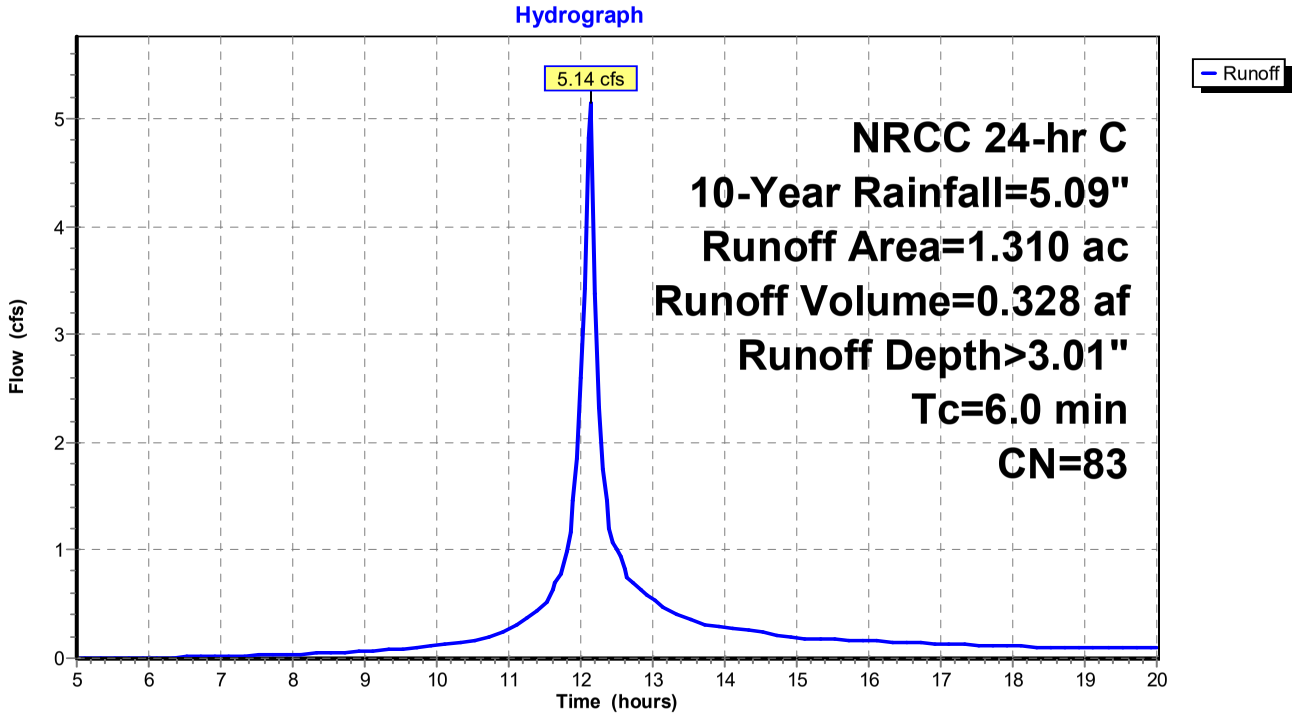
Runoff = 5.14 cfs @ 12.13 hrs, Volume= 0.328 af, Depth> 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=5.09"

Area (ac)	CN	Description
0.790	74	>75% Grass cover, Good, HSG C
0.420	98	Paved parking, HSG C
0.100	89	Gravel roads, HSG C
1.310	83	Weighted Average
0.890		67.94% Pervious Area
0.420		32.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-WS#1: N



Summary for Subcatchment E-WS#2: E

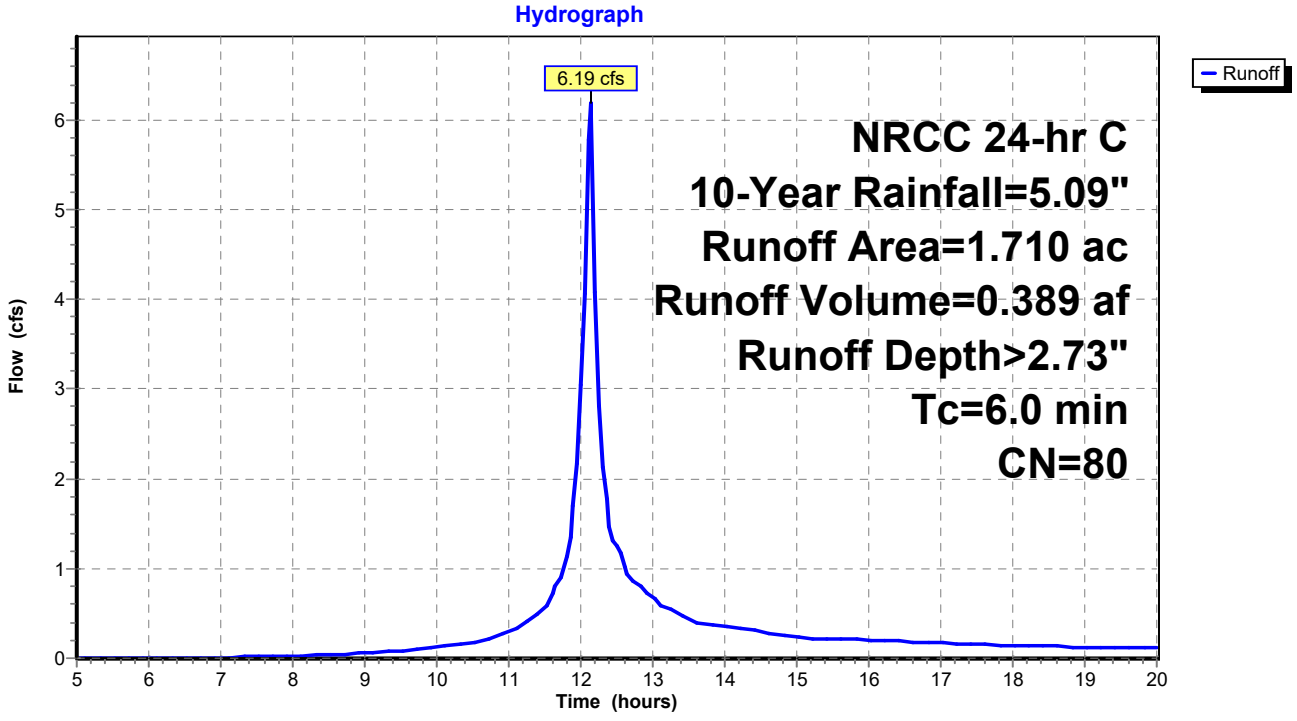
Runoff = 6.19 cfs @ 12.13 hrs, Volume= 0.389 af, Depth> 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=5.09"

Area (ac)	CN	Description
1.270	74	>75% Grass cover, Good, HSG C
0.320	98	Paved parking, HSG C
0.120	89	Gravel roads, HSG C
1.710	80	Weighted Average
1.390		81.29% Pervious Area
0.320		18.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-WS#2: E



Summary for Subcatchment E-WS#3: W

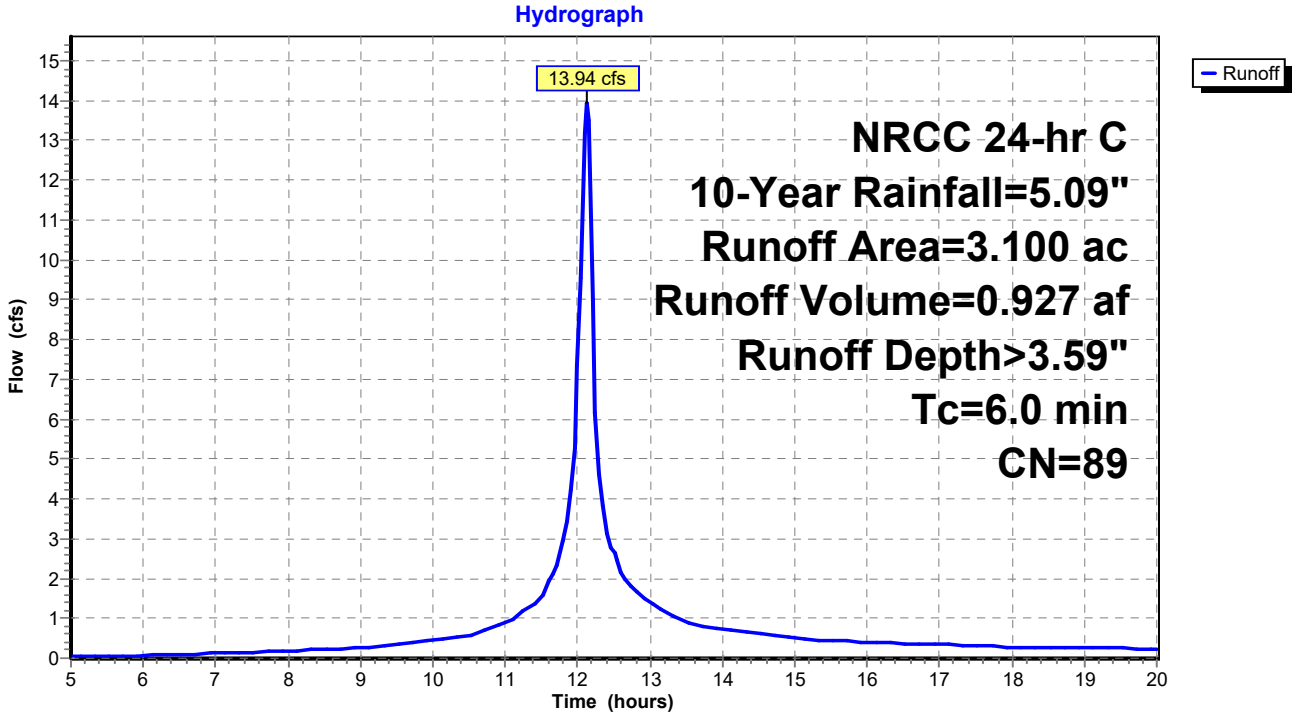
Runoff = 13.94 cfs @ 12.13 hrs, Volume= 0.927 af, Depth> 3.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=5.09"

Area (ac)	CN	Description
0.650	74	>75% Grass cover, Good, HSG C
0.980	98	Paved parking, HSG C
1.470	89	Gravel roads, HSG C
3.100	89	Weighted Average
2.120		68.39% Pervious Area
0.980		31.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-WS#3: W



Summary for Subcatchment E-WS#4: S

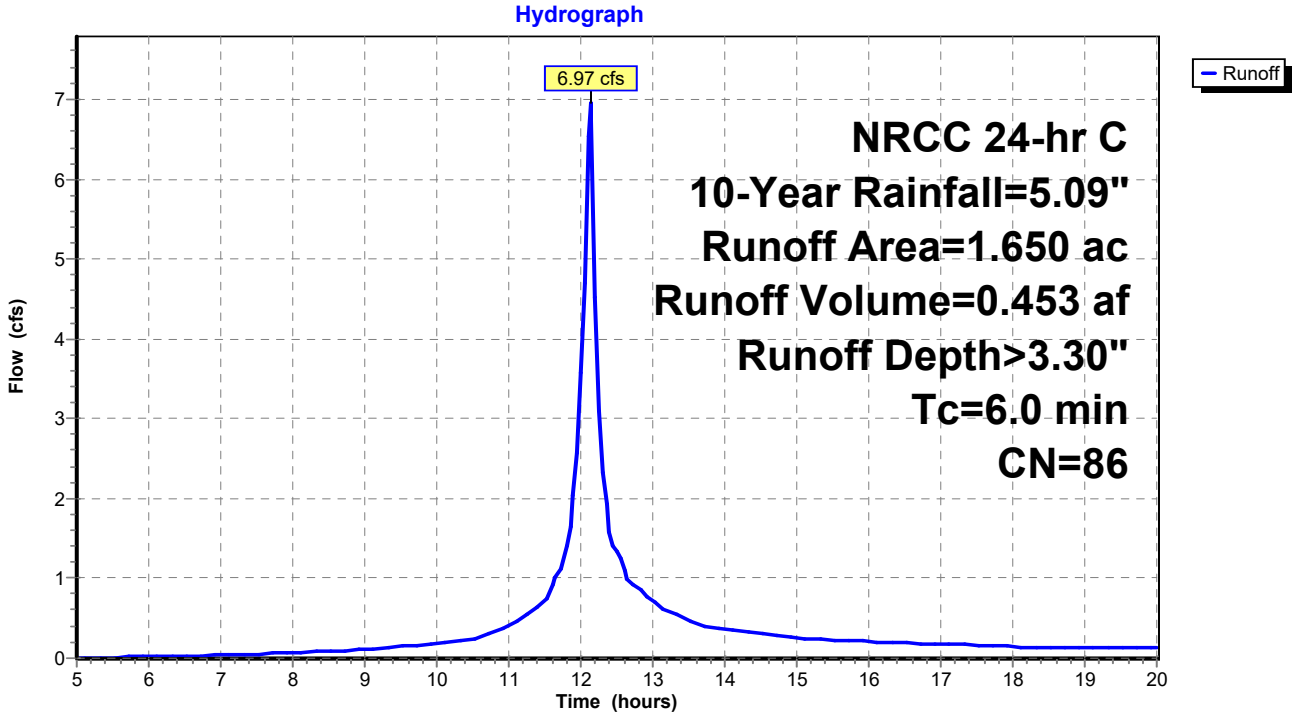
Runoff = 6.97 cfs @ 12.13 hrs, Volume= 0.453 af, Depth> 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=5.09"

Area (ac)	CN	Description
0.700	74	>75% Grass cover, Good, HSG C
0.550	98	Paved parking, HSG C
0.400	89	Gravel roads, HSG C
1.650	86	Weighted Average
1.100		66.67% Pervious Area
0.550		33.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-WS#4: S



Summary for Subcatchment P-WS#1B: North

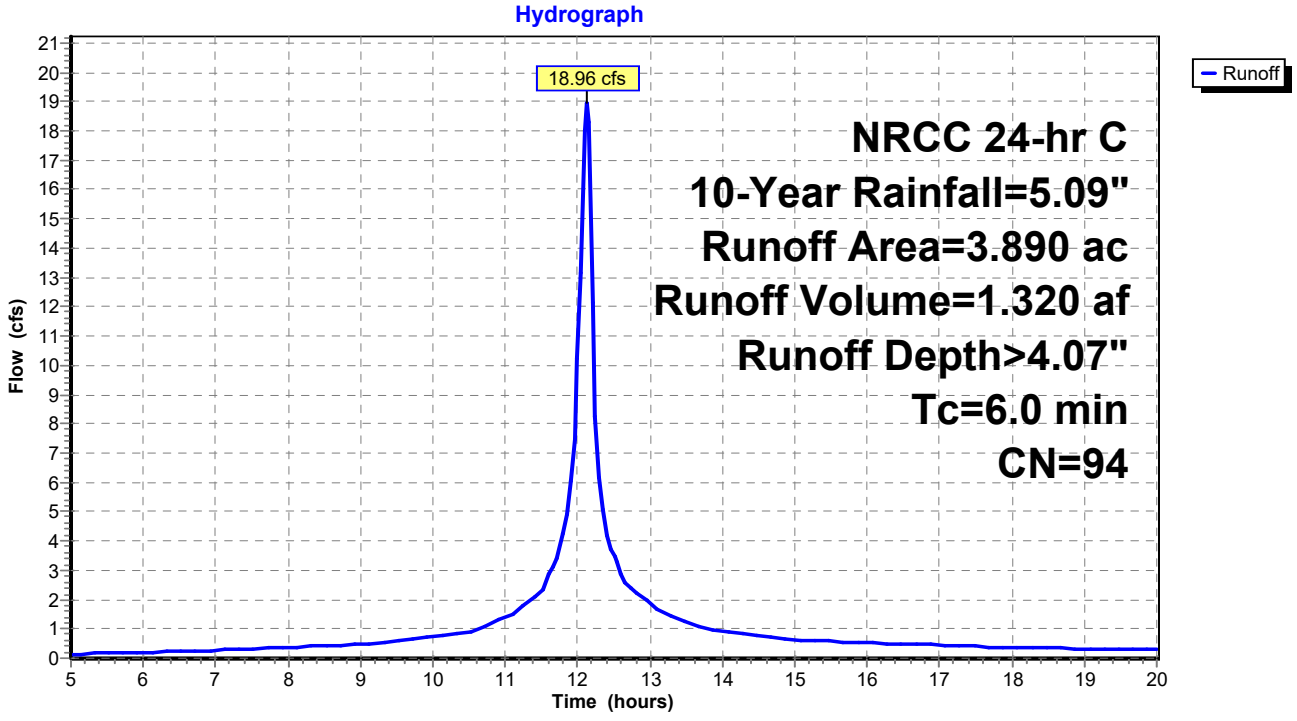
Runoff = 18.96 cfs @ 12.13 hrs, Volume= 1.320 af, Depth> 4.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=5.09"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG C
1.790	89	Gravel roads, HSG C
1.370	98	Roofs, HSG C
3.890	94	Weighted Average
1.790		46.02% Pervious Area
2.100		53.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-WS#1B: North



Summary for Subcatchment P-WS#2: South

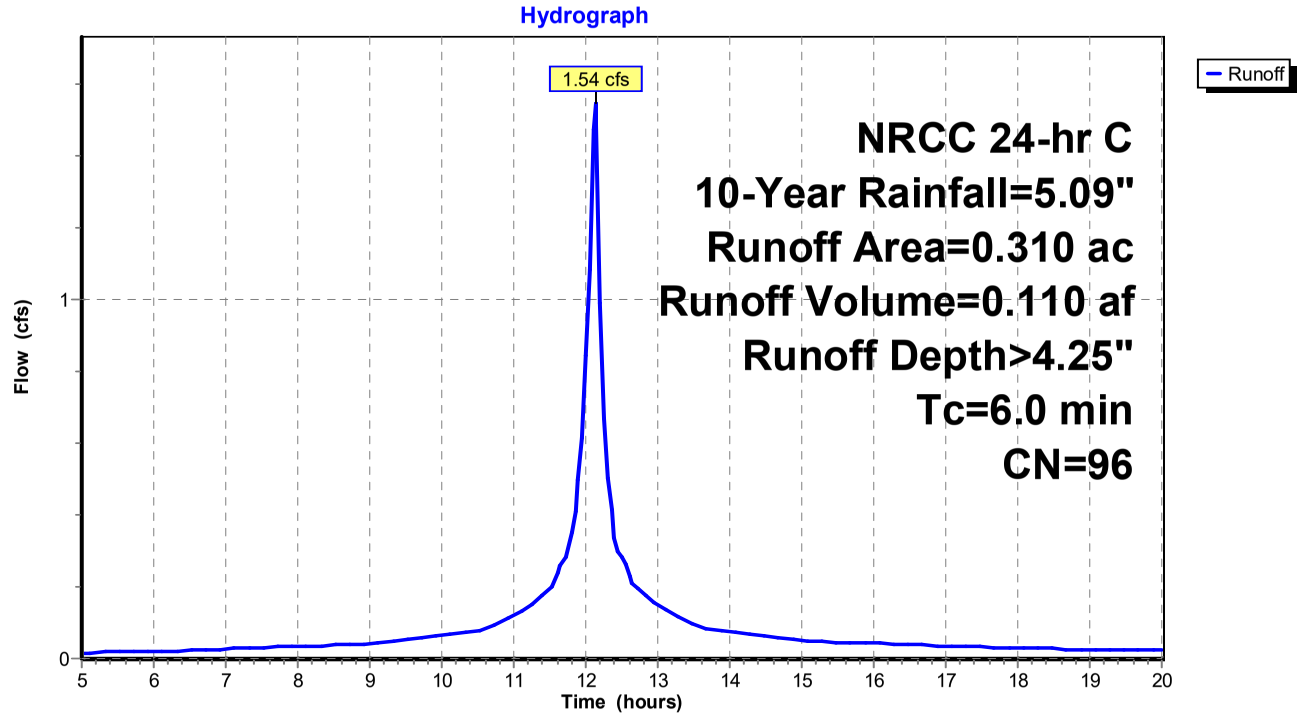
Runoff = 1.54 cfs @ 12.13 hrs, Volume= 0.110 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=5.09"

Area (ac)	CN	Description
0.230	98	Paved parking, HSG C
0.080	89	Gravel roads, HSG C
0.310	96	Weighted Average
0.080		25.81% Pervious Area
0.230		74.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-WS#2: South



Summary for Subcatchment P-WS#3: South

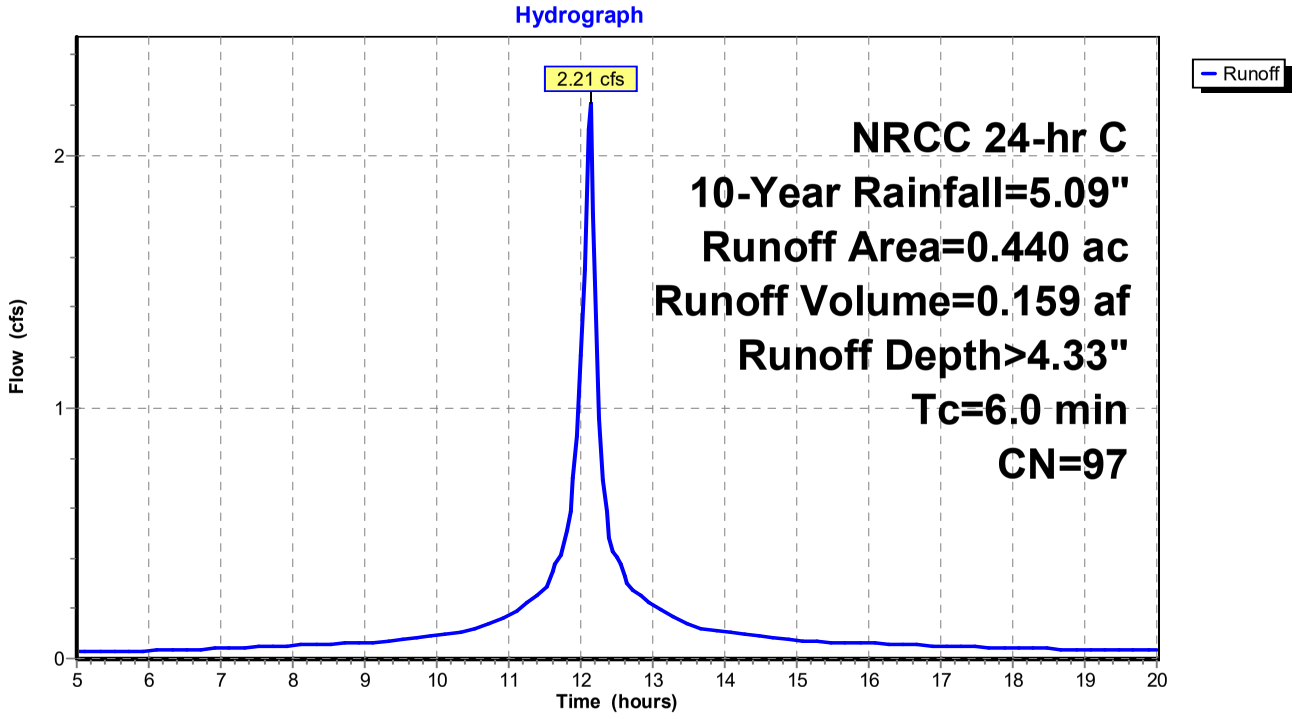
Runoff = 2.21 cfs @ 12.13 hrs, Volume= 0.159 af, Depth> 4.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=5.09"

Area (ac)	CN	Description
0.060	89	Gravel roads, HSG C
0.380	98	Paved parking, HSG C
0.440	97	Weighted Average
0.060		13.64% Pervious Area
0.380		86.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-WS#3: South



Summary for Subcatchment P-WS#4A: South

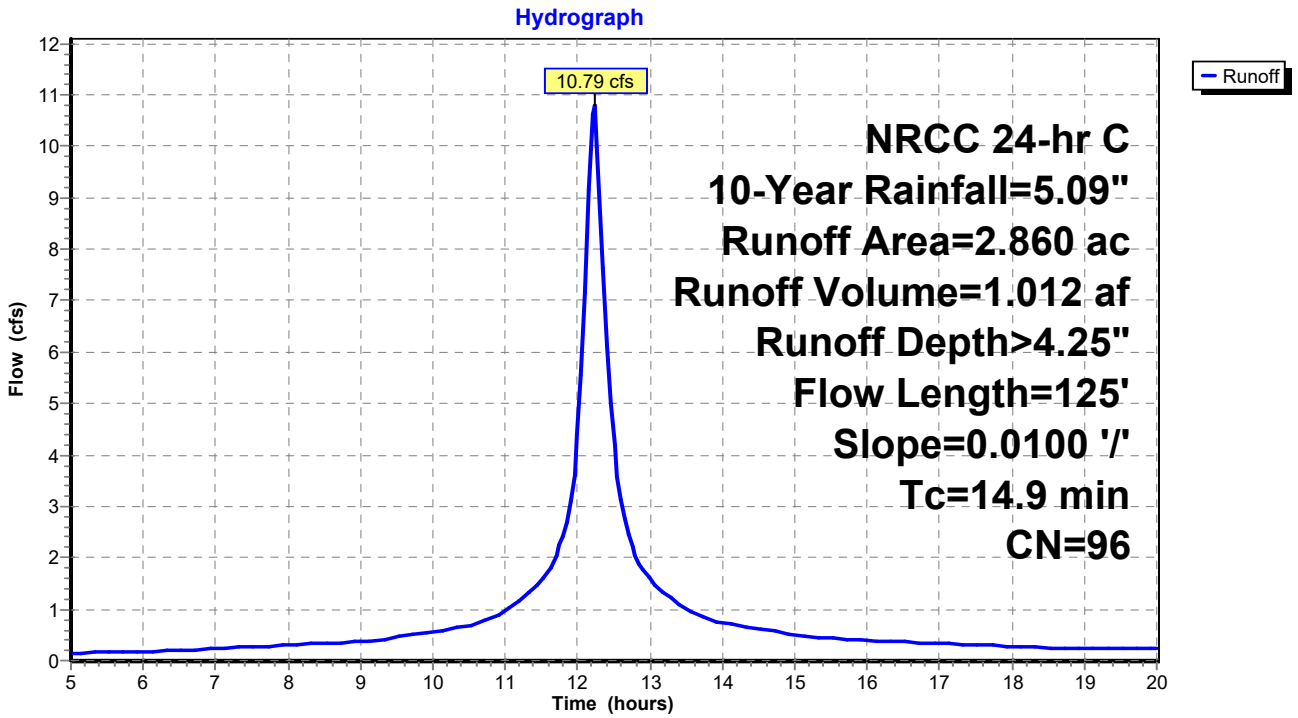
Runoff = 10.79 cfs @ 12.22 hrs, Volume= 1.012 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=5.09"

Area (ac)	CN	Description
0.980	98	Paved parking, HSG C
0.580	89	Gravel roads, HSG C
1.300	98	Roofs, HSG C
2.860	96	Weighted Average
0.580		20.28% Pervious Area
2.280		79.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	125	0.0100	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.45"

Subcatchment P-WS#4A: South



Summary for Subcatchment P-WS#4B: South

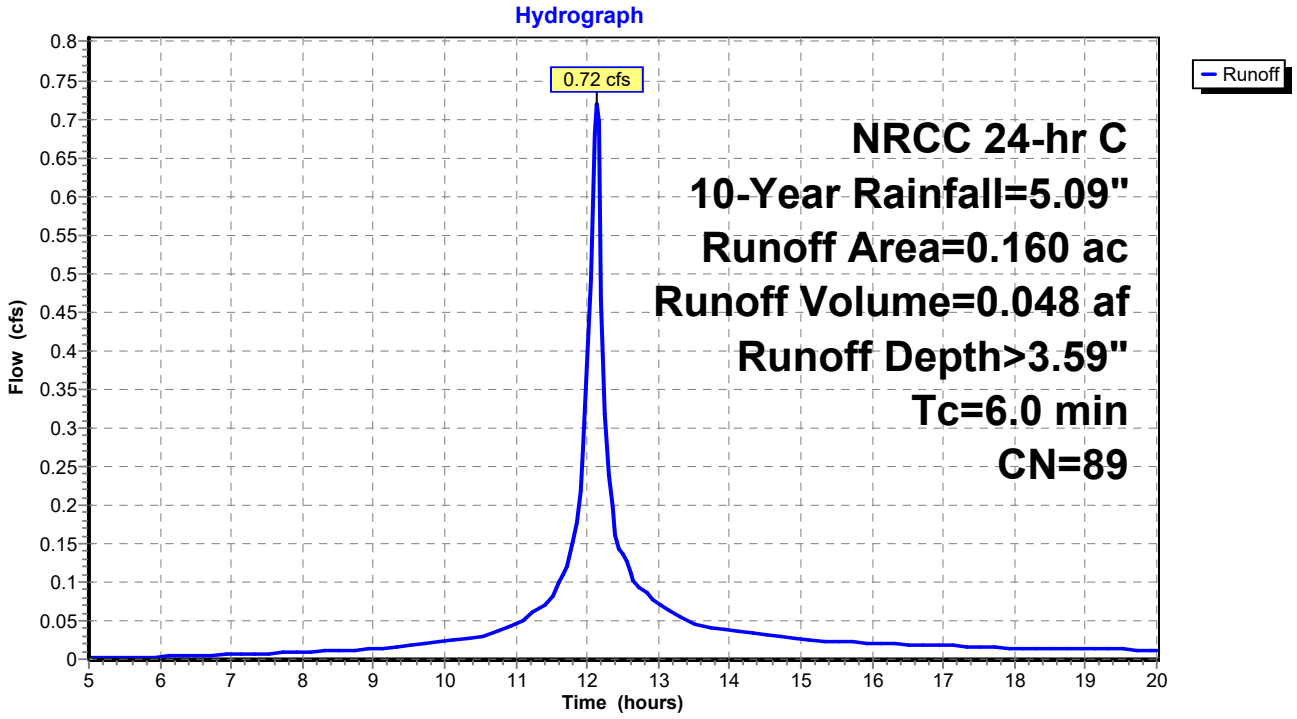
Runoff = 0.72 cfs @ 12.13 hrs, Volume= 0.048 af, Depth> 3.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-Year Rainfall=5.09"

Area (ac)	CN	Description
0.160	89	Gravel roads, HSG C
0.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-WS#4B: South

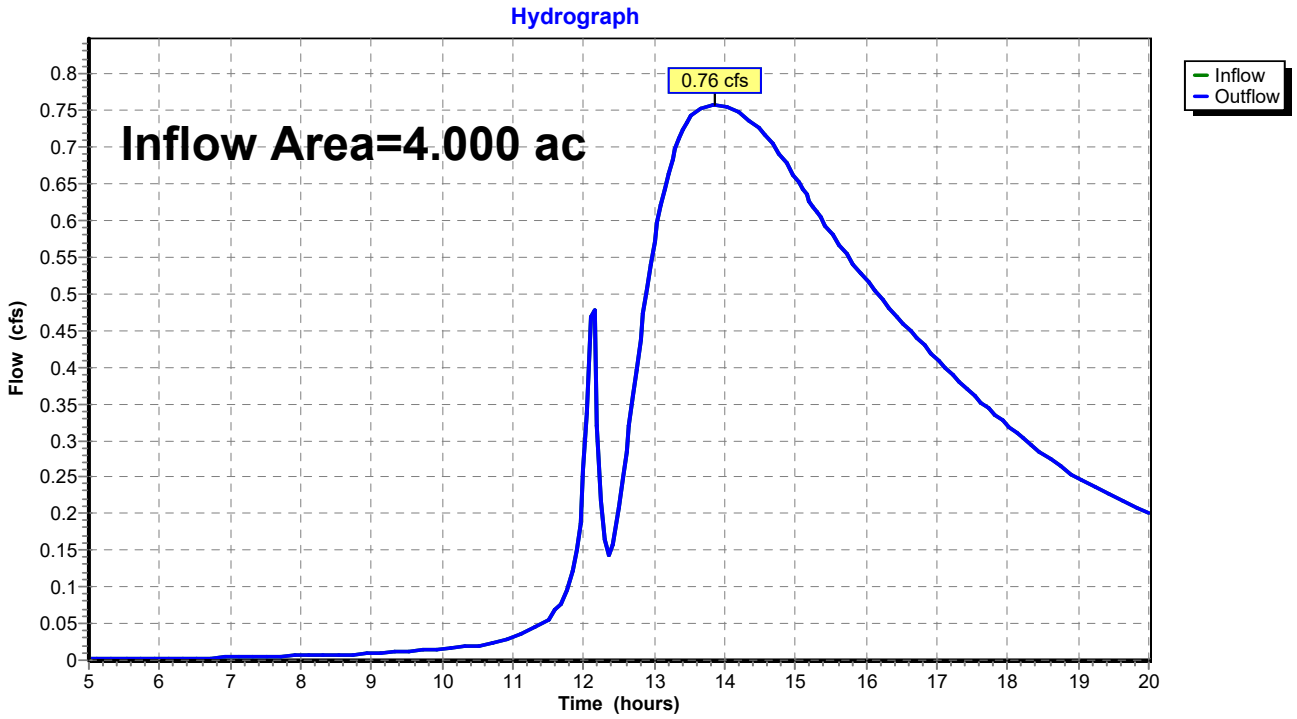


Summary for Reach P-POI#1: North

Inflow Area = 4.000 ac, 52.50% Impervious, Inflow Depth > 0.95" for 10-Year event
Inflow = 0.76 cfs @ 13.86 hrs, Volume= 0.315 af
Outflow = 0.76 cfs @ 13.86 hrs, Volume= 0.315 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach P-POI#1: North

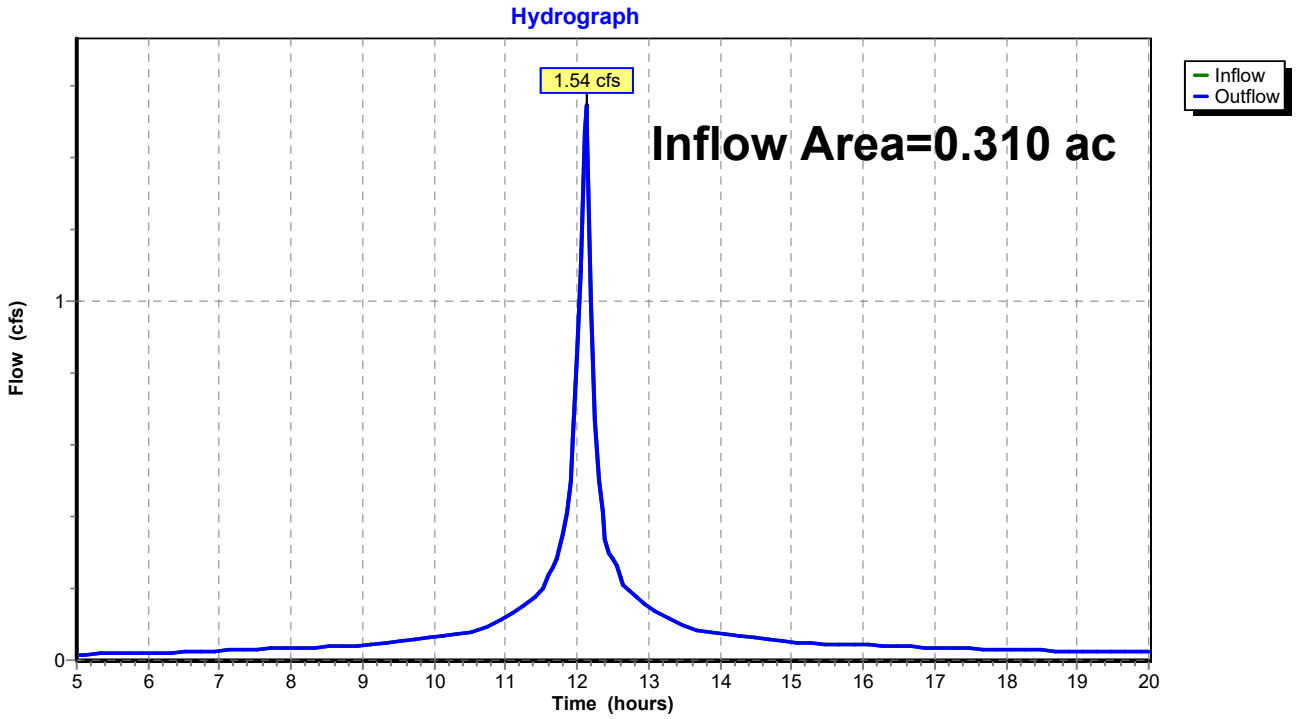


Summary for Reach P-POI#2: East

Inflow Area = 0.310 ac, 74.19% Impervious, Inflow Depth > 4.25" for 10-Year event
Inflow = 1.54 cfs @ 12.13 hrs, Volume= 0.110 af
Outflow = 1.54 cfs @ 12.13 hrs, Volume= 0.110 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach P-POI#2: East

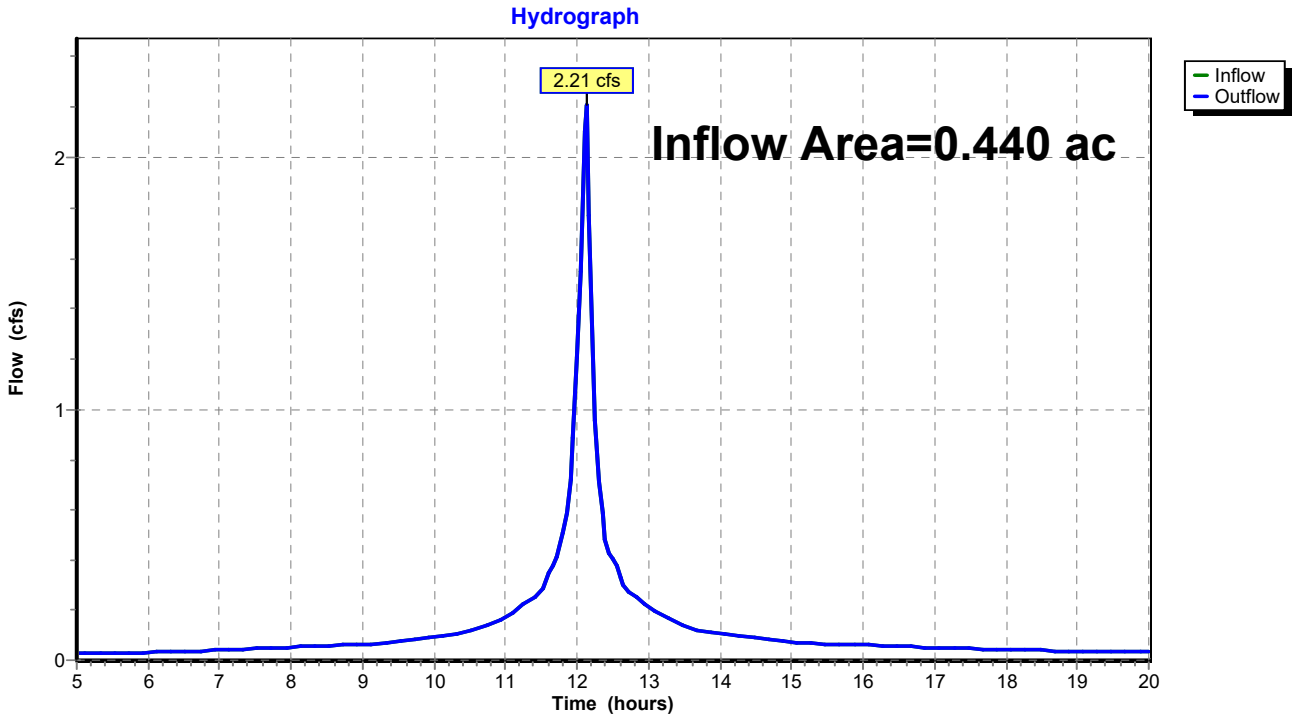


Summary for Reach P-POI#3: West

Inflow Area = 0.440 ac, 86.36% Impervious, Inflow Depth > 4.33" for 10-Year event
Inflow = 2.21 cfs @ 12.13 hrs, Volume= 0.159 af
Outflow = 2.21 cfs @ 12.13 hrs, Volume= 0.159 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach P-POI#3: West

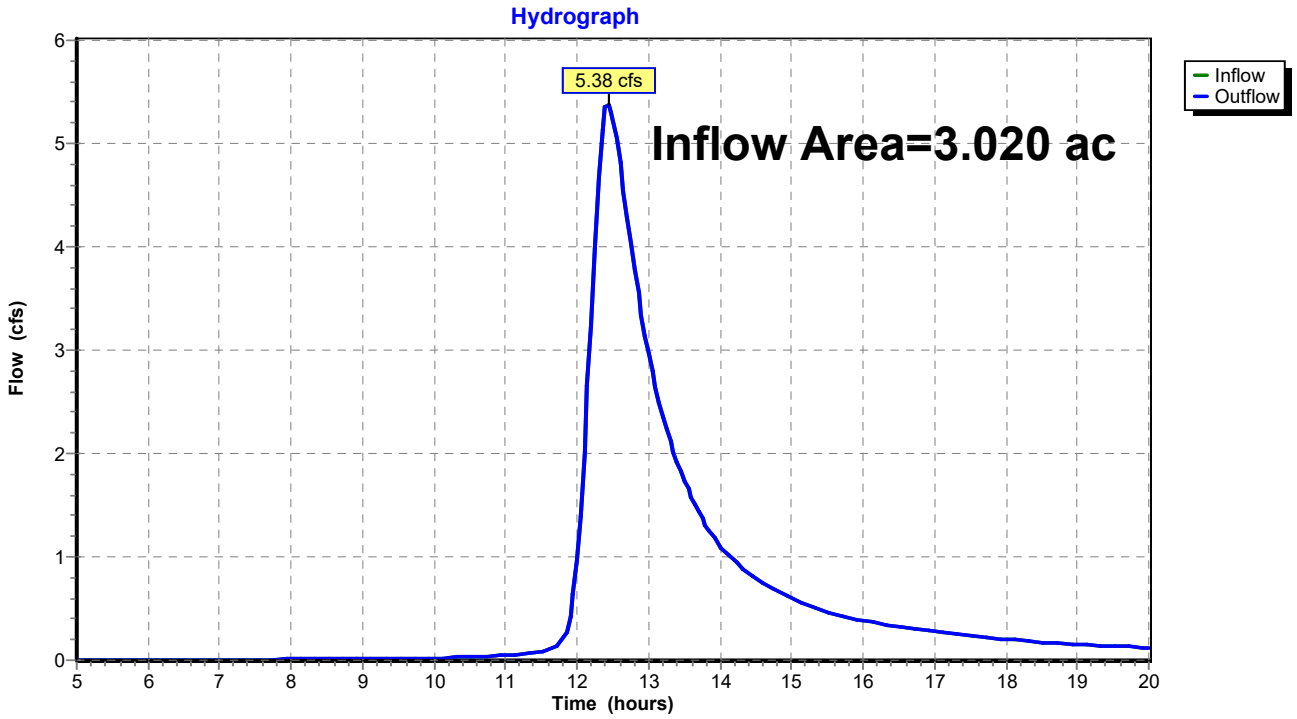


Summary for Reach P-POI#4: South

Inflow Area = 3.020 ac, 75.50% Impervious, Inflow Depth > 2.67" for 10-Year event
Inflow = 5.38 cfs @ 12.43 hrs, Volume= 0.672 af
Outflow = 5.38 cfs @ 12.43 hrs, Volume= 0.672 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach P-POI#4: South



Summary for Pond P-POND: pond

Inflow Area = 3.890 ac, 53.98% Impervious, Inflow Depth > 4.07" for 10-Year event
Inflow = 18.96 cfs @ 12.13 hrs, Volume= 1.320 af
Outflow = 0.97 cfs @ 13.91 hrs, Volume= 0.517 af, Atten= 95%, Lag= 106.9 min
Discarded = 0.24 cfs @ 13.91 hrs, Volume= 0.234 af
Primary = 0.73 cfs @ 13.91 hrs, Volume= 0.283 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 11.38' @ 13.91 hrs Surf.Area= 0.468 ac Storage= 0.891 af

Plug-Flow detention time= 247.5 min calculated for 0.517 af (39% of inflow)
Center-of-Mass det. time= 132.0 min (879.8 - 747.8)

Volume	Invert	Avail.Storage	Storage Description
#1	9.00'	1.966 af	**Custom Stage Data (Pyramidal)** Listed below (Recalc)

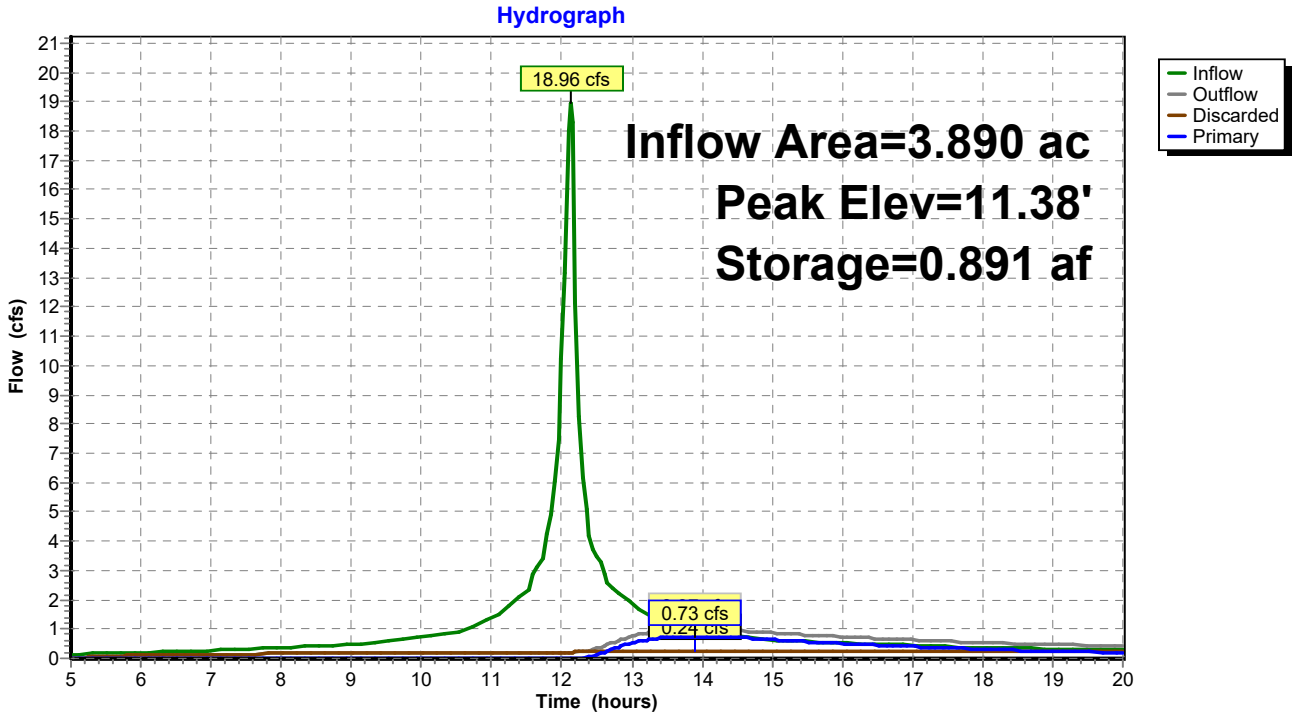
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
9.00	0.291	0.000	0.000	0.291
11.00	0.434	0.720	0.720	0.436
12.50	0.577	0.756	1.476	0.580
13.25	0.733	0.490	1.966	0.737

Device	Routing	Invert	Outlet Devices
#1	Discarded	9.00'	**0.500 in/hr Exfiltration over Surface area**
#2	Primary	11.00'	**18.0" Round Culvert** L= 14.0' Ke= 0.500 Inlet / Outlet Invert= 11.00' / 10.72' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Discarded OutFlow Max=0.24 cfs @ 13.91 hrs HW=11.38' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.24 cfs)

Primary OutFlow Max=0.73 cfs @ 13.91 hrs HW=11.38' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 0.73 cfs @ 2.09 fps)

Pond P-POND: pond



Stage-Area-Storage for Pond P-POND: pond

Elevation (feet)	Surface (acres)	Storage (acre-feet)
9.00	0.291	0.000
9.05	0.294	0.015
9.10	0.297	0.029
9.15	0.301	0.044
9.20	0.304	0.059
9.25	0.307	0.075
9.30	0.311	0.090
9.35	0.314	0.106
9.40	0.317	0.122
9.45	0.321	0.138
9.50	0.324	0.154
9.55	0.327	0.170
9.60	0.331	0.186
9.65	0.334	0.203
9.70	0.338	0.220
9.75	0.341	0.237
9.80	0.345	0.254
9.85	0.348	0.271
9.90	0.352	0.289
9.95	0.355	0.307
10.00	0.359	0.324
10.05	0.363	0.342
10.10	0.366	0.361
10.15	0.370	0.379
10.20	0.373	0.398
10.25	0.377	0.416
10.30	0.381	0.435
10.35	0.384	0.454
10.40	0.388	0.474
10.45	0.392	0.493
10.50	0.396	0.513
10.55	0.399	0.533
10.60	0.403	0.553
10.65	0.407	0.573
10.70	0.411	0.594
10.75	0.415	0.614
10.80	0.418	0.635
10.85	0.422	0.656
10.90	0.426	0.677
10.95	0.430	0.699
11.00	0.434	0.720
11.05	0.438	0.742
11.10	0.443	0.764
11.15	0.447	0.786
11.20	0.452	0.809
11.25	0.456	0.832
11.30	0.461	0.854
11.35	0.466	0.878
11.40	0.470	0.901
11.45	0.475	0.925
11.50	0.479	0.949
11.55	0.484	0.973
11.60	0.489	0.997
11.65	0.493	1.021
11.70	0.498	1.046
11.75	0.503	1.071
11.80	0.508	1.097
11.85	0.513	1.122
11.90	0.517	1.148
11.95	0.522	1.174
12.00	0.527	1.200
12.05	0.532	1.227
12.10	0.537	1.253
12.15	0.542	1.280
12.20	0.547	1.307
12.25	0.552	1.335
12.30	0.557	1.363
12.35	0.562	1.391
12.40	0.567	1.419
12.45	0.572	1.447
12.50	0.577	1.476
12.55	0.587	1.505
12.60	0.597	1.535
12.65	0.607	1.565
12.70	0.617	1.595
12.75	0.627	1.626
12.80	0.637	1.658
12.85	0.647	1.690
12.90	0.658	1.723
12.95	0.668	1.756
13.00	0.679	1.790
13.05	0.690	1.824
13.10	0.700	1.859
13.15	0.711	1.894
13.20	0.722	1.930
13.25	**0.733**	**1.966**

Summary for Pond P-UDS: (new Pond)

Inflow Area = 2.860 ac, 79.72% Impervious, Inflow Depth > 4.25" for 10-Year event
Inflow = 10.79 cfs @ 12.22 hrs, Volume= 1.012 af
Outflow = 5.38 cfs @ 12.44 hrs, Volume= 0.805 af, Atten= 50%, Lag= 12.7 min
Discarded = 0.15 cfs @ 5.80 hrs, Volume= 0.182 af
Primary = 5.23 cfs @ 12.44 hrs, Volume= 0.624 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 11.92' @ 12.44 hrs Surf.Area= 0.295 ac Storage= 0.413 af

Plug-Flow detention time= 115.0 min calculated for 0.805 af (80% of inflow)
Center-of-Mass det. time= 58.3 min (806.2 - 747.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	10.00'	0.221 af	**72.17'W x 178.00'L x 3.21'H Field A** 0.946 af Overall - 0.393 af Embedded = 0.554 af x 40.0% Voids
#2A	10.50'	0.393 af	**Cultec R-280HD** x 400 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 16 rows
		0.614 af	Total Available Storage

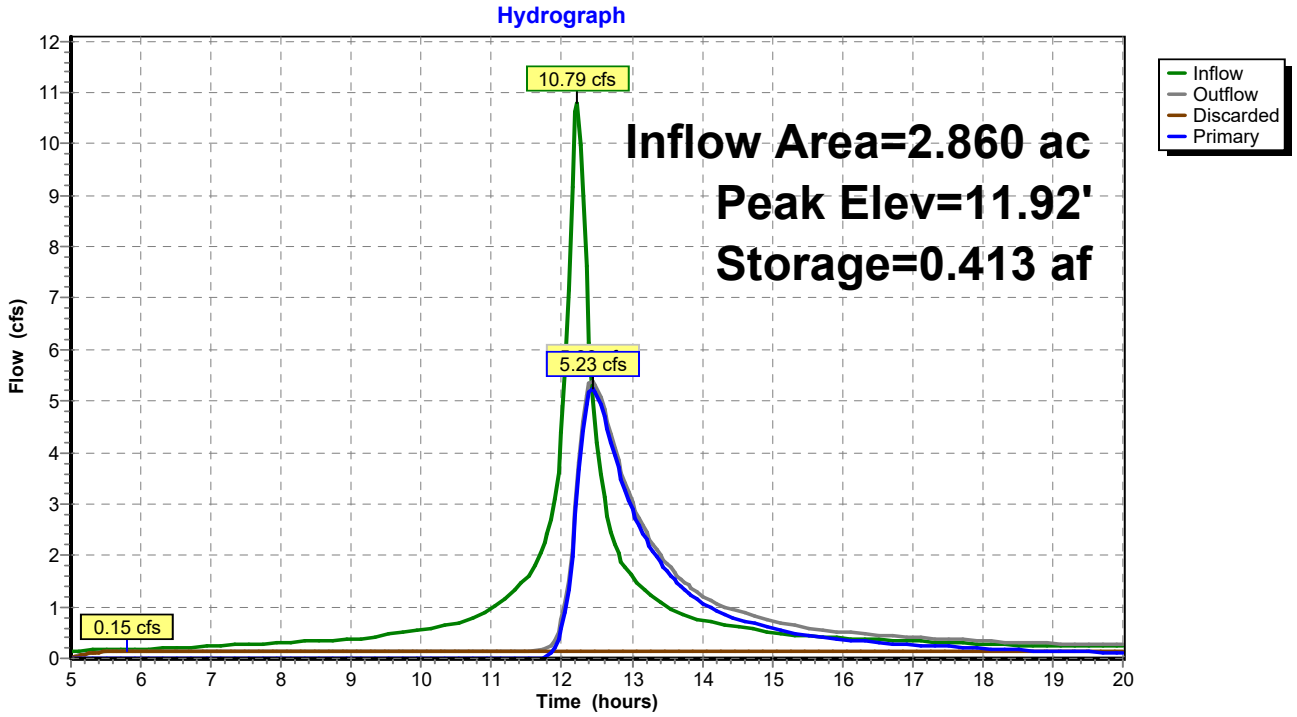
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	**0.500 in/hr Exfiltration over Surface area**
#2	Primary	10.00'	**30.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 10.00' / 9.50' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#3	Device 2	11.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.15 cfs @ 5.80 hrs HW=10.03' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=5.21 cfs @ 12.44 hrs HW=11.92' (Free Discharge)
└**2=Culvert** (Passes 5.21 cfs of 17.04 cfs potential flow)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 5.21 cfs @ 3.13 fps)

Pond P-UDS: (new Pond)



Stage-Area-Storage for Pond P-UDS: (new Pond)

Elevation (feet)	Surface (acres)	Storage (acre-feet)
10.00	**0.295**	0.000
10.05	0.295	0.006
10.10	0.295	0.012
10.15	0.295	0.018
10.20	0.295	0.024
10.25	0.295	0.029
10.30	0.295	0.035
10.35	0.295	0.041
10.40	0.295	0.047
10.45	0.295	0.053
10.50	0.295	0.059
10.55	0.295	0.072
10.60	0.295	0.086
10.65	0.295	0.099
10.70	0.295	0.112
10.75	0.295	0.125
10.80	0.295	0.138
10.85	0.295	0.151
10.90	0.295	0.164
10.95	0.295	0.177
11.00	0.295	0.190
11.05	0.295	0.203
11.10	0.295	0.216
11.15	0.295	0.229
11.20	0.295	0.241
11.25	0.295	0.254
11.30	0.295	0.266
11.35	0.295	0.278
11.40	0.295	0.291
11.45	0.295	0.303
11.50	0.295	0.315
11.55	0.295	0.327
11.60	0.295	0.339
11.65	0.295	0.351
11.70	0.295	0.363
11.75	0.295	0.375
11.80	0.295	0.386
11.85	0.295	0.398
11.90	0.295	0.409
11.95	0.295	0.420
12.00	0.295	0.431
12.05	0.295	0.442
12.10	0.295	0.453
12.15	0.295	0.463
12.20	0.295	0.473
12.25	0.295	0.483
12.30	0.295	0.493
12.35	0.295	0.502
12.40	0.295	0.511
12.45	0.295	0.520
12.50	0.295	0.528
12.55	0.295	0.535
12.60	0.295	0.542
12.65	0.295	0.548
12.70	0.295	0.554
12.75	0.295	0.560
12.80	0.295	0.566
12.85	0.295	0.572
12.90	0.295	0.578
12.95	0.295	0.583
13.00	0.295	0.589
13.05	0.295	0.595
13.10	0.295	0.601
13.15	0.295	0.607
13.20	0.295	**0.613**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: North Runoff Area=0.110 ac 0.00% Impervious Runoff Depth>7.14"
Tc=6.0 min CN=89 Runoff=0.94 cfs 0.065 af

SubcatchmentE-WS#1: N Runoff Area=1.310 ac 32.06% Impervious Runoff Depth>6.48"
Tc=6.0 min CN=83 Runoff=10.58 cfs 0.707 af

SubcatchmentE-WS#2: E Runoff Area=1.710 ac 18.71% Impervious Runoff Depth>6.13"
Tc=6.0 min CN=80 Runoff=13.27 cfs 0.874 af

SubcatchmentE-WS#3: W Runoff Area=3.100 ac 31.61% Impervious Runoff Depth>7.14"
Tc=6.0 min CN=89 Runoff=26.62 cfs 1.845 af

SubcatchmentE-WS#4: S Runoff Area=1.650 ac 33.33% Impervious Runoff Depth>6.82"
Tc=6.0 min CN=86 Runoff=13.78 cfs 0.938 af

SubcatchmentP-WS#1B: North Runoff Area=3.890 ac 53.98% Impervious Runoff Depth>7.62"
Tc=6.0 min CN=94 Runoff=34.54 cfs 2.470 af

SubcatchmentP-WS#2: South Runoff Area=0.310 ac 74.19% Impervious Runoff Depth>7.77"
Tc=6.0 min CN=96 Runoff=2.78 cfs 0.201 af

SubcatchmentP-WS#3: South Runoff Area=0.440 ac 86.36% Impervious Runoff Depth>7.84"
Tc=6.0 min CN=97 Runoff=3.95 cfs 0.287 af

SubcatchmentP-WS#4A: South Runoff Area=2.860 ac 79.72% Impervious Runoff Depth>7.77"
Flow Length=125' Slope=0.0100 '/' Tc=14.9 min CN=96 Runoff=19.42 cfs 1.852 af

SubcatchmentP-WS#4B: South Runoff Area=0.160 ac 0.00% Impervious Runoff Depth>7.14"
Tc=6.0 min CN=89 Runoff=1.37 cfs 0.095 af

Reach P-POI#1: North Inflow=6.24 cfs 1.424 af
Outflow=6.24 cfs 1.424 af

Reach P-POI#2: East Inflow=2.78 cfs 0.201 af
Outflow=2.78 cfs 0.201 af

Reach P-POI#3: West Inflow=3.95 cfs 0.287 af
Outflow=3.95 cfs 0.287 af

Reach P-POI#4: South Inflow=13.52 cfs 1.541 af
Outflow=13.52 cfs 1.541 af

Pond P-POND: pond Peak Elev=12.33' Storage=1.380 af Inflow=34.54 cfs 2.470 af
Discarded=0.28 cfs 0.259 af Primary=6.06 cfs 1.359 af Outflow=6.34 cfs 1.618 af

Pond P-UDS: (new Pond) Peak Elev=12.82' Storage=0.568 af Inflow=19.42 cfs 1.852 af
Discarded=0.15 cfs 0.184 af Primary=13.16 cfs 1.446 af Outflow=13.31 cfs 1.630 af

Total Runoff Area = 15.540 ac Runoff Volume = 9.334 af Average Runoff Depth = 7.21"
53.28% Pervious = 8.280 ac 46.72% Impervious = 7.260 ac

Summary for Subcatchment 1S: North

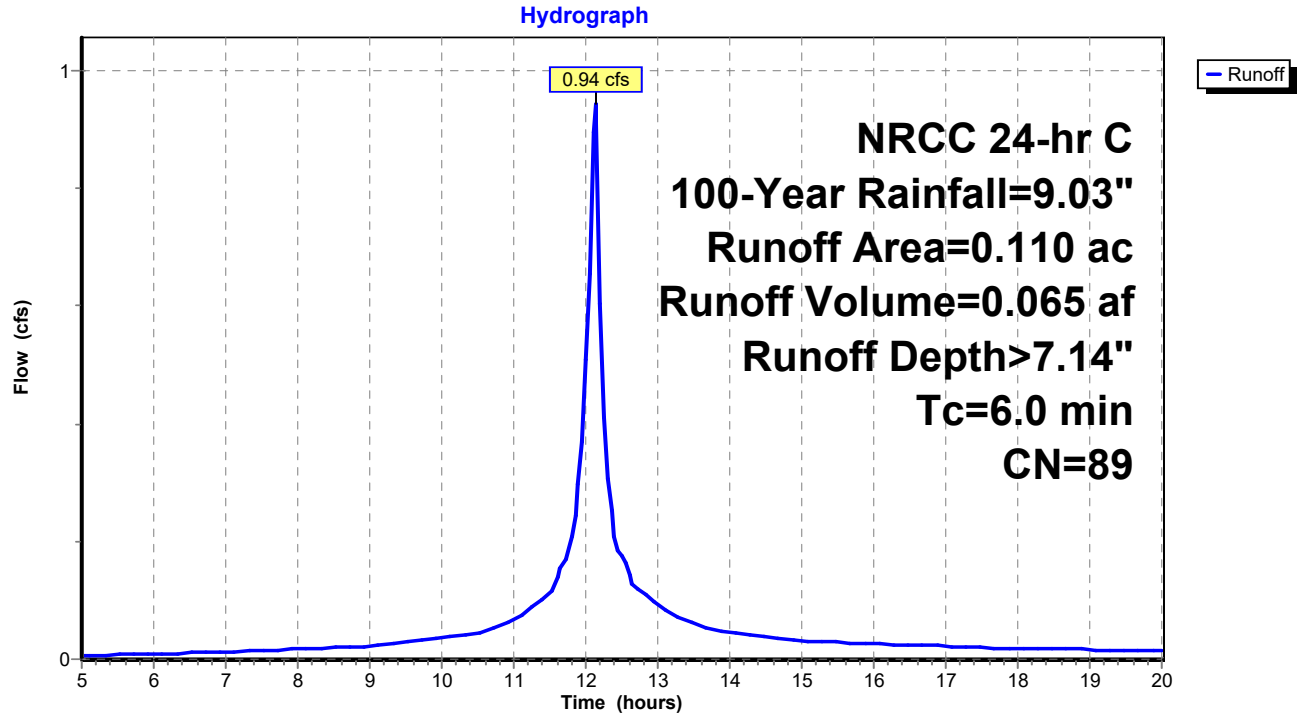
Runoff = 0.94 cfs @ 12.13 hrs, Volume= 0.065 af, Depth> 7.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=9.03"

Area (ac)	CN	Description
0.110	89	Gravel roads, HSG C
0.110		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 1S: North



Summary for Subcatchment E-WS#1: N

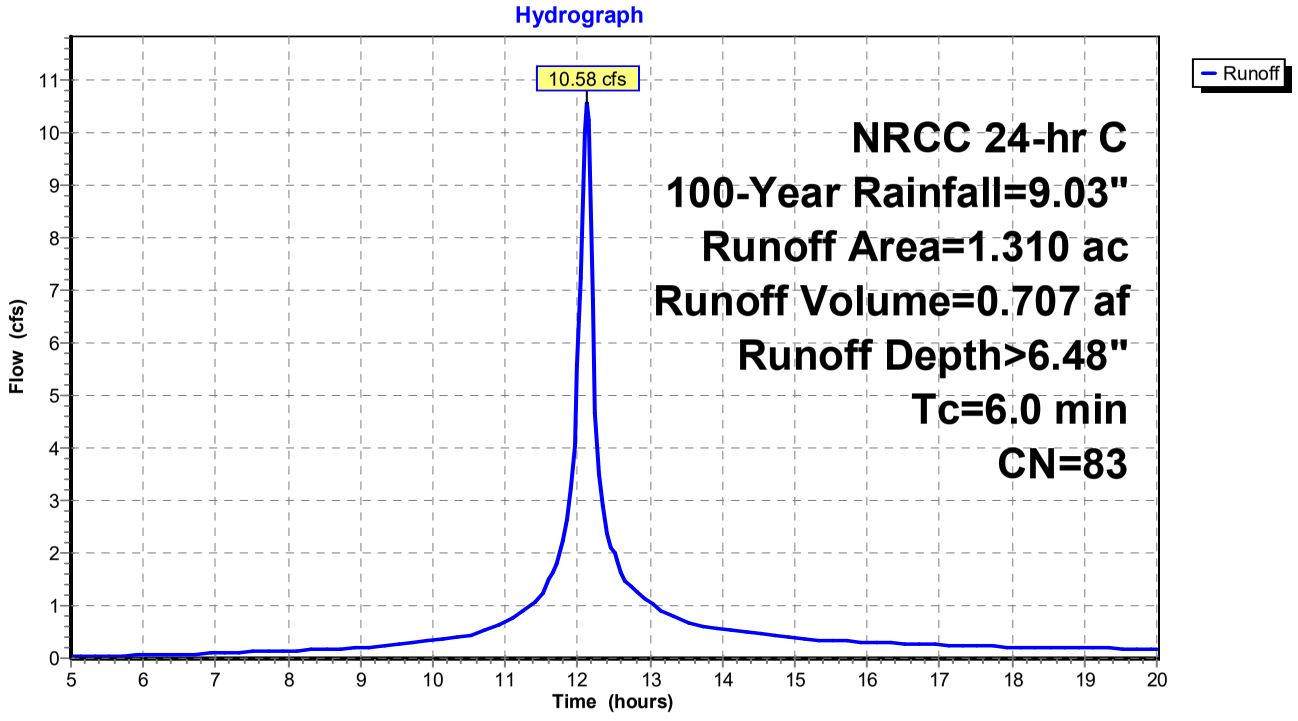
Runoff = 10.58 cfs @ 12.13 hrs, Volume= 0.707 af, Depth> 6.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=9.03"

Area (ac)	CN	Description
0.790	74	>75% Grass cover, Good, HSG C
0.420	98	Paved parking, HSG C
0.100	89	Gravel roads, HSG C
1.310	83	Weighted Average
0.890		67.94% Pervious Area
0.420		32.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-WS#1: N



Summary for Subcatchment E-WS#2: E

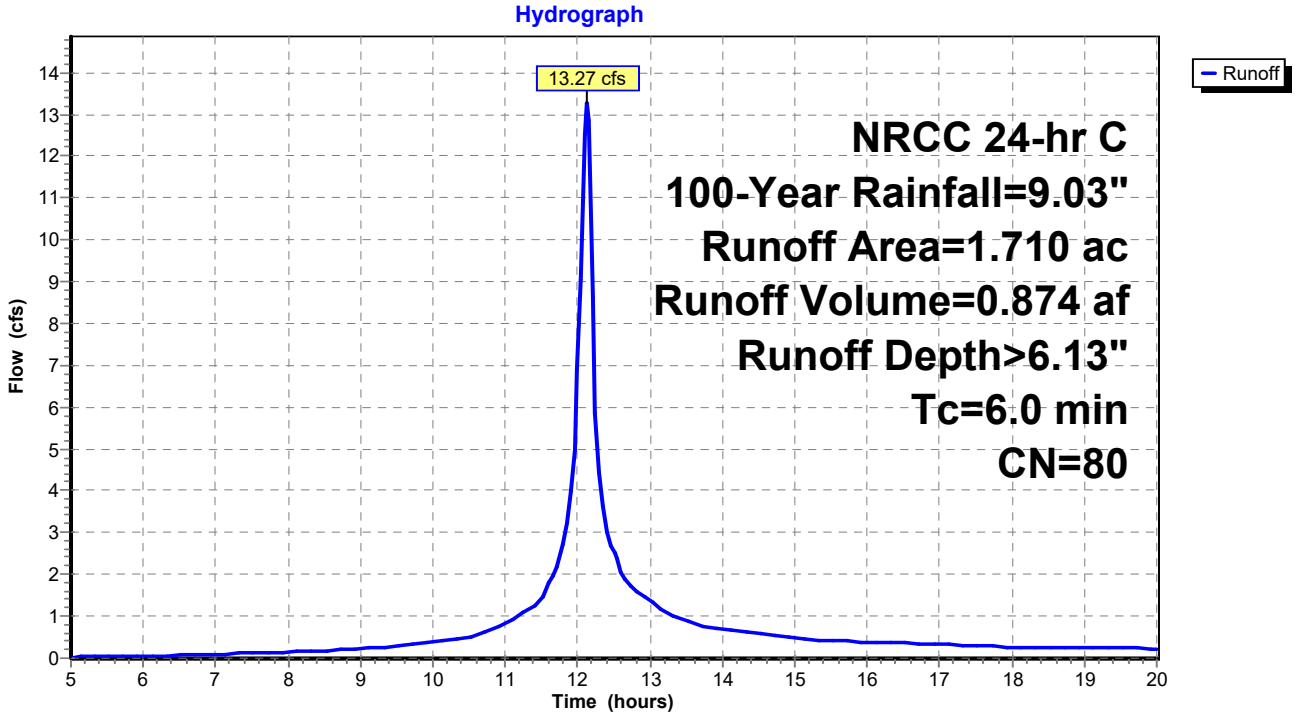
Runoff = 13.27 cfs @ 12.13 hrs, Volume= 0.874 af, Depth> 6.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=9.03"

Area (ac)	CN	Description
1.270	74	>75% Grass cover, Good, HSG C
0.320	98	Paved parking, HSG C
0.120	89	Gravel roads, HSG C
1.710	80	Weighted Average
1.390		81.29% Pervious Area
0.320		18.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-WS#2: E



Summary for Subcatchment E-WS#3: W

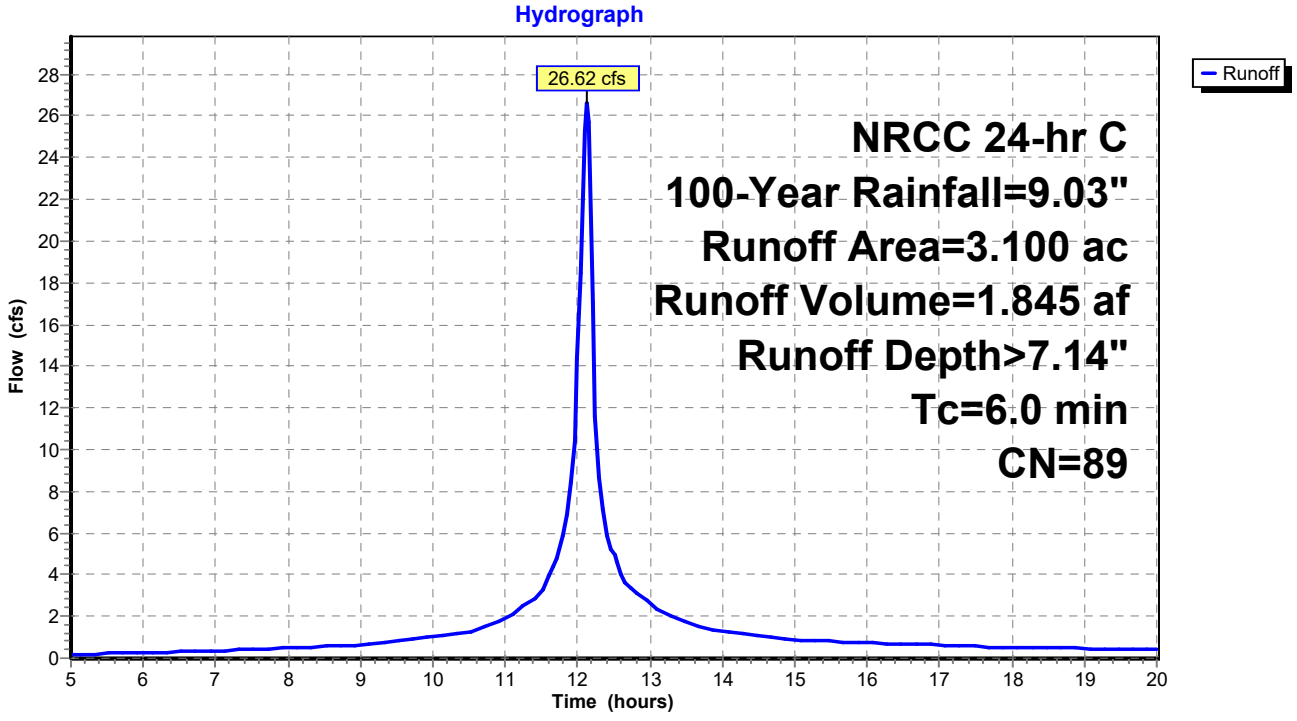
Runoff = 26.62 cfs @ 12.13 hrs, Volume= 1.845 af, Depth> 7.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=9.03"

Area (ac)	CN	Description
0.650	74	>75% Grass cover, Good, HSG C
0.980	98	Paved parking, HSG C
1.470	89	Gravel roads, HSG C
3.100	89	Weighted Average
2.120		68.39% Pervious Area
0.980		31.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-WS#3: W



Summary for Subcatchment E-WS#4: S

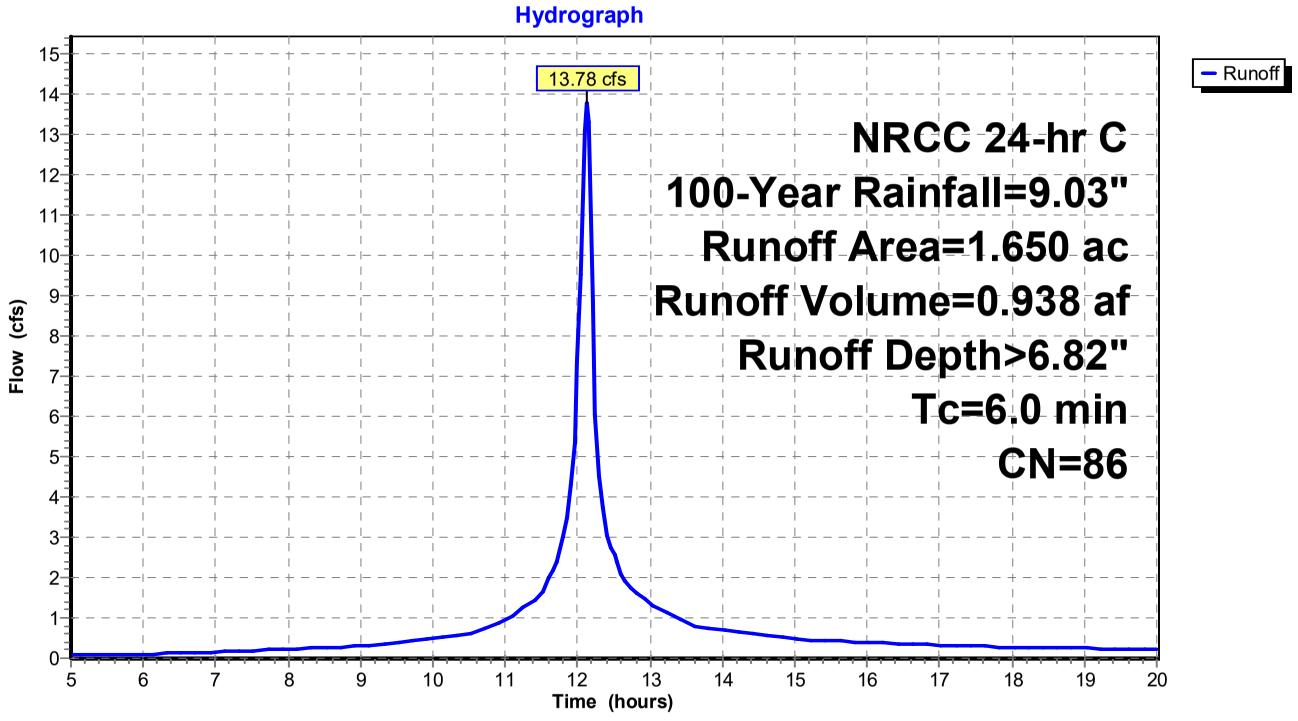
Runoff = 13.78 cfs @ 12.13 hrs, Volume= 0.938 af, Depth> 6.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=9.03"

Area (ac)	CN	Description
0.700	74	>75% Grass cover, Good, HSG C
0.550	98	Paved parking, HSG C
0.400	89	Gravel roads, HSG C
1.650	86	Weighted Average
1.100		66.67% Pervious Area
0.550		33.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment E-WS#4: S



Summary for Subcatchment P-WS#1B: North

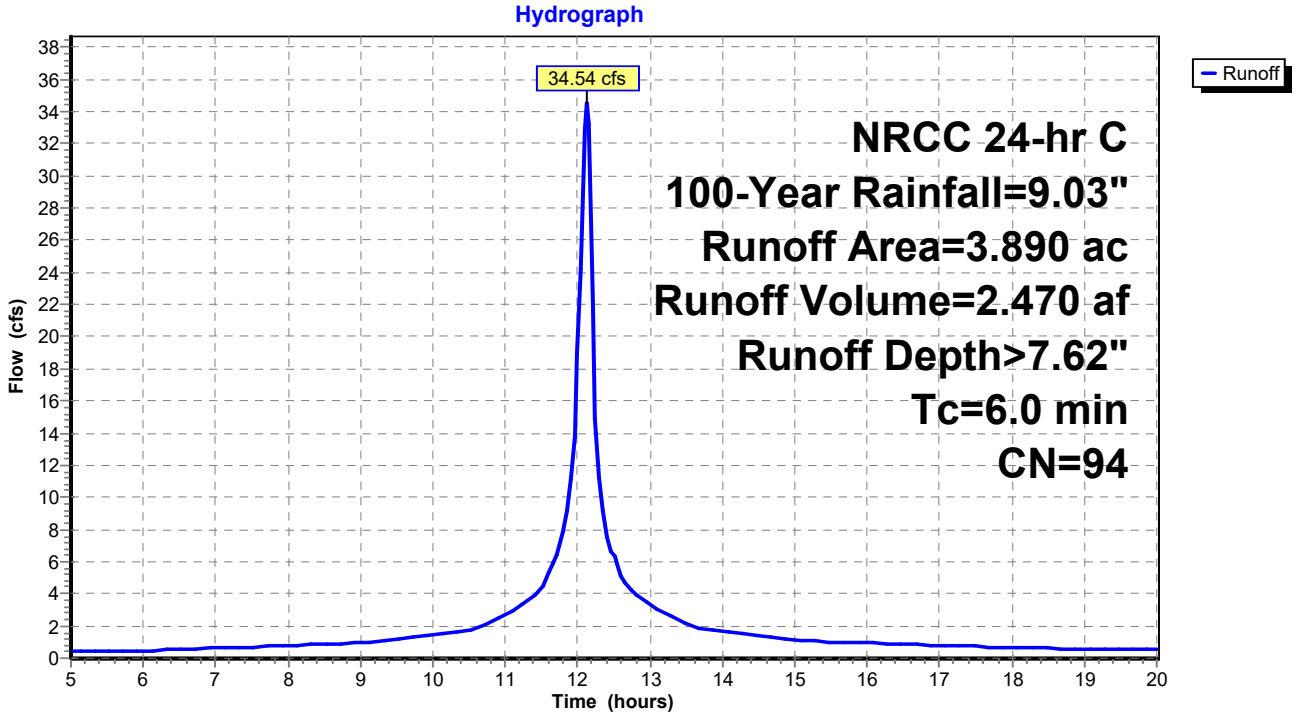
Runoff = 34.54 cfs @ 12.13 hrs, Volume= 2.470 af, Depth> 7.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=9.03"

Area (ac)	CN	Description
0.730	98	Paved parking, HSG C
1.790	89	Gravel roads, HSG C
1.370	98	Roofs, HSG C
3.890	94	Weighted Average
1.790		46.02% Pervious Area
2.100		53.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-WS#1B: North



Summary for Subcatchment P-WS#2: South

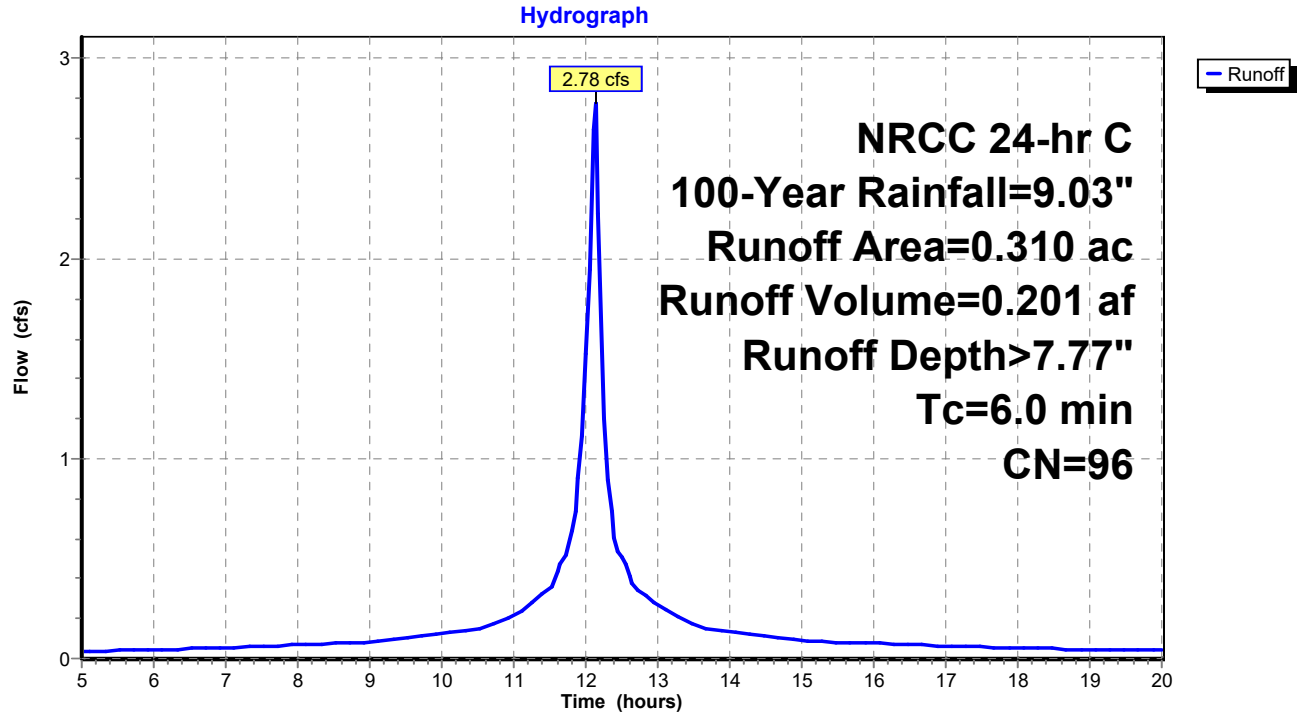
Runoff = 2.78 cfs @ 12.13 hrs, Volume= 0.201 af, Depth> 7.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=9.03"

Area (ac)	CN	Description
0.230	98	Paved parking, HSG C
0.080	89	Gravel roads, HSG C
0.310	96	Weighted Average
0.080		25.81% Pervious Area
0.230		74.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-WS#2: South



Summary for Subcatchment P-WS#3: South

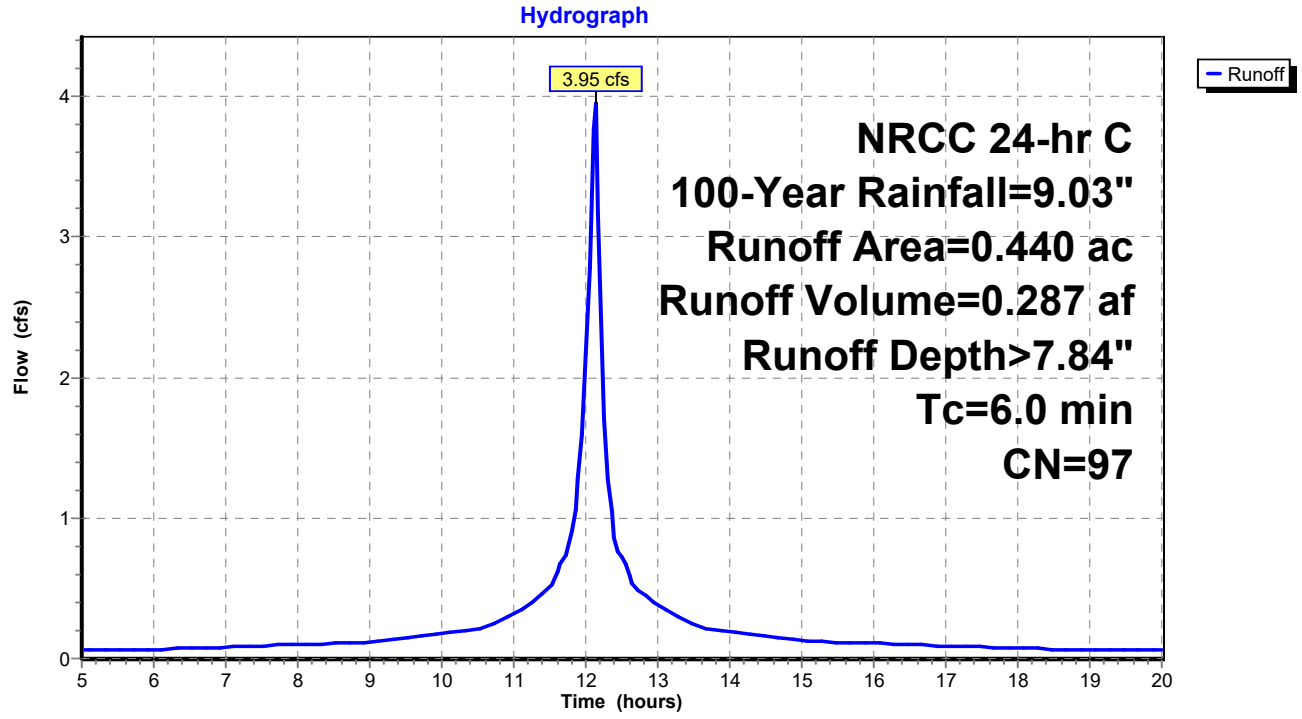
Runoff = 3.95 cfs @ 12.13 hrs, Volume= 0.287 af, Depth> 7.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=9.03"

Area (ac)	CN	Description
0.060	89	Gravel roads, HSG C
0.380	98	Paved parking, HSG C
0.440	97	Weighted Average
0.060		13.64% Pervious Area
0.380		86.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-WS#3: South



Summary for Subcatchment P-WS#4A: South

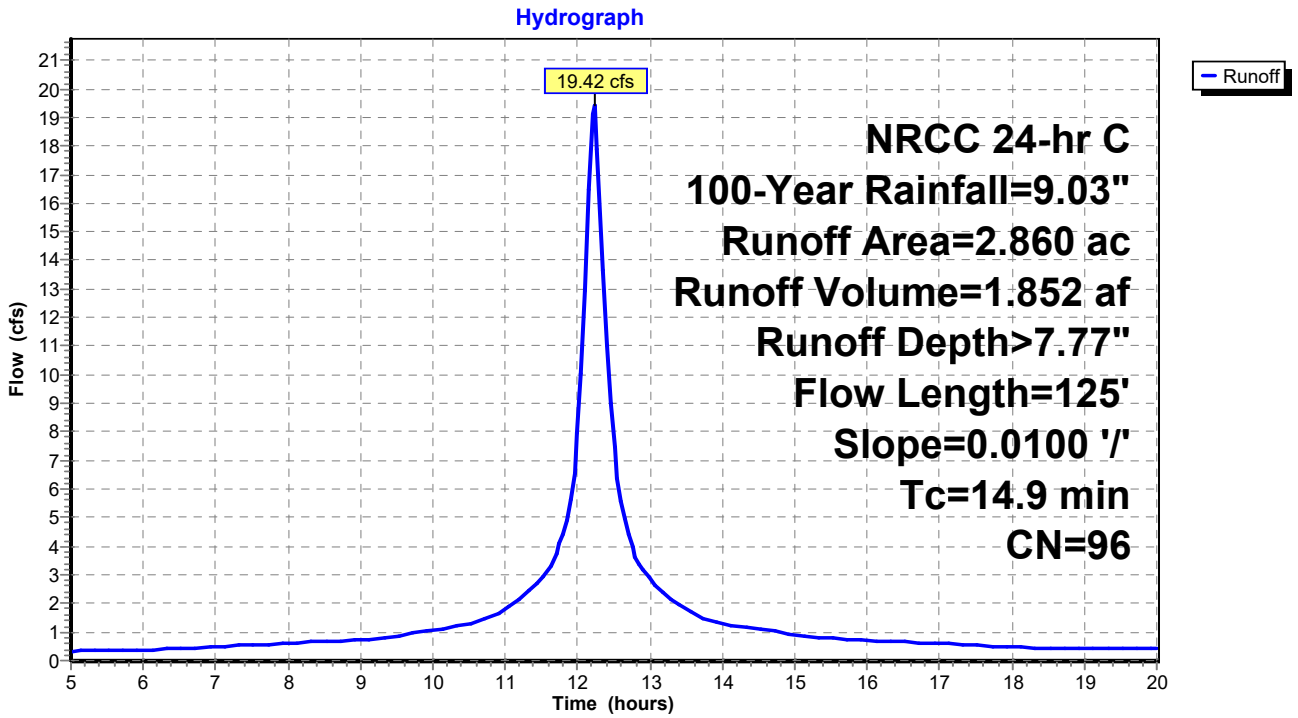
Runoff = 19.42 cfs @ 12.22 hrs, Volume= 1.852 af, Depth> 7.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=9.03"

Area (ac)	CN	Description
0.980	98	Paved parking, HSG C
0.580	89	Gravel roads, HSG C
1.300	98	Roofs, HSG C
2.860	96	Weighted Average
0.580		20.28% Pervious Area
2.280		79.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	125	0.0100	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.45"

Subcatchment P-WS#4A: South



Summary for Subcatchment P-WS#4B: South

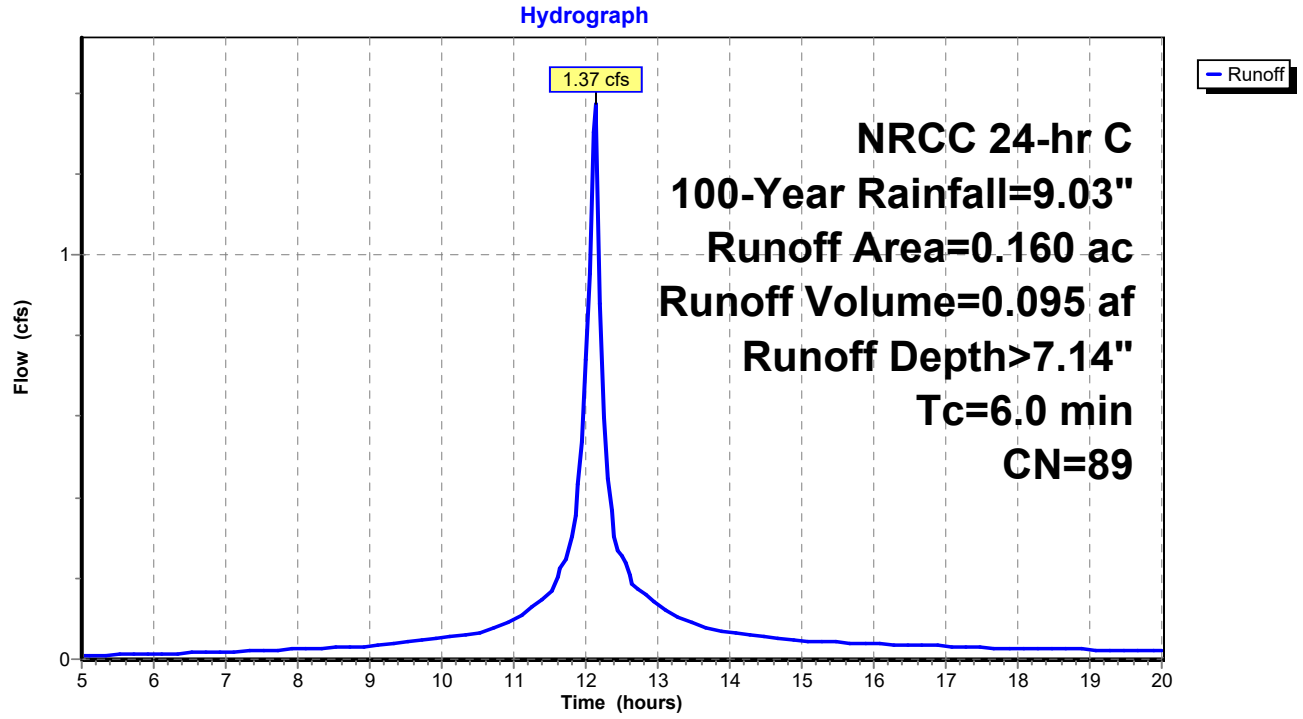
Runoff = 1.37 cfs @ 12.13 hrs, Volume= 0.095 af, Depth> 7.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-Year Rainfall=9.03"

Area (ac)	CN	Description
0.160	89	Gravel roads, HSG C
0.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment P-WS#4B: South

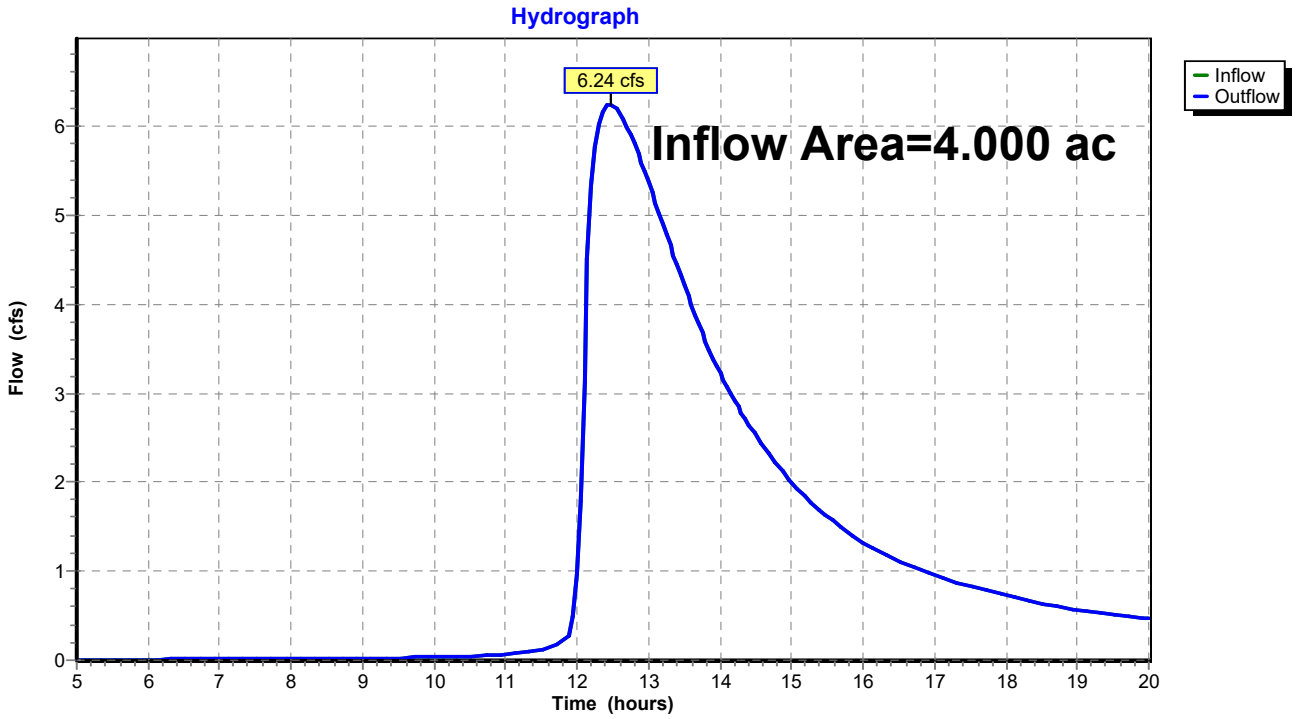


Summary for Reach P-POI#1: North

Inflow Area = 4.000 ac, 52.50% Impervious, Inflow Depth > 4.27" for 100-Year event
Inflow = 6.24 cfs @ 12.47 hrs, Volume= 1.424 af
Outflow = 6.24 cfs @ 12.47 hrs, Volume= 1.424 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach P-POI#1: North

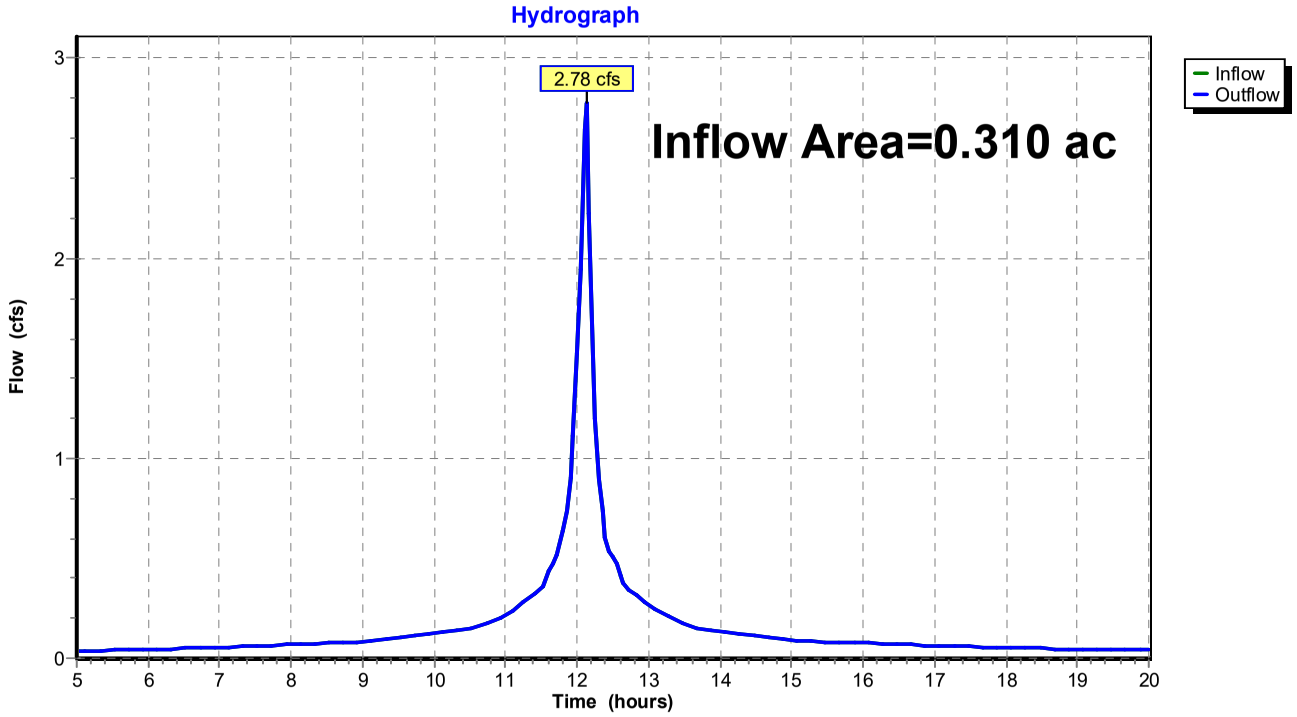


Summary for Reach P-POI#2: East

Inflow Area = 0.310 ac, 74.19% Impervious, Inflow Depth > 7.77" for 100-Year event
Inflow = 2.78 cfs @ 12.13 hrs, Volume= 0.201 af
Outflow = 2.78 cfs @ 12.13 hrs, Volume= 0.201 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach P-POI#2: East

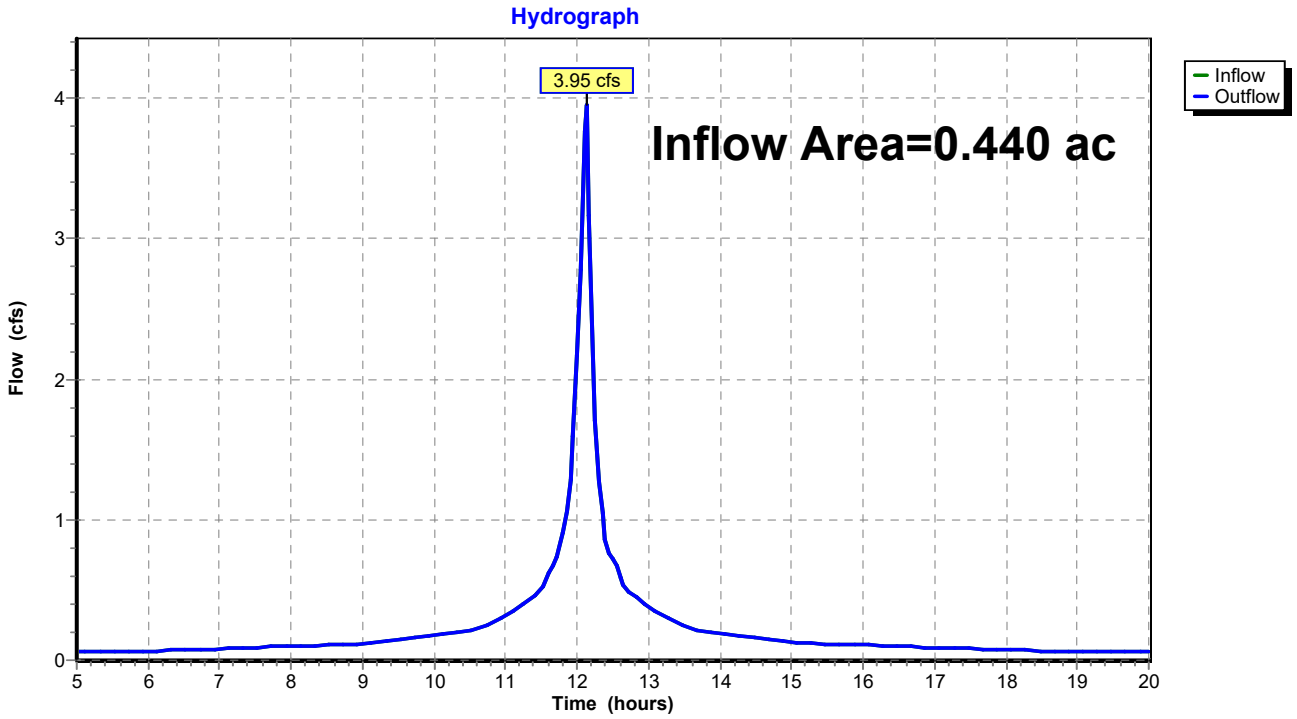


Summary for Reach P-POI#3: West

Inflow Area = 0.440 ac, 86.36% Impervious, Inflow Depth > 7.84" for 100-Year event
Inflow = 3.95 cfs @ 12.13 hrs, Volume= 0.287 af
Outflow = 3.95 cfs @ 12.13 hrs, Volume= 0.287 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach P-POI#3: West

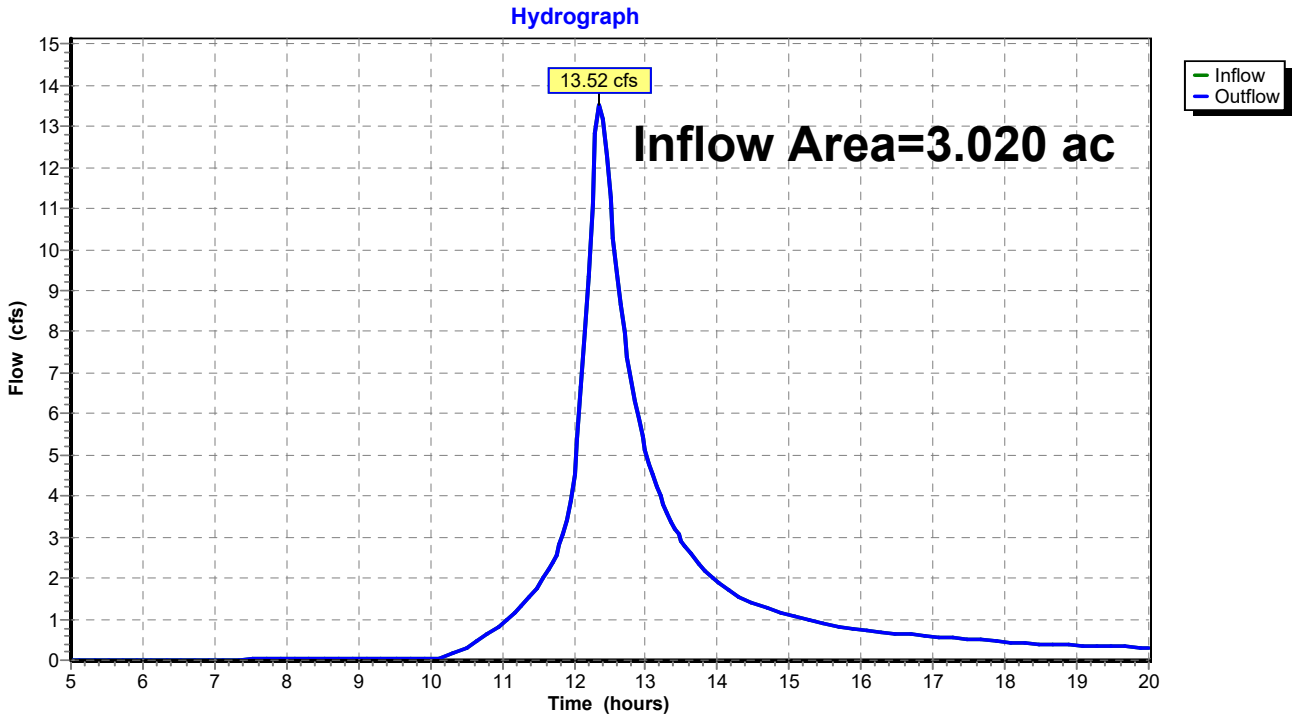


Summary for Reach P-POI#4: South

Inflow Area = 3.020 ac, 75.50% Impervious, Inflow Depth > 6.12" for 100-Year event
Inflow = 13.52 cfs @ 12.36 hrs, Volume= 1.541 af
Outflow = 13.52 cfs @ 12.36 hrs, Volume= 1.541 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach P-POI#4: South



Summary for Pond P-POND: pond

Inflow Area = 3.890 ac, 53.98% Impervious, Inflow Depth > 7.62" for 100-Year event
Inflow = 34.54 cfs @ 12.13 hrs, Volume= 2.470 af
Outflow = 6.34 cfs @ 12.49 hrs, Volume= 1.618 af, Atten= 82%, Lag= 22.1 min
Discarded = 0.28 cfs @ 12.49 hrs, Volume= 0.259 af
Primary = 6.06 cfs @ 12.49 hrs, Volume= 1.359 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 12.33' @ 12.49 hrs Surf.Area= 0.560 ac Storage= 1.380 af

Plug-Flow detention time= 185.4 min calculated for 1.617 af (65% of inflow)
Center-of-Mass det. time= 108.8 min (848.8 - 739.9)

Volume	Invert	Avail.Storage	Storage Description
#1	9.00'	1.966 af	**Custom Stage Data (Pyramidal)** Listed below (Recalc)

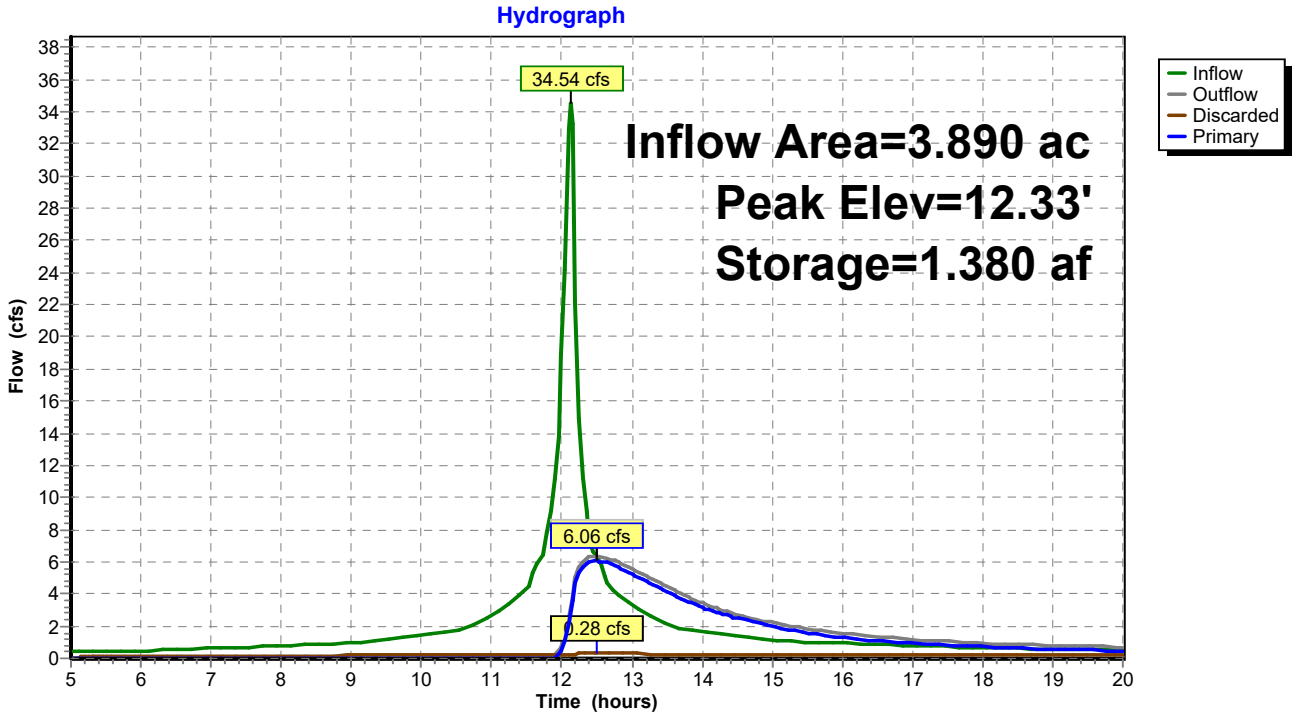
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
9.00	0.291	0.000	0.000	0.291
11.00	0.434	0.720	0.720	0.436
12.50	0.577	0.756	1.476	0.580
13.25	0.733	0.490	1.966	0.737

Device	Routing	Invert	Outlet Devices
#1	Discarded	9.00'	**0.500 in/hr Exfiltration over Surface area**
#2	Primary	11.00'	**18.0" Round Culvert** L= 14.0' Ke= 0.500 Inlet / Outlet Invert= 11.00' / 10.72' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Discarded OutFlow Max=0.28 cfs @ 12.49 hrs HW=12.33' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=6.06 cfs @ 12.49 hrs HW=12.33' (Free Discharge)
↑—**2=Culvert** (Barrel Controls 6.06 cfs @ 4.85 fps)

Pond P-POND: pond



Stage-Area-Storage for Pond P-POND: pond

Elevation (feet)	Surface (acres)	Storage (acre-feet)
9.00	0.291	0.000
9.05	0.294	0.015
9.10	0.297	0.029
9.15	0.301	0.044
9.20	0.304	0.059
9.25	0.307	0.075
9.30	0.311	0.090
9.35	0.314	0.106
9.40	0.317	0.122
9.45	0.321	0.138
9.50	0.324	0.154
9.55	0.327	0.170
9.60	0.331	0.186
9.65	0.334	0.203
9.70	0.338	0.220
9.75	0.341	0.237
9.80	0.345	0.254
9.85	0.348	0.271
9.90	0.352	0.289
9.95	0.355	0.307
10.00	0.359	0.324
10.05	0.363	0.342
10.10	0.366	0.361
10.15	0.370	0.379
10.20	0.373	0.398
10.25	0.377	0.416
10.30	0.381	0.435
10.35	0.384	0.454
10.40	0.388	0.474
10.45	0.392	0.493
10.50	0.396	0.513
10.55	0.399	0.533
10.60	0.403	0.553
10.65	0.407	0.573
10.70	0.411	0.594
10.75	0.415	0.614
10.80	0.418	0.635
10.85	0.422	0.656
10.90	0.426	0.677
10.95	0.430	0.699
11.00	0.434	0.720
11.05	0.438	0.742
11.10	0.443	0.764
11.15	0.447	0.786
11.20	0.452	0.809
11.25	0.456	0.832
11.30	0.461	0.854
11.35	0.466	0.878
11.40	0.470	0.901
11.45	0.475	0.925
11.50	0.479	0.949
11.55	0.484	0.973
11.60	0.489	0.997
11.65	0.493	1.021
11.70	0.498	1.046
11.75	0.503	1.071
11.80	0.508	1.097
11.85	0.513	1.122
11.90	0.517	1.148
11.95	0.522	1.174
12.00	0.527	1.200
12.05	0.532	1.227
12.10	0.537	1.253
12.15	0.542	1.280
12.20	0.547	1.307
12.25	0.552	1.335
12.30	0.557	1.363
12.35	0.562	1.391
12.40	0.567	1.419
12.45	0.572	1.447
12.50	0.577	1.476
12.55	0.587	1.505
12.60	0.597	1.535
12.65	0.607	1.565
12.70	0.617	1.595
12.75	0.627	1.626
12.80	0.637	1.658
12.85	0.647	1.690
12.90	0.658	1.723
12.95	0.668	1.756
13.00	0.679	1.790
13.05	0.690	1.824
13.10	0.700	1.859
13.15	0.711	1.894
13.20	0.722	1.930
13.25	**0.733**	**1.966**

Summary for Pond P-UDS: (new Pond)

Inflow Area = 2.860 ac, 79.72% Impervious, Inflow Depth > 7.77" for 100-Year event
Inflow = 19.42 cfs @ 12.22 hrs, Volume= 1.852 af
Outflow = 13.31 cfs @ 12.36 hrs, Volume= 1.630 af, Atten= 31%, Lag= 8.3 min
Discarded = 0.15 cfs @ 5.20 hrs, Volume= 0.184 af
Primary = 13.16 cfs @ 12.36 hrs, Volume= 1.446 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 12.82' @ 12.36 hrs Surf.Area= 0.295 ac Storage= 0.568 af

Plug-Flow detention time= 93.5 min calculated for 1.624 af (88% of inflow)
Center-of-Mass det. time= 53.5 min (796.2 - 742.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	10.00'	0.221 af	**72.17'W x 178.00'L x 3.21'H Field A** 0.946 af Overall - 0.393 af Embedded = 0.554 af x 40.0% Voids
#2A	10.50'	0.393 af	**Cultec R-280HD** x 400 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 16 rows
		0.614 af	Total Available Storage

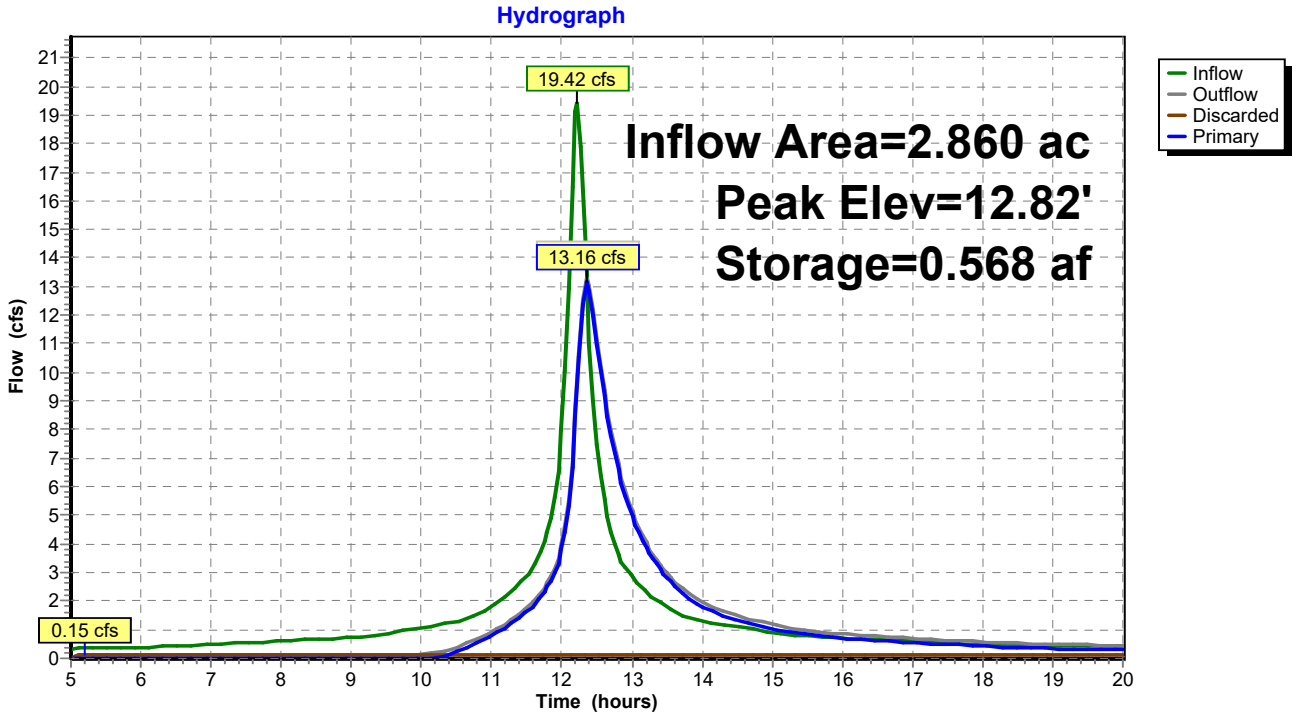
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	**0.500 in/hr Exfiltration over Surface area**
#2	Primary	10.00'	**30.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 10.00' / 9.50' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#3	Device 2	11.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.15 cfs @ 5.20 hrs HW=10.04' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=13.07 cfs @ 12.36 hrs HW=12.81' (Free Discharge)
└**2=Culvert** (Passes 13.07 cfs of 28.96 cfs potential flow)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 13.07 cfs @ 4.40 fps)

Pond P-UDS: (new Pond)



Stage-Area-Storage for Pond P-UDS: (new Pond)

Elevation (feet)	Surface (acres)	Storage (acre-feet)
10.00	**0.295**	0.000
10.05	0.295	0.006
10.10	0.295	0.012
10.15	0.295	0.018
10.20	0.295	0.024
10.25	0.295	0.029
10.30	0.295	0.035
10.35	0.295	0.041
10.40	0.295	0.047
10.45	0.295	0.053
10.50	0.295	0.059
10.55	0.295	0.072
10.60	0.295	0.086
10.65	0.295	0.099
10.70	0.295	0.112
10.75	0.295	0.125
10.80	0.295	0.138
10.85	0.295	0.151
10.90	0.295	0.164
10.95	0.295	0.177
11.00	0.295	0.190
11.05	0.295	0.203
11.10	0.295	0.216
11.15	0.295	0.229
11.20	0.295	0.241
11.25	0.295	0.254
11.30	0.295	0.266
11.35	0.295	0.278
11.40	0.295	0.291
11.45	0.295	0.303
11.50	0.295	0.315
11.55	0.295	0.327
11.60	0.295	0.339
11.65	0.295	0.351
11.70	0.295	0.363
11.75	0.295	0.375
11.80	0.295	0.386
11.85	0.295	0.398
11.90	0.295	0.409
11.95	0.295	0.420
12.00	0.295	0.431
12.05	0.295	0.442
12.10	0.295	0.453
12.15	0.295	0.463
12.20	0.295	0.473
12.25	0.295	0.483
12.30	0.295	0.493
12.35	0.295	0.502
12.40	0.295	0.511
12.45	0.295	0.520
12.50	0.295	0.528
12.55	0.295	0.535
12.60	0.295	0.542
12.65	0.295	0.548
12.70	0.295	0.554
12.75	0.295	0.560
12.80	0.295	0.566
12.85	0.295	0.572
12.90	0.295	0.578
12.95	0.295	0.583
13.00	0.295	0.589
13.05	0.295	0.595
13.10	0.295	0.601
13.15	0.295	0.607
13.20	0.295	**0.613**

Green Infrastructure

Reduction of Impervious Cover:

There will be no reduction in impervious area for this project. The net increase in impervious area is 1.89 acres.

Runoff Reduction Techniques:

Reduction of Contributing Volume Practices	Description
Infiltration Practice	0.64 acre feet of runoff will be infiltrated onsite, reducing the Water Quality Volume by 0.64 acre feet.

Post Construction Stormwater Control Practices

Post Construction Practices:

An infiltration basin and underground infiltration system are proposed to provide peak flow mitigation, water quality volume, and runoff reduction volume.

Summary of Water Quality Provisions:

The proposed site will have a total of 6.25 acres of impervious/gravel cover. Of this, 5.34 acres will be treated. The remaining area is located on sloping entry driveways. We determined that there is no effective way to capture this runoff for treatment. Minimum RRv is provided.

The site water quality requirement is as follows:

$$WQ_V = PAR_V$$
$$P = 1.5"$$
$$A = 7.73\ acres$$
$$R_V = 0.05 + 0.009I = 0.05 + 0.009 * \left(\frac{6.25}{7.73} * 100\%\right) = 0.778$$
$$WQ_V = 1.5\ inch * 7.73\ acs * 0.778 * \frac{1\ ft}{12\ inch} = 0.751\ acs.ft$$

Infiltration basin will treat WS#1.

$$WQ_V = PAR_V$$
$$P = 1.5"$$
$$A = 3.91\ acres$$
$$R_V = 0.05 + 0.009I = 0.05 + 0.009 * \left(\frac{2.9}{3.91} * 100\%\right) = 0.718$$
$$WQ_V = 1.5\ inch * 3.91\ acs * 0.718 * \frac{1\ ft}{12\ inch} = 0.351\ acs.ft$$

Underground infiltration system will treat WS#4A.

$$WQ_V = PAR_V$$
$$P = 1.5"$$
$$A = 2.44\ acres$$
$$R_V = 0.05 + 0.009I = 0.05 + 0.009 * \left(\frac{2.44}{2.44} * 100\%\right) = 0.95$$
$$WQ_V = 1.4\ inch * 2.44\ acs * 0.95 * \frac{1\ ft}{12\ inch} = 0.290\ acs.ft$$

Runoff Reduction Volume (RRv)

The minimum RRv is shown in the following calculation.

$$RRv_{min} = \frac{P * R_V * A_{ic} * S}{12}$$
$$A_{ic} = 6.25\ acres$$
$$S = 0.30$$
$$R_V = 0.05 + 0.009I = 0.05 + 0.009 * \left(\frac{6.25}{7.73} * 100\%\right) = 0.778$$
$$RRv_{min} = \frac{1.5\ inch * 0.778 * 6.25\ acres * 0.30}{12} = 0.182\ acs.ft$$

The proposed basins provide a combined total of 0.641 acs.ft of infiltration volume, which meets the min RRv requirement.

Peak Flow Mitigation

Offsite Design Points:

Our analysis used 4 points of interest. POI#1 is to the north of the site. POI#2 is to the east of the site. POI#3 is to the west of the site. POI#4 is to the south of the site.

Post Construction Stormwater Practices

Infiltration Basin: North corner of the site, POI#1
Underground infiltration system: South corner of site, POI#4.

Table of Pre and Post Development Storm Runoff, POI#1:

Storm Event	Pre – Project runoff (ft^3/s)	Post – Project runoff (ft^3/s)
1	2.20	0.00
10	3.50	0.00
100	5.40	0.00

Table of Pre and Post Development Storm Runoff, POI#2:

Storm Event	Pre – Project runoff (ft^3/s)	Post – Project runoff (ft^3/s)
1	2.39	1.55
10	3.79	2.46
100	5.85	3.81

Table of Pre and Post Development Storm Runoff, POI#3:

Storm Event	Pre – Project runoff (ft^3/s)	Post – Project runoff (ft^3/s)
1	7.38	1.52
10	11.71	2.41
100	18.09	3.71

Table of Pre and Post Development Storm Runoff, POI#4:

Storm Event	Pre – Project runoff (ft^3/s)	Post – Project runoff (ft^3/s)
1	3.35	0.15
10	5.32	0.23
100	8.21	0.36

DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER & SEWER OPERATIONS

HYDRAULIC COMPUTATION TEMPLATE

JOB CHPE Astoria SHEET 1 OF 1

LOCATION COMPUTED BY

DATE 7/29/2022 CHECKED BY

DATUM APPROVED BY

$R = \frac{125}{T+15}$

STORMWATER SEWER DESIGN

LOCATION	FROM	TO	ZONING	AREA UNIT	TOTAL 'A'	RAINFALL INTENSITY (IN./HR.)	RUN-OFF COEFF.	TOTAL RUN-OFF (CFS)	SURFACE ELEVATION		COVER		INNER ELEVATION		FALL (F.T.)	LENGTH (F.T.)	SLOPE (%)	SHAPE OF SEWER	DIMENSION OF SEWER	CAPACITY OF SEWER (CFS)	VELOCITY (FPS)	TIME ELAPSED (MIN)			REMARKS
									UPPER END	LOWER END	UPPER END	LOWER END	UPPER END	LOWER END								UPPER END OF SECTION	IN SECTION	LOWER END OF SECTION	
P-1	S-1	S-2		Acre	0.52	4.17	0.92	2.00048	14.20	13.96	1.40	1.81	11.80	11.15	0.65	144.29	0.45	Round	12" PVC	2.59	3.639	15	0.66083631	15.6608363	
P-2	S-2	S-3		Acre	0.28	4.17	0.90	3.06193	13.96	14.24	1.31	2.14	11.15	10.60	0.55	167.12	0.33	Round	18" DIP	6.53	3.639	15	0.76541174	15.7654117	
P-3	S-3	S-4		Acre	0.92	4.17	0.89	6.48498	14.24	13.97	2.14	1.97	10.60	10.50	0.10	21.31	0.47	Round	18" DIP	7.08	4.938	15	0.07191171	15.0719117	
P-4	S-12	S-13		Acre	0.29	4.17	0.85	8.94998	14.51	14.55	2.01	2.18	10.50	10.37	0.13	12.75	1.02	Round	24" RCP	24.75	7.244	15	0.02932542	15.0293254	
P-5	S-13	S-14		Acre	0.03	4.17	0.85	9.04206	14.55	12.19	6.20	4.19	6.35	6.00	0.35	33.85	1.03	Round	24" RCP	24.87	7.290	15	0.07738683	15.0773868	
P-6	S-5	S-15		Acre	0.25	4.17	0.85	0.8925	13.65	14.02	1.65	2.52	11.00	10.50	0.50	55.81	0.90	Round	12" DIP	3.66	3.848	15	0.24173597	15.241736	
P-7	S-7	S-6		Acre	1.29	4.17	0.79	4.22148	13.00	13.82	1.50	3.12	10.50	9.70	0.80	52.71	1.52	Round	12" DIP	4.76	6.844	15	0.12835817	15.1283582	
P-8	S-16	S-15		Acre	0.152	4.17	0.85	0.53833	14.24	14.02	2.24	2.52	11.50	11.00	0.50	22.84	2.19	Round	6" DIP	0.9	4.786	15	0.07953754	15.0795375	
P-9	S-6	S-8 Flare End Section		Acre	0.45	4.17	0.93	5.94585	13.82	10.60	2.92	N/A	9.40	9.00	0.40	50.83	0.79	Round	18" RCP	10.11	5.954	15	0.1422965	15.1422965	
P-10	S-9	S-10 Flare End Section		Acre	0.63	4.17	0.65	1.71656	13.00	11.20	2.00	N/A	10.00	9.25	0.75	117.80	0.64	Round	12" DIP	3.82	4.035	15	0.48657993	15.4865799	
P-11	S-0 Culvert	S-11 Flare End Section		Acre	0.32	4.17	0.20	7.93074	13.09	12.46	N/A	N/A	11.00	10.85	0.15	7.28	2.06	Round	18" PVC	16.33	9.175	15	0.01321708	15.0132171	

Hydraulic Analysis Report

Project Data

Project Title:
Designer:
Project Date: Friday, July 29, 2022
Project Units: U.S. Customary Units
Notes:

Channel Analysis: P-1

Notes:

Input Parameters

Channel Type: Circular
Pipe Diameter: 1.0000 ft
Longitudinal Slope: 0.0045 ft/ft
Manning's n: 0.0120
Flow: 2.0000 cfs

Result Parameters

Depth: 0.6597 ft
Area of Flow: 0.5496 ft^2
Wetted Perimeter: 1.8959 ft
Hydraulic Radius: 0.2899 ft
Average Velocity: 3.6388 ft/s
Top Width: 0.9476 ft
Froude Number: 0.8420
Critical Depth: 0.6035 ft
Critical Velocity: 4.0366 ft/s
Critical Slope: 0.0058 ft/ft
Critical Top Width: 0.98 ft
Calculated Max Shear Stress: 0.1852 lb/ft^2
Calculated Avg Shear Stress: 0.0814 lb/ft^2

Channel Analysis: P-2

Notes:

Input Parameters

Channel Type: Circular
Pipe Diameter: 1.5000 ft
Longitudinal Slope: 0.0033 ft/ft
Manning's n: 0.0120
Flow: 3.0619 cfs

Result Parameters

Depth: 0.7219 ft
Area of Flow: 0.8415 ft^2
Wetted Perimeter: 2.3001 ft
Hydraulic Radius: 0.3659 ft
Average Velocity: 3.6387 ft/s
Top Width: 1.4989 ft
Froude Number: 0.8558
Critical Depth: 0.6658 ft
Critical Velocity: 4.0422 ft/s
Critical Slope: 0.0044 ft/ft
Critical Top Width: 1.49 ft
Calculated Max Shear Stress: 0.1487 lb/ft^2
Calculated Avg Shear Stress: 0.0753 lb/ft^2

Channel Analysis: P-3

Notes:

Input Parameters

Channel Type: Circular
Pipe Diameter: 1.5000 ft
Longitudinal Slope: 0.0047 ft/ft
Manning's n: 0.0120
Flow: 6.4850 cfs

Result Parameters

Depth: 1.0443 ft
Area of Flow: 1.3134 ft^2
Wetted Perimeter: 2.9610 ft
Hydraulic Radius: 0.4436 ft
Average Velocity: 4.9376 ft/s
Top Width: 1.3797 ft
Froude Number: 0.8918
Critical Depth: 0.9844 ft
Critical Velocity: 5.2752 ft/s
Critical Slope: 0.0055 ft/ft
Critical Top Width: 1.42 ft
Calculated Max Shear Stress: 0.3063 lb/ft^2
Calculated Avg Shear Stress: 0.1301 lb/ft^2

Channel Analysis: P-4

Notes:

Input Parameters

Channel Type: Circular
Pipe Diameter: 2.0000 ft
Longitudinal Slope: 0.0102 ft/ft
Manning's n: 0.0120
Flow: 8.9499 cfs

Result Parameters

Depth: 0.8316 ft
Area of Flow: 1.2355 ft^2
Wetted Perimeter: 2.8031 ft
Hydraulic Radius: 0.4408 ft
Average Velocity: 7.2437 ft/s
Top Width: 1.9714 ft
Froude Number: 1.6125
Critical Depth: 1.0674 ft
Critical Velocity: 5.2478 ft/s
Critical Slope: 0.0043 ft/ft
Critical Top Width: 2.00 ft
Calculated Max Shear Stress: 0.5293 lb/ft^2
Calculated Avg Shear Stress: 0.2805 lb/ft^2

Channel Analysis: P-5

Notes:

Input Parameters

Channel Type: Circular
Pipe Diameter: 2.0000 ft
Longitudinal Slope: 0.0103 ft/ft
Manning's n: 0.0120
Flow: 9.0420 cfs

Result Parameters

Depth: 0.8340 ft
Area of Flow: 1.2404 ft^2
Wetted Perimeter: 2.8081 ft
Hydraulic Radius: 0.4417 ft
Average Velocity: 7.2896 ft/s
Top Width: 1.9723 ft
Froude Number: 1.6199
Critical Depth: 1.0732 ft
Critical Velocity: 5.2657 ft/s
Critical Slope: 0.0043 ft/ft
Critical Top Width: 1.99 ft
Calculated Max Shear Stress: 0.5360 lb/ft^2
Calculated Avg Shear Stress: 0.2839 lb/ft^2

Channel Analysis: P-6

Notes:

Input Parameters

Channel Type: Circular
Pipe Diameter: 1.0000 ft
Longitudinal Slope: 0.0090 ft/ft
Manning's n: 0.0120
Flow: 0.8925 cfs

Result Parameters

Depth: 0.3362 ft
Area of Flow: 0.2319 ft^2
Wetted Perimeter: 1.2371 ft
Hydraulic Radius: 0.1875 ft
Average Velocity: 3.8483 ft/s
Top Width: 0.9448 ft
Froude Number: 1.3688
Critical Depth: 0.3958 ft
Critical Velocity: 3.0860 ft/s
Critical Slope: 0.0049 ft/ft
Critical Top Width: 0.98 ft
Calculated Max Shear Stress: 0.1888 lb/ft^2
Calculated Avg Shear Stress: 0.1053 lb/ft^2

Channel Analysis: P-7

Notes:

Input Parameters

Channel Type: Circular
Pipe Diameter: 1.0000 ft
Longitudinal Slope: 0.0152 ft/ft
Manning's n: 0.0120
Flow: 4.2215 cfs

Result Parameters

Depth: 0.7328 ft
Area of Flow: 0.6168 ft^2
Wetted Perimeter: 2.0552 ft
Hydraulic Radius: 0.3001 ft
Average Velocity: 6.8439 ft/s
Top Width: 0.8850 ft
Froude Number: 1.4446
Critical Depth: 0.8657 ft
Critical Velocity: 5.8429 ft/s
Critical Slope: 0.0110 ft/ft
Critical Top Width: 0.68 ft
Calculated Max Shear Stress: 0.6951 lb/ft^2
Calculated Avg Shear Stress: 0.2847 lb/ft^2

Channel Analysis: P-8

Notes:

Input Parameters

Channel Type: Circular
Pipe Diameter: 0.5000 ft
Longitudinal Slope: 0.0219 ft/ft
Manning's n: 0.0120
Flow: 0.5383 cfs

Result Parameters

Depth: 0.2787 ft
Area of Flow: 0.1125 ft^2
Wetted Perimeter: 0.8429 ft
Hydraulic Radius: 0.1335 ft
Average Velocity: 4.7856 ft/s
Top Width: 0.4967 ft
Froude Number: 1.7722
Critical Depth: 0.3740 ft
Critical Velocity: 3.4171 ft/s
Critical Slope: 0.0095 ft/ft
Critical Top Width: 0.43 ft
Calculated Max Shear Stress: 0.3808 lb/ft^2
Calculated Avg Shear Stress: 0.1824 lb/ft^2

Channel Analysis: P-9

Notes:

Input Parameters

Channel Type: Circular
Pipe Diameter: 1.5000 ft
Longitudinal Slope: 0.0079 ft/ft
Manning's n: 0.0120
Flow: 5.9459 cfs

Result Parameters

Depth: 0.8269 ft
Area of Flow: 0.9987 ft^2
Wetted Perimeter: 2.5102 ft
Hydraulic Radius: 0.3978 ft
Average Velocity: 5.9537 ft/s
Top Width: 1.4921 ft
Froude Number: 1.2825
Critical Depth: 0.9419 ft
Critical Velocity: 5.0896 ft/s
Critical Slope: 0.0053 ft/ft
Critical Top Width: 1.45 ft
Calculated Max Shear Stress: 0.4076 lb/ft^2
Calculated Avg Shear Stress: 0.1961 lb/ft^2

Channel Analysis: P-10

Notes:

Input Parameters

Channel Type: Circular
Pipe Diameter: 1.0000 ft
Longitudinal Slope: 0.0064 ft/ft
Manning's n: 0.0120
Flow: 1.7166 cfs

Result Parameters

Depth: 0.5327 ft
Area of Flow: 0.4254 ft^2
Wetted Perimeter: 1.6363 ft
Hydraulic Radius: 0.2600 ft
Average Velocity: 4.0353 ft/s
Top Width: 0.9979 ft
Froude Number: 1.0892
Critical Depth: 0.5571 ft
Critical Velocity: 3.8171 ft/s
Critical Slope: 0.0055 ft/ft
Critical Top Width: 0.99 ft
Calculated Max Shear Stress: 0.2127 lb/ft^2
Calculated Avg Shear Stress: 0.1038 lb/ft^2

Channel Analysis: P-11

Notes:

Input Parameters

Channel Type: Circular
Pipe Diameter: 1.5000 ft
Longitudinal Slope: 0.0206 ft/ft
Manning's n: 0.0120
Flow: 7.9307 cfs

Result Parameters

Depth: 0.7372 ft
Area of Flow: 0.8644 ft^2
Wetted Perimeter: 2.3306 ft
Hydraulic Radius: 0.3709 ft
Average Velocity: 9.1747 ft/s
Top Width: 1.4998 ft
Froude Number: 2.1297
Critical Depth: 1.0913 ft
Critical Velocity: 5.7583 ft/s
Critical Slope: 0.0063 ft/ft
Critical Top Width: 1.34 ft
Calculated Max Shear Stress: 0.9477 lb/ft^2
Calculated Avg Shear Stress: 0.4768 lb/ft^2

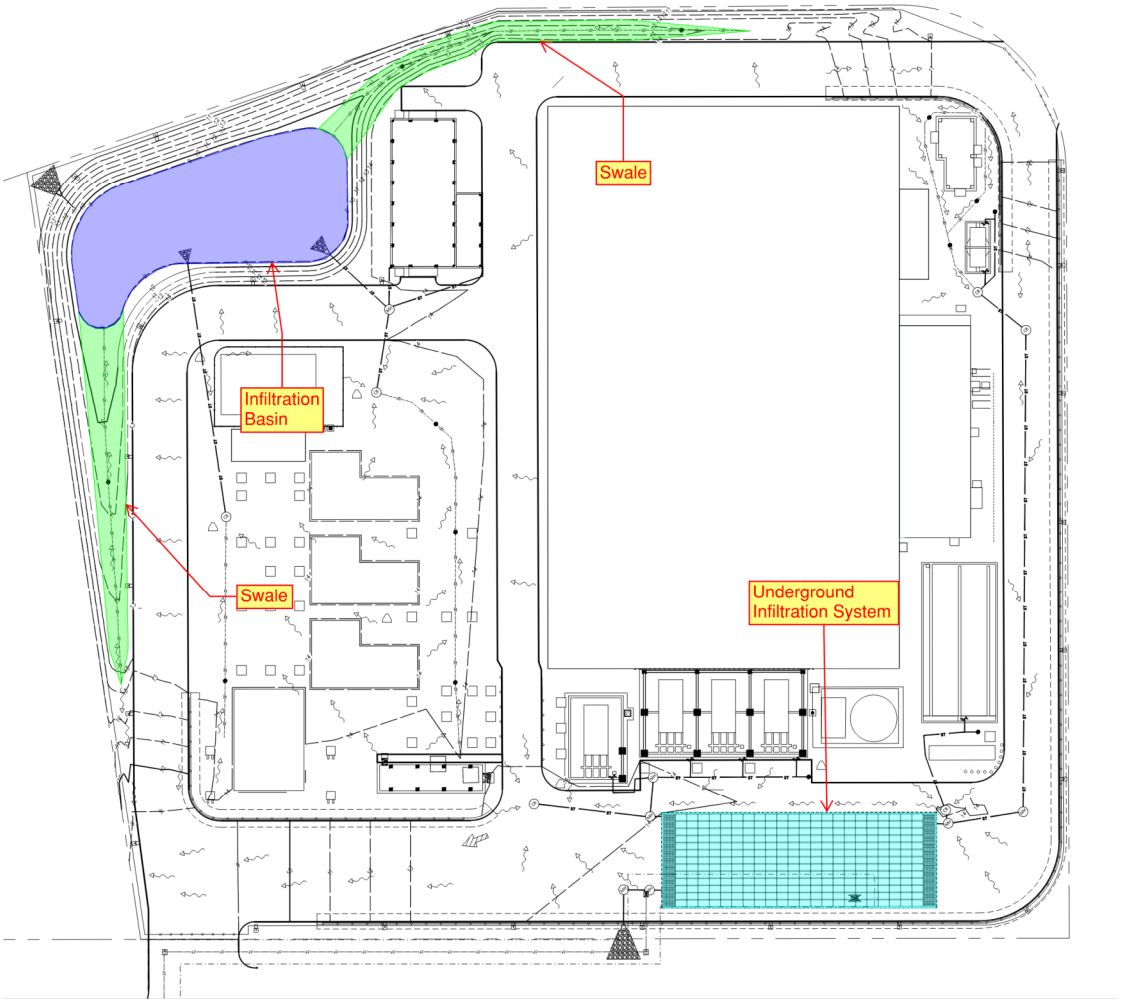
Appendix K - Preliminary Operation and Maintenance Manual for Post Construction SMPs

Operations and Maintenance Manual

Maintenance of Stormwater Management Practices (SMPs) and Best Management Practices (BMPs) is the responsibility of the property owner and is required per the issued Stormwater Maintenance Permit. The Stormwater Maintenance Permit requires ongoing maintenance and periodic inspections to assess the condition and functionality of each SMP and BMP and to assess any adjustments to maintenance frequencies and tasks that may be needed to maintain performance over time. Furthermore, permittees must provide an annual certification that SMPs and BMPs have been inspected and properly maintained. Permittees are subject to random DEP inspections and must renew their Stormwater Maintenance Permit(s) every five years.

See SMP Location Maps below for reference. The following lists the Stormwater Management Practices that require routine maintenance:

- Infiltration Basin
- Underground Infiltration Basin
- Swales (2)



SMP Location Map

Operation and Maintenance Responsible Part

TDI will be responsible for conducting periodic inspections as shown below and within 24 hours of a 0.5-inch rainfall event, at least 2-days between inspection. Reports will be kept onsite for ease of access. M&O will be responsible for providing an Annual Certification attesting that any permitted SMPs and BMPs have been properly inspected and maintained.

TDI M&O contact person: .

Routine Maintenance Tasks and Frequencies For Level 1 Inspection

MAINTENANCE ITEM	FREQUENCY	Follow-Up Actions
Swale		
Trash Removal	As needed	Remove trash and debris
Eroded areas	Annually	Check and repair eroded areas
Sediment Removal	Annually	Remove accumulated sand or sediment
Underdrains	Annually	Inspect underdrains and repair any clogging or damage
Inflow and outlets	Annually	Inspect inflow and outlets and repair any clogging or damage
Infiltration Basin		
Sediment Removal	Twice per year or more frequently if needed based on inspections (note: leaves and other natural materials can be left in place)	Removal of accumulated sediment and debris from infiltration/ filtration areas
Sediment Removal	As warranted based on video pipe inspections conducted every three years	Hydraulic cleaning of inflow and outflow piping
Sediment Removal	As warranted based on video pipe inspections conducted every three years	Hydraulic cleaning of underdrain piping
Inlet Cleaning	Twice per year or more frequently based on inspections if sediment and debris accumulation is rapid	Vacuum cleaning of accumulated sediment and debris within inlets
Outlet Cleaning	Annually at minimum or more frequently based on ongoing and annual inspections	Removal of accumulated sediment and debris from risers (vacuum cleaning), trash racks, and spillways
Underground Infiltration Basin		
Vacuum cleaning	Every three years or more frequently based on inspections	Removal of accumulated sediment and debris within the pipes

Inflow outflow pipes cleaning	Monthly for the first year or until sediment and debris accumulation decrease, then twice per year	Removal of accumulated debris within the pipes
Inlet Cleaning	Twice per year or more frequently based on inspections if sediment and debris accumulation is rapid	Vacuum cleaning of accumulated sediment and debris within inlets
Outlet Cleaning	Annually at minimum or more frequently based on ongoing and annual inspections	Removal of accumulated sediment and debris from risers (vacuum cleaning), trash racks, and spillways
Sediment Removal	As warranted based on video pipe inspections conducted every three years	Hydraulic cleaning of underdrain piping

Level 2 Inspection and Triggers for level 3 are attached. Refer to NYSDEC Maintenance Guidance Stormwater Management Practices for more detail.

Operation, Maintenance, and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

Maintenance Item	Satisfactory/Unsatisfactory	Comments
1. Swales		
Trash Removal		
Eroded areas		
Sediment Removal		
Check Dam		
Underdrains		
Inflow and outlets		
2. Infiltration Basin		
Watering		
Sediment removal from infiltration/filtration areas		
Sediment removal for inflow and outflow piping		
Sediment removal for underdrain piping		
Inlet cleaning		
Outlet cleaning		
3. Underground Infiltration System		
Sediment removal within underground system		
System is free flowing with no clogging or backups		
Inlet Cleaning		
Outlet Cleaning		

4. Drainage Structures (Monthly for first year/semiannually after)		
Drainage structures clear of debris		
Inlet pipes clear of debris		
Outlet pipes clear of debris		

Comments:

Actions to be Taken:

Schedule of Self-Inspections

Maintained by	TDI	(Others)
Name, Address, Phone of Responsible Party		
Facilities to be Maintained	Swale	
Description of Maintenance Activity for each Facility and Frequency	Remove sediment as required.	
Access and safety issues		
Testing and disposal of sediments		

Maintained by	TDI	(Others)
Name, Address, Phone of Responsible Party		
Facilities to be Maintained	Infiltration Basin	
Description of Maintenance Activity for each Facility and Frequency	Twice per year. Sediment removal and inlet cleaning	
Access and safety issues		
Testing and disposal of sediments		

Maintained by	TDI	(Others)
Name, Address, Phone of Responsible Party		
Facilities to be Maintained	Underground Infiltration System	
Description of Maintenance Activity for each Facility and Frequency	Twice per year. Sediment removal and inlet cleaning	
Access and safety issues		
Testing and disposal of sediments		

Stormwater Management Practices As-Built Plans

Stormwater Maintenance Permit

Appendix L - Copy of the NYS Construction General Permit

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SPDES GENERAL PERMIT
FOR STORMWATER DISCHARGES

From

CONSTRUCTION ACTIVITY

Permit No. GP- 0-20-001

Issued Pursuant to Article 17, Titles 7, 8 and Article 70

of the Environmental Conservation Law

Effective Date: January 29, 2020 Expiration Date: January 28, 2025

John J. Ferguson

Chief Permit Administrator

1-23-20

Authorized Signature Date

Address: NYS DEC
Division of Environmental Permits
625 Broadway, 4th Floor
Albany, N.Y. 12233-1750

PREFACE

Pursuant to Section 402 of the Clean Water Act ("CWA"), stormwater *discharges* from certain *construction activities* are unlawful unless they are authorized by a *National Pollutant Discharge Elimination System ("NPDES")* permit or by a state permit program. New York administers the approved State Pollutant Discharge Elimination System (SPDES) program with permits issued in accordance with the New York State Environmental Conservation Law (ECL) Article 17, Titles 7, 8 and Article 70.

An *owner or operator* of a *construction activity* that is eligible for coverage under this permit must obtain coverage prior to the *commencement of construction activity*. Activities that fit the definition of "*construction activity*", as defined under 40 CFR 122.26(b)(14)(x), (15)(i), and (15)(ii), constitute construction of a *point source* and therefore, pursuant to ECL section 17-0505 and 17-0701, the *owner or operator* must have coverage under a SPDES permit prior to *commencing construction activity*. The *owner or operator* cannot wait until there is an actual *discharge* from the *construction site* to obtain permit coverage.

***Note: The italicized words/phrases within this permit are defined in Appendix A.**

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SPDES GENERAL PERMIT FOR STORMWATER DISCHARGES FROM CONSTRUCTION ACTIVITIES

Table of Contents

Part 1. PERMIT COVERAGE AND LIMITATIONS

A. Permit Application

This permit authorizes stormwater *discharges* to *surface waters of the State* from the following *construction activities* identified within 40 CFR Parts 122.26(b)(14)(x), 122.26(b)(15)(i) and 122.26(b)(15)(ii), provided all of the eligibility provisions of this permit are met:

1. *Construction activities* involving soil disturbances of one (1) or more acres; including disturbances of less than one acre that are part of a *larger common plan of development or sale* that will ultimately disturb one or more acres of land; excluding *routine maintenance activity* that is performed to maintain the original line and grade, hydraulic capacity or original purpose of a facility;

2. *Construction activities* involving soil disturbances of less than one (1) acre where the Department has determined that a *SPDES* permit is required for stormwater *discharges* based on the potential for contribution to a violation of a *water quality standard* or for significant contribution of *pollutants* to *surface waters of the State.*

3. *Construction activities* located in the watershed(s) identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.

B. Effluent Limitations Applicable to Discharges from Construction Activities

*Discharge*s authorized by this permit must achieve, at a minimum, the effluent limitations in Part I.B.1. (a) – (f) of this permit. These limitations represent the degree of effluent reduction attainable by the application of best practicable technology currently available.

1. Erosion and Sediment Control Requirements - The *owner or operator* must select, design, install, implement and maintain control measures to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. The selection, design, installation, implementation, and maintenance of these control measures must meet the non-numeric effluent limitations in Part I.B.1.(a) – (f) of this permit and be in accordance with the New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016, using sound engineering judgment. Where control measures are not designed in conformance with the design criteria included in the technical standard, the *owner or operator* must include in the *Stormwater Pollution Prevention Plan* (“SWPPP”) the reason(s) for the

deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

a. **Erosion and Sediment Controls.** Design, install and maintain effective erosion and sediment controls to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. At a minimum, such controls must be designed, installed and maintained to:

   (i) *Minimize* soil erosion through application of runoff control and soil stabilization control measure to *minimize pollutant discharge*s;

   (ii) Control stormwater *discharge*s, including both peak flowrates and total stormwater volume, to *minimize* channel and *streambank* erosion and scour in the immediate vicinity of the *discharge* points;

   (iii) *Minimize* the amount of soil exposed during *construction activity*;

   (iv) *Minimize* the disturbance of *steep slopes*;

   (v) *Minimize* sediment *discharge*s from the site;

   (vi) Provide and maintain *natural buffer*s around surface waters, direct stormwater to vegetated areas and maximize stormwater infiltration to reduce *pollutant discharge*s, unless *infeasible*;

   (vii) *Minimize* soil compaction. Minimizing soil compaction is not required where the intended function of a specific area of the site dictates that it be compacted;

   (viii) Unless *infeasible*, preserve a sufficient amount of topsoil to complete soil restoration and establish a uniform, dense vegetative cover; and

   (ix) *Minimize* dust. On areas of exposed soil, *minimize* dust through the appropriate application of water or other dust suppression techniques to control the generation of pollutants that could be discharged from the site.

b. **Soil Stabilization**. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within fourteen (14) days from the date the current soil disturbance activity ceased. For construction sites that *directly discharge* to one of the 303(d) segments

listed in Appendix E or is located in one of the watersheds listed in Appendix C, the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven (7) days from the date the current soil disturbance activity ceased. See Appendix A for definition of *Temporarily Ceased*.

c. **Dewatering**. *Discharge*s from *dewatering* activities, including *discharge*s from *dewatering* of trenches and excavations, must be managed by appropriate control measures.

d. **Pollution Prevention Measures**. Design, install, implement, and maintain effective pollution prevention measures to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. At a minimum, such measures must be designed, installed, implemented and maintained to:

(i) *Minimize* the *discharge* of *pollutants* from equipment and vehicle washing, wheel wash water, and other wash waters. This applies to washing operations that use clean water only. Soaps, detergents and solvents cannot be used;

(ii) *Minimize* the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, hazardous and toxic waste, and other materials present on the site to precipitation and to stormwater. Minimization of exposure is not required in cases where the exposure to precipitation and to stormwater will not result in a *discharge* of *pollutants*, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use) ; and

(iii) Prevent the *discharge* of *pollutants* from spills and leaks and implement chemical spill and leak prevention and response procedures.

e. **Prohibited *Discharges*.** The following *discharge*s are prohibited:

(i) Wastewater from washout of concrete;

(ii) Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;

(iii) Fuels, oils, or other *pollutants* used in vehicle and equipment operation and maintenance;

(iv) Soaps or solvents used in vehicle and equipment washing; and

(v) Toxic or hazardous substances from a spill or other release.

f. Surface Outlets. When discharging from basins and impoundments, the outlets shall be designed, constructed and maintained in such a manner that sediment does not leave the basin or impoundment and that erosion at or below the outlet does not occur.

C. Post-construction Stormwater Management Practice Requirements

1. The *owner or operator* of a *construction activity* that requires post-construction stormwater management practices pursuant to Part III.C. of this permit must select, design, install, and maintain the practices to meet the *performance criteria* in the New York State Stormwater Management Design Manual ("Design Manual"), dated January 2015, using sound engineering judgment. Where post-construction stormwater management practices ("SMPs") are not designed in conformance with the *performance criteria* in the Design Manual, the *owner or operator* must include in the SWPPP the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

2. The *owner or operator* of a *construction activity* that requires post-construction stormwater management practices pursuant to Part III.C. of this permit must design the practices to meet the applicable *sizing criteria* in Part I.C.2.a., b., c. or d. of this permit.

a. Sizing Criteria for New Development

(i) Runoff Reduction Volume ("RRv"): Reduce the total Water Quality Volume ("WQv") by application of RR techniques and standard SMPs with RRv capacity. The total WQv shall be calculated in accordance with the criteria in Section 4.2 of the Design Manual.

(ii) Minimum RRv and Treatment of Remaining Total WQv: Construction activities that cannot meet the criteria in Part I.C.2.a.(i) of this permit due to site limitations shall direct runoff from all newly constructed impervious areas to a RR technique or standard SMP with RRv capacity unless infeasible. The specific site limitations that prevent the reduction of 100% of the WQv shall be documented in the SWPPP.

For each impervious area that is not directed to a RR technique or standard SMP with RRv capacity, the SWPPP must include documentation which demonstrates that all options were considered and for each option explains why it is considered infeasible.

In no case shall the runoff reduction achieved from the newly constructed impervious areas be less than the Minimum RRv as calculated using the criteria in Section 4.3 of the Design Manual. The remaining portion of the total WQv that cannot be reduced shall be treated by application of standard SMPs.

(iii) Channel Protection Volume ("Cpv"): Provide 24 hour extended detention of the post-developed 1-year, 24-hour storm event; remaining after runoff reduction. The Cpv requirement does not apply when:
(1) Reduction of the entire Cpv is achieved by application of runoff reduction techniques or infiltration systems, or
(2) The site discharges directly to tidal waters, or fifth order or larger streams.

(iv) *Overbank* Flood Control Criteria ("Qp"): Requires storage to attenuate the post-development 10-year, 24-hour peak discharge rate (Qp) to predevelopment rates. The Qp requirement does not apply when:
(1) the site discharges directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

(v) Extreme Flood Control Criteria ("Qf"): Requires storage to attenuate the post-development 100-year, 24-hour peak discharge rate (Qf) to predevelopment rates. The Qf requirement does not apply when:
(1) the site discharges directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

b. *Sizing Criteria* for *New Development* in Enhanced Phosphorus Removal Watershed

(i) Runoff Reduction Volume (RRv): Reduce the total Water Quality Volume (WQv) by application of RR techniques and standard SMPs with RRv capacity. The total WQv is the runoff volume from the 1-year, 24 hour design storm over the post-developed watershed and shall be

calculated in accordance with the criteria in Section 10.3 of the Design Manual.

(ii) Minimum RRv and Treatment of Remaining Total WQv: *Construction activities* that cannot meet the criteria in Part I.C.2.b.(i) of this permit due to *site limitations* shall direct runoff from all newly constructed *impervious areas* to a RR technique or standard SMP with RRv capacity unless *infeasible*. The specific *site limitations* that prevent the reduction of 100% of the WQv shall be documented in the SWPPP. For each *impervious area* that is not directed to a RR technique or standard SMP with RRv capacity, the SWPPP must include documentation which demonstrates that all options were considered and for each option explains why it is considered *infeasible.*

In no case shall the runoff reduction achieved from the newly constructed *impervious areas* be less than the Minimum RRv as calculated using the criteria in Section 10.3 of the Design Manual. The remaining portion of the total WQv that cannot be reduced shall be treated by application of standard SMPs.

(iii) Channel Protection Volume (Cpv): Provide 24 hour extended detention of the post-developed 1-year, 24-hour storm event; remaining after runoff reduction. The Cpv requirement does not apply when:
(1) Reduction of the entire Cpv is achieved by application of runoff reduction techniques or infiltration systems, or
(2) The site *discharge*s directly to tidal waters, or fifth order or larger streams.

(iv) *Overbank* Flood Control Criteria (Qp): Requires storage to attenuate the post-development 10-year, 24-hour peak *discharge* rate (Qp) to predevelopment rates. The Qp requirement does not apply when:
(1) the site *discharge*s directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

(v) Extreme Flood Control Criteria (Qf): Requires storage to attenuate the post-development 100-year, 24-hour peak *discharge* rate (Qf) to predevelopment rates. The Qf requirement does not apply when:
(1) the site *discharge*s directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

c. Sizing Criteria for Redevelopment Activity

(i) Water Quality Volume (WQv): The WQv treatment objective for *redevelopment activity* shall be addressed by one of the following options. *Redevelopment activities* located in an Enhanced Phosphorus Removal Watershed (see Part III.B.3. and Appendix C of this permit) shall calculate the WQv in accordance with Section 10.3 of the Design Manual. All other *redevelopment activities* shall calculate the WQv in accordance with Section 4.2 of the Design Manual.

(1) Reduce the existing *impervious cover* by a minimum of 25% of the total disturbed, *impervious area*. The Soil Restoration criteria in Section 5.1.6 of the Design Manual must be applied to all newly created pervious areas, or

(2) Capture and treat a minimum of 25% of the WQv from the disturbed, *impervious area* by the application of standard SMPs; or reduce 25% of the WQv from the disturbed, *impervious area* by the application of RR techniques or standard SMPs with RRv capacity., or

(3) Capture and treat a minimum of 75% of the WQv from the disturbed, *impervious area* as well as any additional runoff from tributary areas by application of the alternative practices discussed in Sections 9.3 and 9.4 of the Design Manual., or

(4) Application of a combination of 1, 2 and 3 above that provide a weighted average of at least two of the above methods. Application of this method shall be in accordance with the criteria in Section 9.2.1(B) (IV) of the Design Manual.

If there is an existing post-construction stormwater management practice located on the site that captures and treats runoff from the *impervious area* that is being disturbed, the WQv treatment option selected must, at a minimum, provide treatment equal to the treatment that was being provided by the existing practice(s) if that treatment is greater than the treatment required by options 1 – 4 above.

(ii) Channel Protection Volume (Cpv): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site.

(iii) *Overbank* Flood Control Criteria (Qp): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site.

(iv) Extreme Flood Control Criteria (Qf): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site

d. Sizing Criteria for Combination of Redevelopment Activity and New Development

Construction projects that include both New Development and Redevelopment Activity shall provide post-construction stormwater management controls that meet the sizing criteria calculated as an aggregate of the Sizing Criteria in Part I.C.2.a. or b. of this permit for the New Development portion of the project and Part I.C.2.c of this permit for Redevelopment Activity portion of the project.

D. Maintaining Water Quality

The Department expects that compliance with the conditions of this permit will control *discharge*s necessary to meet applicable *water quality standards*. It shall be a violation of the *ECL* for any discharge to either cause or contribute to a violation of *water quality standards* as contained in Parts 700 through 705 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York, such as:

1. There shall be no increase in turbidity that will cause a substantial visible contrast to natural conditions;

2. There shall be no increase in suspended, colloidal or settleable solids that will cause deposition or impair the waters for their best usages; and

3. There shall be no residue from oil and floating substances, nor visible oil film, nor globules of grease.

If there is evidence indicating that the stormwater *discharge*s authorized by this permit are causing, have the reasonable potential to cause, or are contributing to a violation of the *water quality standards*; the *owner or operator* must take appropriate corrective action in accordance with Part IV.C.5. of this general permit and document in accordance with Part IV.C.4. of this general permit. To address the *water quality standard* violation the *owner or operator* may need to provide additional information, include and implement appropriate controls in the SWPPP to correct the problem, or obtain an individual SPDES permit.

If there is evidence indicating that despite compliance with the terms and conditions of this general permit it is demonstrated that the stormwater *discharge*s authorized by this permit are causing or contributing to a violation of *water quality standards*, or if the Department determines that a modification of the permit is necessary to prevent a violation of *water quality standards*, the authorized *discharge*s will no longer be eligible for coverage under this permit. The Department may require the *owner or operator* to obtain an individual SPDES permit to continue discharging.

E. Eligibility Under This General Permit

1. This permit may authorize all *discharges* of stormwater from *construction activity* to *surface waters of the State* and *groundwaters* except for ineligible *discharges* identified under subparagraph F. of this Part.

2. Except for non-stormwater *discharges* explicitly listed in the next paragraph, this permit only authorizes stormwater *discharge*s; including stormwater runoff, snowmelt runoff, and surface runoff and drainage, from *construction activities*.

3. Notwithstanding paragraphs E.1 and E.2 above, the following non-stormwater discharges are authorized by this permit: those listed in 6 NYCRR 750-1.2(a)(29)(vi), with the following exception: "Discharges from firefighting activities are authorized only when the firefighting activities are emergencies/unplanned"; waters to which other components have not been added that are used to control dust in accordance with the SWPPP; and uncontaminated *discharge*s from *construction site* de-watering operations. All non-stormwater discharges must be identified in the SWPPP. Under all circumstances, the *owner or operator* must still comply with *water quality standards* in Part I.D of this permit.

4. The *owner or operator* must maintain permit eligibility to *discharge* under this permit. Any *discharges* that are not compliant with the eligibility conditions of this permit are not authorized by the permit and the *owner or operator* must either apply for a separate permit to cover those ineligible *discharges* or take steps necessary to make the *discharge* eligible for coverage.

F. Activities Which Are Ineligible for Coverage Under This General Permit

All of the following are **not** authorized by this permit:

1. *Discharge*s after *construction activities* have been completed and the site has undergone *final stabilization*;

2. *Discharge*s that are mixed with sources of non-stormwater other than those expressly authorized under subsection E.3. of this Part and identified in the SWPPP required by this permit;

3. *Discharges* that are required to obtain an individual SPDES permit or another SPDES general permit pursuant to Part VII.K. of this permit;

4. *Construction activities* or *discharges* from *construction activities* that may adversely affect an *endangered or threatened species* unless the *owner or*

operator has obtained a permit issued pursuant to 6 NYCRR Part 182 for the project or the Department has issued a letter of non-jurisdiction for the project. All documentation necessary to demonstrate eligibility shall be maintained on site in accordance with Part II.D.2 of this permit;

5. *Discharges* which either cause or contribute to a violation of *water quality standards* adopted pursuant to the *ECL* and its accompanying regulations;

6. *Construction activities* for residential, commercial and institutional projects:

   a. Where the *discharge*s from the *construction activities* are tributary to waters of the state classified as AA or AA-s; and

   b. Which are undertaken on land with no existing *impervious cover*; and

   c. Which disturb one (1) or more acres of land designated on the current United States Department of Agriculture ("USDA") Soil Survey as Soil Slope Phase "D", (provided the map unit name is inclusive of slopes greater than 25%), or Soil Slope Phase "E" or "F" (regardless of the map unit name), or a combination of the three designations.

7. *Construction activities* for linear transportation projects and linear utility projects:

   a. Where the *discharge*s from the *construction activities* are tributary to waters of the state classified as AA or AA-s; and

   b. Which are undertaken on land with no existing *impervious cover*; and

   c. Which disturb two (2) or more acres of land designated on the current USDA Soil Survey as Soil Slope Phase "D" (provided the map unit name is inclusive of slopes greater than 25%), or Soil Slope Phase "E" or "F" (regardless of the map unit name), or a combination of the three designations.

8. *Construction activities* that have the potential to affect an *historic property*, unless there is documentation that such impacts have been resolved. The following documentation necessary to demonstrate eligibility with this requirement shall be maintained on site in accordance with Part II.D.2 of this permit and made available to the Department in accordance with Part VII.F of this permit:

   a. Documentation that the *construction activity* is not within an archeologically sensitive area indicated on the sensitivity map, and that the *construction activity* is not located on or immediately adjacent to a property listed or determined to be eligible for listing on the National or State Registers of Historic Places, and that there is no new permanent building on the *construction site* within the following distances from a building, structure, or object that is more than 50 years old, or if there is such a new permanent building on the *construction site* within those parameters that NYS Office of Parks, Recreation and Historic Preservation (OPRHP), a Historic Preservation Commission of a Certified Local Government, or a qualified preservation professional has determined that the building, structure, or object more than 50 years old is not historically/archeologically significant.

      - 1-5 acres of disturbance - 20 feet
      - 5-20 acres of disturbance - 50 feet
      - 20+ acres of disturbance - 100 feet, or

   b. DEC consultation form sent to OPRHP, and copied to the NYS DEC Agency Historic Preservation Officer (APO), and
      (i) the State Environmental Quality Review (SEQR) Environmental Assessment Form (EAF) with a negative declaration or the Findings Statement, with documentation of OPRHP's agreement with the resolution; or
      (ii) documentation from OPRHP that the *construction activity* will result in No Impact; or
      (iii) documentation from OPRHP providing a determination of No Adverse Impact; or
      (iv) a Letter of Resolution signed by the owner/operator, OPRHP and the DEC APO which allows for this *construction activity* to be eligible for coverage under the general permit in terms of the State Historic Preservation Act (SHPA); or

   c. Documentation of satisfactory compliance with Section 106 of the National Historic Preservation Act for a coterminous project area:

(i) No Affect
(ii) No Adverse Affect
(iii) Executed Memorandum of Agreement, or

d. Documentation that:

(i) SHPA Section 14.09 has been completed by NYS DEC or another state agency.

9. *Discharge*s from *construction activities* that are subject to an existing SPDES individual or general permit where a SPDES permit for *construction activity* has been terminated or denied; or where the *owner or operator* has failed to renew an expired individual permit.

Part II. PERMIT COVERAGE

A. How to Obtain Coverage

1. An *owner or operator* of a *construction activity* that is not subject to the requirements of a regulated, traditional land use control MS4 must first prepare a SWPPP in accordance with all applicable requirements of this permit and then submit a completed Notice of Intent (NOI) to the Department to be authorized to discharge under this permit.

2. An *owner or operator* of a *construction activity* that is subject to the requirements of a *regulated, traditional land use control MS4* must first prepare a SWPPP in accordance with all applicable requirements of this permit and then have the SWPPP reviewed and accepted by the *regulated, traditional land use control MS4* prior to submitting the NOI to the Department. The *owner or operator* shall have the “MS4 SWPPP Acceptance” form signed in accordance with Part VII.H., and then submit that form along with a completed NOI to the Department.

3. The requirement for an *owner or operator* to have its SWPPP reviewed and accepted by the *regulated, traditional land use control MS4* prior to submitting the NOI to the Department does not apply to an *owner or operator* that is obtaining permit coverage in accordance with the requirements in Part II.F. (Change of *Owner or Operator*) or where the *owner or operator* of the *construction activity* is the *regulated, traditional land use control MS4* . This exemption does not apply to *construction activities* subject to the New York City Administrative Code.

B. Notice of Intent (NOI) Submittal

1. Prior to December 21, 2020, an owner or operator shall use either the electronic (eNOI) or paper version of the NOI that the Department prepared. Both versions of the NOI are located on the Department's website (http://www.dec.ny.gov/). The paper version of the NOI shall be signed in accordance with Part VII.H. of this permit and submitted to the following address:

   NOTICE OF INTENT
   NYS DEC, Bureau of Water Permits
   625 Broadway, 4th Floor
   Albany, New York 12233-3505

2. Beginning December 21, 2020 and in accordance with EPA's 2015 NPDES Electronic Reporting Rule (40 CFR Part 127), the *owner or operator* must submit the NOI electronically using the *Department's* online NOI.

3. The *owner or operator* shall have the SWPPP preparer sign the "SWPPP Preparer Certification" statement on the NOI prior to submitting the form to the Department.

4. As of the date the NOI is submitted to the Department, the *owner or operator* shall make the NOI and SWPPP available for review and copying in accordance with the requirements in Part VII.F. of this permit.

C. Permit Authorization

1. An *owner or operator* shall not *commence construction activity* until their authorization to *discharge* under this permit goes into effect.

2. Authorization to *discharge* under this permit will be effective when the *owner or operator* has satisfied all of the following criteria:

   a. project review pursuant to the State Environmental Quality Review Act ("SEQRA") have been satisfied, when SEQRA is applicable. See the Department's website (http://www.dec.ny.gov/) for more information,

   b. where required, all necessary Department permits subject to the *Uniform Procedures Act ("UPA")* (see 6 NYCRR Part 621), or the equivalent from another New York State agency, have been obtained, unless otherwise notified by the Department pursuant to 6 NYCRR 621.3(a)(4). *Owners or operators* of *construction activities* that are required to obtain *UPA* permits

must submit a preliminary SWPPP to the appropriate DEC Permit Administrator at the Regional Office listed in Appendix F at the time all other necessary *UPA* permit applications are submitted. The preliminary SWPPP must include sufficient information to demonstrate that the *construction activity* qualifies for authorization under this permit,

c. the final SWPPP has been prepared, and

d. a complete NOI has been submitted to the Department in accordance with the requirements of this permit.

3. An *owner or operator* that has satisfied the requirements of Part II.C.2 above will be authorized to *discharge* stormwater from their *construction activity* in accordance with the following schedule:

   a. For *construction activities* that are <u>not</u> subject to the requirements of a *regulated, traditional land use control MS4*:

      (i) Five (5) business days from the date the Department receives a complete electronic version of the NOI (eNOI) for *construction activities* with a SWPPP that has been prepared in conformance with the design criteria in the technical standard referenced in Part III.B.1 and the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C.; or

      (ii) Sixty (60) business days from the date the Department receives a complete NOI (electronic or paper version) for *construction activities* with a SWPPP that has <u>not</u> been prepared in conformance with the design criteria in technical standard referenced in Part III.B.1. or, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C., the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, or;

      (iii) Ten (10) business days from the date the Department receives a complete paper version of the NOI for *construction activities* with a SWPPP that has been prepared in conformance with the design criteria in the technical standard referenced in Part III.B.1 and the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C.

b. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*:

(i) Five (5) business days from the date the Department receives both a complete electronic version of the NOI (eNOI) and signed "*MS4* SWPPP Acceptance" form, or

(ii) Ten (10) business days from the date the Department receives both a complete paper version of the NOI and signed "MS4 SWPPP Acceptance" form.

4. Coverage under this permit authorizes stormwater *discharges* from only those areas of disturbance that are identified in the NOI. If an *owner or operator* wishes to have stormwater *discharges* from future or additional areas of disturbance authorized, they must submit a new NOI that addresses that phase of the development, unless otherwise notified by the Department. The *owner or operator* shall not *commence construction activity* on the future or additional areas until their authorization to *discharge* under this permit goes into effect in accordance with Part II.C. of this permit.

D. General Requirements For Owners or Operators With Permit Coverage

1. The *owner or operator* shall ensure that the provisions of the SWPPP are implemented from the *commencement of construction activity* until all areas of disturbance have achieved *final stabilization* and the Notice of Termination ("NOT") has been submitted to the Department in accordance with Part V. of this permit. This includes any changes made to the SWPPP pursuant to Part III.A.4. of this permit.

2. The *owner or operator* shall maintain a copy of the General Permit (GP-0-20-001), NOI, *NOI Acknowledgment Letter*, SWPPP, MS4 SWPPP Acceptance form, inspection reports, responsible contractor's or subcontractor's certification statement (see Part III.A.6.), and all documentation necessary to demonstrate eligibility with this permit at the *construction site* until all disturbed areas have achieved *final stabilization* and the NOT has been submitted to the Department. The documents must be maintained in a secure location, such as a job trailer, on-site construction office, or mailbox with lock. The secure location must be accessible during normal business hours to an individual performing a compliance inspection.

3. The *owner or operator* of a *construction activity* shall not disturb greater than five (5) acres of soil at any one time without prior written authorization from the Department or, in areas under the jurisdiction of a *regulated, traditional land*

use control MS4, the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*). At a minimum, the *owner or operator* must comply with the following requirements in order to be authorized to disturb greater than five (5) acres of soil at any one time:

a. The *owner or operator* shall have a *qualified inspector* conduct **at least** two (2) site inspections in accordance with Part IV.C. of this permit every seven (7) calendar days, for as long as greater than five (5) acres of soil remain disturbed. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

b. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven (7) days from the date the current soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016.

c. The *owner or operator* shall prepare a phasing plan that defines maximum disturbed area per phase and shows required cuts and fills.

d. The *owner or operator* shall install any additional site-specific practices needed to protect water quality.

e. The *owner or operator* shall include the requirements above in their SWPPP.

4. In accordance with statute, regulations, and the terms and conditions of this permit, the Department may suspend or revoke an *owner's or operator's* coverage under this permit at any time if the Department determines that the SWPPP does not meet the permit requirements or consistent with Part VII.K..

5. Upon a finding of significant non-compliance with the practices described in the SWPPP or violation of this permit, the Department may order an immediate stop to all activity at the site until the non-compliance is remedied. The stop work order shall be in writing, describe the non-compliance in detail, and be sent to the *owner or operator*.

6. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*, the *owner or operator* shall notify the

regulated, traditional land use control MS4 in writing of any planned amendments or modifications to the post-construction stormwater management practice component of the SWPPP required by Part III.A. 4. and 5. of this permit. Unless otherwise notified by the *regulated, traditional land use control MS4*, the *owner or operator* shall have the SWPPP amendments or modifications reviewed and accepted by the *regulated, traditional land use control MS4* prior to commencing construction of the post-construction stormwater management practice.

E. Permit Coverage for Discharges Authorized Under GP-0-15-002

1. Upon renewal of SPDES General Permit for Stormwater Discharges from *Construction Activity* (Permit No. GP-0-15-002), an *owner or operator* of *a construction activity* with coverage under GP-0-15-002, as of the effective date of GP- 0-20-001, shall be authorized to *discharge* in accordance with GP- 0-20-001, unless otherwise notified by the Department.

   An *owner or operator* may continue to implement the technical/design components of the post-construction stormwater management controls provided that such design was done in conformance with the technical standards in place at the time of initial project authorization. However, they must comply with the other, non-design provisions of GP-0-20-001.

F. Change of Owner or Operator

1. When property ownership changes or when there is a change in operational control over the construction plans and specifications, the original *owner or operator* must notify the new *owner or operator*, in writing, of the requirement to obtain permit coverage by submitting a NOI with the Department. For *construction activities* subject to the requirements of a *regulated, traditional land use control MS4,* the original *owner or operator* must also notify the MS4, in writing, of the change in ownership at least 30 calendar days prior to the change in ownership.

2. Once the new *owner or operator* obtains permit coverage, the original *owner or operator* shall then submit a completed NOT with the name and permit identification number of the new *owner or operator* to the Department at the address in Part II.B.1. of this permit. If the original *owner or operator* maintains ownership of a portion of the *construction activity* and will disturb soil, they must maintain their coverage under the permit.

3. Permit coverage for the new *owner or operator* will be effective as of the date the Department receives a complete NOI, provided the original *owner or*

operator was not subject to a sixty (60) business day authorization period that has not expired as of the date the Department receives the NOI from the new *owner or operator*.

Part III. STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A. General SWPPP Requirements

1. A SWPPP shall be prepared and implemented by the *owner or operator* of each *construction activity* covered by this permit. The SWPPP must document the selection, design, installation, implementation and maintenance of the control measures and practices that will be used to meet the effluent limitations in Part I.B. of this permit and where applicable, the post-construction stormwater management practice requirements in Part I.C. of this permit. The SWPPP shall be prepared prior to the submittal of the NOI. The NOI shall be submitted to the Department prior to the *commencement of construction activity*. A copy of the completed, final NOI shall be included in the SWPPP.

2. The SWPPP shall describe the erosion and sediment control practices and where required, post-construction stormwater management practices that will be used and/or constructed to reduce the *pollutants* in stormwater *discharges* and to assure compliance with the terms and conditions of this permit. In addition, the SWPPP shall identify potential sources of pollution which may reasonably be expected to affect the quality of stormwater *discharges*.

3. All SWPPPs that require the post-construction stormwater management practice component shall be prepared by a *qualified professional* that is knowledgeable in the principles and practices of stormwater management and treatment.

4. The *owner or operator* must keep the SWPPP current so that it at all times accurately documents the erosion and sediment controls practices that are being used or will be used during construction, and all post-construction stormwater management practices that will be constructed on the site. At a minimum, the *owner or operator* shall amend the SWPPP, including construction drawings:

    a. whenever the current provisions prove to be ineffective in minimizing *pollutants* in stormwater *discharges* from the site;

b. whenever there is a change in design, construction, or operation at the *construction site* that has or could have an effect on the *discharge* of *pollutants*;

c. to address issues or deficiencies identified during an inspection by the *qualified inspector,* the Department or other regulatory authority; and

d. to document the final construction conditions.

5. The Department may notify the *owner or operator* at any time that the SWPPP does not meet one or more of the minimum requirements of this permit. The notification shall be in writing and identify the provisions of the SWPPP that require modification. Within fourteen (14) calendar days of such notification, or as otherwise indicated by the Department, the *owner or operator* shall make the required changes to the SWPPP and submit written notification to the Department that the changes have been made. If the *owner or operator* does not respond to the Department's comments in the specified time frame, the Department may suspend the *owner's or operator's* coverage under this permit or require the *owner or operator* to obtain coverage under an individual SPDES permit in accordance with Part II.D.4. of this permit.

6. Prior to the *commencement of construction activity*, the *owner or operator* must identify the contractor(s) and subcontractor(s) that will be responsible for installing, constructing, repairing, replacing, inspecting and maintaining the erosion and sediment control practices included in the SWPPP; and the contractor(s) and subcontractor(s) that will be responsible for constructing the post-construction stormwater management practices included in the SWPPP. The *owner or operator* shall have each of the contractors and subcontractors identify at least one person from their company that will be responsible for implementation of the SWPPP. This person shall be known as the *trained contractor.* The *owner or operator* shall ensure that at least one *trained contractor* is on site on a daily basis when soil disturbance activities are being performed.

   The *owner or operator* shall have each of the contractors and subcontractors identified above sign a copy of the following certification statement below before they commence any *construction activity*:

   "I hereby certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the *qualified inspector* during a site inspection. I also understand that the *owner or operator* must comply with

the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater *discharge*s from *construction activities* and that it is unlawful for any person to cause or contribute to a violation of *water quality standards*. Furthermore, I am aware that there are significant penalties for submitting false information, that I do not believe to be true, including the possibility of fine and imprisonment for knowing violations"

In addition to providing the certification statement above, the certification page must also identify the specific elements of the SWPPP that each contractor and subcontractor will be responsible for and include the name and title of the person providing the signature; the name and title of the *trained contractor* responsible for SWPPP implementation; the name, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification statement is signed. The *owner or operator* shall attach the certification statement(s) to the copy of the SWPPP that is maintained at the *construction site*. If new or additional contractors are hired to implement measures identified in the SWPPP after construction has commenced, they must also sign the certification statement and provide the information listed above.

7. For projects where the Department requests a copy of the SWPPP or inspection reports, the *owner or operator* shall submit the documents in both electronic (PDF only) and paper format within five (5) business days, unless otherwise notified by the Department.

B. Required SWPPP Contents

1. Erosion and sediment control component - All SWPPPs prepared pursuant to this permit shall include erosion and sediment control practices designed in conformance with the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016. Where erosion and sediment control practices are not designed in conformance with the design criteria included in the technical standard, the *owner or operator* must demonstrate *equivalence* to the technical standard. At a minimum, the erosion and sediment control component of the SWPPP shall include the following:

    a. Background information about the scope of the project, including the location, type and size of project

b. A site map/construction drawing(s) for the project, including a general location map. At a minimum, the site map shall show the total site area; all improvements; areas of disturbance; areas that will not be disturbed; existing vegetation; on-site and adjacent off-site surface water(s); floodplain/floodway boundaries; wetlands and drainage patterns that could be affected by the *construction activity*; existing and final contours ; locations of different soil types with boundaries; material, waste, borrow or equipment storage areas located on adjacent properties; and location(s) of the stormwater *discharge*(s);

c. A description of the soil(s) present at the site, including an identification of the Hydrologic Soil Group (HSG);

d. A construction phasing plan and sequence of operations describing the intended order of *construction activities*, including clearing and grubbing, excavation and grading, utility and infrastructure installation and any other activity at the site that results in soil disturbance;

e. A description of the minimum erosion and sediment control practices to be installed or implemented for each *construction activity* that will result in soil disturbance. Include a schedule that identifies the timing of initial placement or implementation of each erosion and sediment control practice and the minimum time frames that each practice should remain in place or be implemented;

f. A temporary and permanent soil stabilization plan that meets the requirements of this general permit and the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016, for each stage of the project, including initial land clearing and grubbing to project completion and achievement of *final stabilization*;

g. A site map/construction drawing(s) showing the specific location(s), size(s), and length(s) of each erosion and sediment control practice;

h. The dimensions, material specifications, installation details, and operation and maintenance requirements for all erosion and sediment control practices. Include the location and sizing of any temporary sediment basins and structural practices that will be used to divert flows from exposed soils;

i. A maintenance inspection schedule for the contractor(s) identified in Part III.A.6. of this permit, to ensure continuous and effective operation of the erosion and sediment control practices. The maintenance inspection

schedule shall be in accordance with the requirements in the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016;

j. A description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a *pollutant* source in the stormwater *discharges*;

k. A description and location of any stormwater *discharges* associated with industrial activity other than construction at the site, including, but not limited to, stormwater *discharges* from asphalt plants and concrete plants located on the *construction site*; and

l. Identification of any elements of the design that are not in conformance with the design criteria in the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016. Include the reason for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

2. Post-construction stormwater management practice component – The *owner or operator* of any construction project identified in Table 2 of Appendix B as needing post-construction stormwater management practices shall prepare a SWPPP that includes practices designed in conformance with the applicable *sizing criteria* in Part I.C.2.a., c. or d. of this permit and the *performance criteria* in the technical standard, New York State Stormwater Management Design Manual dated January 2015

   Where post-construction stormwater management practices are not designed in conformance with the *performance criteria* in the technical standard, the *owner or operator* must include in the SWPPP the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

   The post-construction stormwater management practice component of the SWPPP shall include the following:

   a. Identification of all post-construction stormwater management practices to be constructed as part of the project. Include the dimensions, material specifications and installation details for each post-construction stormwater management practice;

b. A site map/construction drawing(s) showing the specific location and size of each post-construction stormwater management practice;

c. A Stormwater Modeling and Analysis Report that includes:
   (i) Map(s) showing pre-development conditions, including watershed/subcatchments boundaries, flow paths/routing, and design points;

   (ii) Map(s) showing post-development conditions, including watershed/subcatchments boundaries, flow paths/routing, design points and post-construction stormwater management practices;

   (iii) Results of stormwater modeling (i.e. hydrology and hydraulic analysis) for the required storm events. Include supporting calculations (model runs), methodology, and a summary table that compares pre and post-development runoff rates and volumes for the different storm events;

   (iv) Summary table, with supporting calculations, which demonstrates that each post-construction stormwater management practice has been designed in conformance with the *sizing criteria* included in the Design Manual;

   (v) Identification of any *sizing criteria* that is not required based on the requirements included in Part I.C. of this permit; and

   (vi) Identification of any elements of the design that are not in conformance with the *performance criteria* in the Design Manual. Include the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the Design Manual;

d. Soil testing results and locations (test pits, borings);

e. Infiltration test results, when required; and

f. An operations and maintenance plan that includes inspection and maintenance schedules and actions to ensure continuous and effective operation of each post-construction stormwater management practice. The plan shall identify the entity that will be responsible for the long term operation and maintenance of each practice.

3. Enhanced Phosphorus Removal Standards - All construction projects identified in Table 2 of Appendix B that are located in the watersheds identified in Appendix C shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the applicable *sizing criteria* in Part I.C.2. b., c. or d. of this permit and the *performance criteria,* Enhanced Phosphorus Removal Standards included in the Design Manual. At a minimum, the post-construction stormwater management practice component of the SWPPP shall include items 2.a - 2.f. above.

C. Required SWPPP Components by Project Type

Unless otherwise notified by the Department, *owners or operators* of *construction activities* identified in Table 1 of Appendix B are required to prepare a SWPPP that only includes erosion and sediment control practices designed in conformance with Part III.B.1 of this permit. *Owners or operators* of the *construction activities* identified in Table 2 of Appendix B shall prepare a SWPPP that also includes post-construction stormwater management practices designed in conformance with Part III.B.2 or 3 of this permit.

Part IV. INSPECTION AND MAINTENANCE REQUIREMENTS

A. General Construction Site Inspection and Maintenance Requirements

1. The *owner or operator* must ensure that all erosion and sediment control practices (including pollution prevention measures) and all post-construction stormwater management practices identified in the SWPPP are inspected and maintained in accordance with Part IV.B. and C. of this permit.

2. The terms of this permit shall not be construed to prohibit the State of New York from exercising any authority pursuant to the ECL, common law or federal law, or prohibit New York State from taking any measures, whether civil or criminal, to prevent violations of the laws of the State of New York or protect the public health and safety and/or the environment.

B. Contractor Maintenance Inspection Requirements

1. The *owner or operator* of each *construction activity* identified in Tables 1 and 2 of Appendix B shall have a *trained contractor* inspect the erosion and sediment control practices and pollution prevention measures being implemented within the active work area daily to ensure that they are being maintained in effective operating condition at all times. If deficiencies are identified, the contractor shall

begin implementing corrective actions within one business day and shall complete the corrective actions in a reasonable time frame.

2. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and *temporary stabilization* measures have been applied to all disturbed areas, the *trained contractor* can stop conducting the maintenance inspections. The *trained contractor* shall begin conducting the maintenance inspections in accordance with Part IV.B.1. of this permit as soon as soil disturbance activities resume.

3. For construction sites where soil disturbance activities have been shut down with partial project completion, the *trained contractor* can stop conducting the maintenance inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational.

C. Qualified Inspector Inspection Requirements

The *owner or operator* shall have a *qualified inspector* conduct site inspections in conformance with the following requirements:

[Note: The *trained contractor* identified in Part III.A.6. and IV.B. of this permit **cannot** conduct the *qualified inspector* site inspections unless they meet the *qualified inspector* qualifications included in Appendix A. In order to perform these inspections, the *trained contractor* would have to be a:

- licensed Professional Engineer,
- Certified Professional in Erosion and Sediment Control (CPESC),
- New York State Erosion and Sediment Control Certificate Program holder
- Registered Landscape Architect, or
- someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity].

1. A *qualified inspector* shall conduct site inspections for all *construction activities* identified in Tables 1 and 2 of Appendix B, with the exception of:

   a. the construction of a single family residential subdivision with 25% or less *impervious cover* at total site build-out that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is not located

in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E;

b. the construction of a single family home that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is not located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E;

c. construction on agricultural property that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres; and

d. *construction activities* located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.

2. Unless otherwise notified by the Department, the *qualified inspector* shall conduct site inspections in accordance with the following timetable:

a. For construction sites where soil disturbance activities are on-going, the *qualified inspector* shall conduct a site inspection at least once every seven (7) calendar days.

b. For construction sites where soil disturbance activities are on-going and the *owner or operator* has received authorization in accordance with Part II.D.3 to disturb greater than five (5) acres of soil at any one time, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

c. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and *temporary stabilization* measures have been applied to all disturbed areas, the *qualified inspector* shall conduct a site inspection at least once every thirty (30) calendar days. The *owner or operator* shall notify the DOW Water (SPDES) Program contact at the Regional Office (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*) in writing prior to reducing the frequency of inspections.

d. For construction sites where soil disturbance activities have been shut down with partial project completion, the *qualified inspector* can stop conducting inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational. The *owner or operator* shall notify the DOW Water (SPDES) Program contact at the Regional Office (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*) in writing prior to the shutdown. If soil disturbance activities are not resumed within 2 years from the date of shutdown, the *owner or operator* shall have the *qualified inspector* perform a final inspection and certify that all disturbed areas have achieved *final stabilization,* and all temporary, structural erosion and sediment control measures have been removed*;* and that all post-construction stormwater management practices have been constructed in conformance with the SWPPP by signing the "*Final Stabilization*" and "Post-Construction Stormwater Management Practice" certification statements on the NOT. The *owner or operator* shall then submit the completed NOT form to the address in Part II.B.1 of this permit.

e. For construction sites that directly *discharge* to one of the 303(d) segments listed in Appendix E or is located in one of the watersheds listed in Appendix C, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

3. At a minimum, the *qualified inspector* shall inspect all erosion and sediment control practices and pollution prevention measures to ensure integrity and effectiveness, all post-construction stormwater management practices under construction to ensure that they are constructed in conformance with the SWPPP, all areas of disturbance that have not achieved *final stabilization,* all points of *discharge* to natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the *construction site*, and all points of *discharge* from the *construction site*.

4. The *qualified inspector* shall prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report shall include and/or address the following:

a. Date and time of inspection;

b. Name and title of person(s) performing inspection;

c. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of the inspection;

d. A description of the condition of the runoff at all points of *discharge* from the *construction site*. This shall include identification of any *discharges* of sediment from the *construction site*. Include *discharges* from conveyance systems (i.e. pipes, culverts, ditches, etc.) and overland flow;

e. A description of the condition of all natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the *construction site* which receive runoff from disturbed areas. This shall include identification of any *discharges* of sediment to the surface waterbody;

f. Identification of all erosion and sediment control practices and pollution prevention measures that need repair or maintenance;

g. Identification of all erosion and sediment control practices and pollution prevention measures that were not installed properly or are not functioning as designed and need to be reinstalled or replaced;

h. Description and sketch of areas with active soil disturbance activity, areas that have been disturbed but are inactive at the time of the inspection, and areas that have been stabilized (temporary and/or final) since the last inspection;

i. Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards;

j. Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices and pollution prevention measures; and to correct deficiencies identified with the construction of the post-construction stormwater management practice(s);

k. Identification and status of all corrective actions that were required by previous inspection; and

l. Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing corrective actions. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report being maintained onsite within seven (7) calendar days of the date of the inspection. The *qualified inspector* shall also take digital photographs, with date stamp, that clearly show the condition of the practice(s) after the corrective action has been completed. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report that documents the completion of the corrective action work within seven (7) calendar days of that inspection.

5. Within one business day of the completion of an inspection, the *qualified inspector* shall notify the *owner or operator* and appropriate contractor or subcontractor identified in Part III.A.6. of this permit of any corrective actions that need to be taken. The contractor or subcontractor shall begin implementing the corrective actions within one business day of this notification and shall complete the corrective actions in a reasonable time frame.

6. All inspection reports shall be signed by the *qualified inspector.* Pursuant to Part II.D.2. of this permit, the inspection reports shall be maintained on site with the SWPPP.

Part V. TERMINATION OF PERMIT COVERAGE

A. Termination of Permit Coverage

1. An *owner or operator* that is eligible to terminate coverage under this permit must submit a completed NOT form to the address in Part II.B.1 of this permit. The NOT form shall be one which is associated with this permit, signed in accordance with Part VII.H of this permit.

2. An *owner or operator* may terminate coverage when one or more the following conditions have been met:

   a. Total project completion - All *construction activity* identified in the SWPPP has been completed; and all areas of disturbance have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices have been constructed in conformance with the SWPPP and are operational;

b. Planned shutdown with partial project completion - All soil disturbance activities have ceased; and all areas disturbed as of the project shutdown date have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational;

c. A new *owner or operator* has obtained coverage under this permit in accordance with Part II.F. of this permit.

d. The *owner or operator* obtains coverage under an alternative SPDES general permit or an individual SPDES permit.

3. For *construction activities* meeting subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *qualified inspector* perform a final site inspection prior to submitting the NOT. The *qualified inspector* shall, by signing the "*Final Stabilization*" and "Post-Construction Stormwater Management Practice certification statements on the NOT, certify that all the requirements in Part V.A.2.a. or b. of this permit have been achieved.

4. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4* and meet subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *regulated, traditional land use control MS4* sign the "MS4 Acceptance" statement on the NOT in accordance with the requirements in Part VII.H. of this permit. The *regulated, traditional land use control MS4* official, by signing this statement, has determined that it is acceptable for the *owner or operator* to submit the NOT in accordance with the requirements of this Part. The *regulated, traditional land use control MS4* can make this determination by performing a final site inspection themselves or by accepting the *qualified inspector*'s final site inspection certification(s) required in Part V.A.3. of this permit.

5. For *construction activities* that require post-construction stormwater management practices and meet subdivision 2a. of this Part, the *owner or operator* must, prior to submitting the NOT, ensure one of the following:

   a. the post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain such practice(s) have been deeded to the municipality in which the practice(s) is located,

b. an executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s),

c. for post-construction stormwater management practices that are privately owned, the *owner or operator* has a mechanism in place that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan, such as a deed covenant in the *owner or operator's* deed of record,

d. for post-construction stormwater management practices that are owned by a public or private institution (e.g. school, university, hospital), government agency or authority, or public utility; the *owner or operator* has policy and procedures in place that ensures operation and maintenance of the practices in accordance with the operation and maintenance plan.

Part VI. REPORTING AND RETENTION RECORDS

A. Record Retention

The *owner or operator* shall retain a copy of the NOI, NOI Acknowledgment Letter, SWPPP, MS4 SWPPP Acceptance form and any inspection reports that were prepared in conjunction with this permit for a period of at least five (5) years from the date that the Department receives a complete NOT submitted in accordance with Part V. of this general permit.

B. Addresses

With the exception of the NOI, NOT, and MS4 SWPPP Acceptance form (which must be submitted to the address referenced in Part II.B.1 of this permit), all written correspondence requested by the Department, including individual permit applications, shall be sent to the address of the appropriate DOW Water (SPDES) Program contact at the Regional Office listed in Appendix F.

Part VII. STANDARD PERMIT CONDITIONS

A. Duty to Comply

The *owner or operator* must comply with all conditions of this permit. All contractors and subcontractors associated with the project must comply with the terms of the SWPPP. Any non-compliance with this permit constitutes a violation of the Clean Water

Act (CWA) and the ECL and is grounds for an enforcement action against the *owner or operator* and/or the contractor/subcontractor; permit revocation, suspension or modification; or denial of a permit renewal application. Upon a finding of significant non-compliance with this permit or the applicable SWPPP, the Department may order an immediate stop to all *construction activity* at the site until the non-compliance is remedied. The stop work order shall be in writing, shall describe the non-compliance in detail, and shall be sent to the *owner or operator*.

If any human remains or archaeological remains are encountered during excavation, the *owner or operator* must immediately cease, or cause to cease, all *construction activity* in the area of the remains and notify the appropriate Regional Water Engineer (RWE). *Construction activity* shall not resume until written permission to do so has been received from the RWE.

B. Continuation of the Expired General Permit

This permit expires five (5) years from the effective date. If a new general permit is not issued prior to the expiration of this general permit, an *owner or operator* with coverage under this permit may continue to operate and *discharge* in accordance with the terms and conditions of this general permit, if it is extended pursuant to the State Administrative Procedure Act and 6 NYCRR Part 621, until a new general permit is issued.

C. Enforcement

Failure of the *owner or operator,* its contractors, subcontractors, agents and/or assigns to strictly adhere to any of the permit requirements contained herein shall constitute a violation of this permit. There are substantial criminal, civil, and administrative penalties associated with violating the provisions of this permit. Fines of up to $37,500 per day for each violation and imprisonment for up to fifteen (15) years may be assessed depending upon the nature and degree of the offense.

D. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for an *owner or operator* in an enforcement action that it would have been necessary to halt or reduce the *construction activity* in order to maintain compliance with the conditions of this permit.

E. Duty to Mitigate

The *owner or operator* and its contractors and subcontractors shall take all reasonable steps to *minimize* or prevent any *discharge* in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

F. Duty to Provide Information

The *owner or operator* shall furnish to the Department, within a reasonable specified time period of a written request, all documentation necessary to demonstrate eligibility and any information to determine compliance with this permit or to determine whether cause exists for modifying or revoking this permit, or suspending or denying coverage under this permit, in accordance with the terms and conditions of this permit. The NOI, SWPPP and inspection reports required by this permit are public documents that the *owner or operator* must make available for review and copying by any person within five (5) business days of the *owner or operator* receiving a written request by any such person to review these documents. Copying of documents will be done at the requester's expense.

G. Other Information

When the *owner or operator* becomes aware that they failed to submit any relevant facts, or submitted incorrect information in the NOI or in any of the documents required by this permit , or have made substantive revisions to the SWPPP (e.g. the scope of the project changes significantly, the type of post-construction stormwater management practice(s) changes, there is a reduction in the sizing of the post-construction stormwater management practice, or there is an increase in the disturbance area or *impervious area*), which were not reflected in the original NOI submitted to the Department, they shall promptly submit such facts or information to the Department using the contact information in Part II.A. of this permit. Failure of the *owner or operator* to correct or supplement any relevant facts within five (5) business days of becoming aware of the deficiency shall constitute a violation of this permit.

H. Signatory Requirements

1. All NOIs and NOTs shall be signed as follows:

    a. For a corporation these forms shall be signed by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

(i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

(ii) the manager of one or more manufacturing, production or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

b. For a partnership or sole proprietorship these forms shall be signed by a general partner or the proprietor, respectively; or

c. For a municipality, State, Federal, or other public agency these forms shall be signed by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:

(i) the chief executive officer of the agency, or

(ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

2. The SWPPP and other information requested by the Department shall be signed by a person described in Part VII.H.1. of this permit or by a duly authorized representative of that person. A person is a duly authorized representative only if:

a. The authorization is made in writing by a person described in Part VII.H.1. of this permit;

b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field,

superintendent, position of *equivalent* responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position) and,

c. The written authorization shall include the name, title and signature of the authorized representative and be attached to the SWPPP.

3. All inspection reports shall be signed by the *qualified inspector* that performs the inspection.

4. The MS4 SWPPP Acceptance form shall be signed by the principal executive officer or ranking elected official from the *regulated, traditional land use control MS4,* or by a duly authorized representative of that person.

   It shall constitute a permit violation if an incorrect and/or improper signatory authorizes any required forms, SWPPP and/or inspection reports.

I. Property Rights

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations. *Owners or operators* must obtain any applicable conveyances, easements, licenses and/or access to real property prior to *commencing construction activity*.

J. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

K. Requirement to Obtain Coverage Under an Alternative Permit

1. The Department may require any owner or operator authorized by this permit to apply for and/or obtain either an individual SPDES permit or another SPDES general permit. When the Department requires any discharger authorized by a general permit to apply for an individual SPDES permit, it shall notify the discharger in writing that a permit application is required. This notice shall

include a brief statement of the reasons for this decision, an application form, a statement setting a time frame for the owner or operator to file the application for an individual SPDES permit, and a deadline, not sooner than 180 days from owner or operator receipt of the notification letter, whereby the authorization to discharge under this general permit shall be terminated. Applications must be submitted to the appropriate Permit Administrator at the Regional Office. The Department may grant additional time upon demonstration, to the satisfaction of the Department, that additional time to apply for an alternative authorization is necessary or where the Department has not provided a permit determination in accordance with Part 621 of this Title.

2. When an individual SPDES permit is issued to a discharger authorized to *discharge* under a general SPDES permit for the same *discharge*(s), the general permit authorization for outfalls authorized under the individual SPDES permit is automatically terminated on the effective date of the individual permit unless termination is earlier in accordance with 6 NYCRR Part 750.

L. Proper Operation and Maintenance

The *owner or operator* shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the *owner or operator* to achieve compliance with the conditions of this permit and with the requirements of the SWPPP.

M. Inspection and Entry

The *owner or operator* shall allow an authorized representative of the Department, EPA, applicable county health department, or, in the case of a *construction site* which *discharges* through an *MS4*, an authorized representative of the *MS4* receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the owner’s or operator's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and

3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment), practices or operations regulated or required by this permit.

4. Sample or monitor at reasonable times, for purposes of assuring permit compliance or as otherwise authorized by the Act or ECL, any substances or parameters at any location.

N. Permit Actions

This permit may, at any time, be modified, suspended, revoked, or renewed by the Department in accordance with 6 NYCRR Part 621. The filing of a request by the *owner or operator* for a permit modification, revocation and reissuance, termination, a notification of planned changes or anticipated noncompliance does not limit, diminish and/or stay compliance with any terms of this permit.

O. Definitions

Definitions of key terms are included in Appendix A of this permit.

P. Re-Opener Clause

1. If there is evidence indicating potential or realized impacts on water quality due to any stormwater discharge associated with construction activity covered by this permit, the owner or operator of such discharge may be required to obtain an individual permit or alternative general permit in accordance with Part VII.K. of this permit or the permit may be modified to include different limitations and/or requirements.

2. Any Department initiated permit modification, suspension or revocation will be conducted in accordance with 6 NYCRR Part 621, 6 NYCRR 750-1.18, and 6 NYCRR 750-1.20.

Q. Penalties for Falsification of Forms and Reports

In accordance with 6NYCRR Part 750-2.4 and 750-2.5, any person who knowingly makes any false material statement, representation, or certification in any application, record, report or other document filed or required to be maintained under this permit, including reports of compliance or noncompliance shall, upon conviction, be punished in accordance with ECL §71-1933 and or Articles 175 and 210 of the New York State Penal Law.

R. Other Permits

Nothing in this permit relieves the *owner or operator* from a requirement to obtain any other permits required by law.

APPENDIX A – Acronyms and Definitions

Acronyms

APO – Agency Preservation Officer
BMP – Best Management Practice
CPESC – Certified Professional in Erosion and Sediment Control
Cpv – Channel Protection Volume
CWA – Clean Water Act (or the Federal Water Pollution Control Act, 33 U.S.C. §1251 et seq)
DOW – Division of Water
EAF – Environmental Assessment Form
ECL - Environmental Conservation Law
EPA – U. S. Environmental Protection Agency
HSG – Hydrologic Soil Group
MS4 – Municipal Separate Storm Sewer System
NOI – Notice of Intent
NOT – Notice of Termination
NPDES – National Pollutant Discharge Elimination System
OPRHP – Office of Parks, Recreation and Historic Places
Qf – Extreme Flood
Qp – Overbank Flood
RRv – Runoff Reduction Volume
RWE – Regional Water Engineer
SEQR – State Environmental Quality Review
SEQRA - State Environmental Quality Review Act
SHPA – State Historic Preservation Act
SPDES – State Pollutant Discharge Elimination System
SWPPP – Stormwater Pollution Prevention Plan
TMDL – Total Maximum Daily Load
UPA – Uniform Procedures Act
USDA – United States Department of Agriculture
WQv – Water Quality Volume

Definitions

All definitions in this section are solely for the purposes of this permit.

Agricultural Building – a structure designed and constructed to house farm implements, hay, grain, poultry, livestock or other horticultural products; excluding any structure designed, constructed or used, in whole or in part, for human habitation, as a place of employment where agricultural products are processed, treated or packaged, or as a place used by the public.

Agricultural Property –means the land for construction of a barn, *agricultural building*, silo, stockyard, pen or other structural practices identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State" prepared by the Department in cooperation with agencies of New York Nonpoint Source Coordinating Committee (dated June 2007).

Alter Hydrology from Pre to Post-Development Conditions - means the post-development peak flow rate(s) has increased by more than 5% of the pre-developed condition for the design storm of interest (e.g. 10 yr and 100 yr).

Combined Sewer - means a sewer that is designed to collect and convey both "sewage" and "stormwater".

Commence (Commencement of) Construction Activities - means the initial disturbance of soils associated with clearing, grading or excavation activities; or other construction related activities that disturb or expose soils such as demolition, stockpiling of fill material, and the initial installation of erosion and sediment control practices required in the SWPPP. See definition for "*Construction Activity(ies)*" also.

Construction Activity(ies) - means any clearing, grading, excavation, filling, demolition or stockpiling activities that result in soil disturbance. Clearing activities can include, but are not limited to, logging equipment operation, the cutting and skidding of trees, stump removal and/or brush root removal. Construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

Construction Site – means the land area where *construction activity(ies)* will occur. See definition for "*Commence (Commencement of) Construction Activities"* and "*Larger Common Plan of Development or Sale" also.*

Dewatering – means the act of draining rainwater and/or groundwater from building foundations, vaults or excavations/trenches.

Direct Discharge (to a specific surface waterbody) - means that runoff flows from a *construction site* by overland flow and the first point of discharge is the specific surface waterbody, or runoff flows from a *construction site* to a separate storm sewer system

and the first point of discharge from the separate storm sewer system is the specific surface waterbody.

Discharge(s) - means any addition of any pollutant to waters of the State through an outlet or *point source*.

Embankment –means an earthen or rock slope that supports a road/highway.

Endangered or Threatened Species – see 6 NYCRR Part 182 of the Department's rules and regulations for definition of terms and requirements.

Environmental Conservation Law (ECL) - means chapter 43-B of the Consolidated Laws of the State of New York, entitled the Environmental Conservation Law.

Equivalent (Equivalence) – means that the practice or measure meets all the performance, longevity, maintenance, and safety objectives of the technical standard and will provide an equal or greater degree of water quality protection.

Final Stabilization - means that all soil disturbance activities have ceased and a uniform, perennial vegetative cover with a density of eighty (80) percent over the entire pervious surface has been established; or other equivalent stabilization measures, such as permanent landscape mulches, rock rip-rap or washed/crushed stone have been applied on all disturbed areas that are not covered by permanent structures, concrete or pavement.

General SPDES permit - means a SPDES permit issued pursuant to 6 NYCRR Part 750-1.21 and Section 70-0117 of the ECL authorizing a category of discharges.

Groundwater(s) - means waters in the saturated zone. The saturated zone is a subsurface zone in which all the interstices are filled with water under pressure greater than that of the atmosphere. Although the zone may contain gas-filled interstices or interstices filled with fluids other than water, it is still considered saturated.

Historic Property – means any building, structure, site, object or district that is listed on the State or National Registers of Historic Places or is determined to be eligible for listing on the State or National Registers of Historic Places.

Impervious Area (Cover) - means all impermeable surfaces that cannot effectively infiltrate rainfall. This includes paved, concrete and gravel surfaces (i.e. parking lots, driveways, roads, runways and sidewalks); building rooftops and miscellaneous impermeable structures such as patios, pools, and sheds.

Infeasible – means not technologically possible, or not economically practicable and achievable in light of best industry practices.

Larger Common Plan of Development or Sale - means a contiguous area where multiple separate and distinct *construction activities* are occurring, or will occur, under one plan. The term “plan” in “larger common plan of development or sale” is broadly defined as any announcement or piece of documentation (including a sign, public notice or hearing, marketing plan, advertisement, drawing, permit application, State Environmental Quality Review Act (SEQRA) environmental assessment form or other documents, zoning request, computer design, etc.) or physical demarcation (including boundary signs, lot stakes, surveyor markings, etc.) indicating that *construction activities* may occur on a specific plot.

For discrete construction projects that are located within a larger common plan of development or sale that are at least 1/4 mile apart, each project can be treated as a separate plan of development or sale provided any interconnecting road, pipeline or utility project that is part of the same “common plan” is not concurrently being disturbed.

Minimize – means reduce and/or eliminate to the extent achievable using control measures (including best management practices) that are technologically available and economically practicable and achievable in light of best industry practices.

Municipal Separate Storm Sewer (MS4) - a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to surface waters of the State*;*
(ii) Designed or used for collecting or conveying stormwater;
(iii) Which is not a *combined sewer*; and
(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

National Pollutant Discharge Elimination System (NPDES) - means the national system for the issuance of wastewater and stormwater permits under the Federal Water Pollution Control Act (Clean Water Act).

Natural Buffer –means an undisturbed area with natural cover running along a surface water (e.g. wetland, stream, river, lake, etc.).

New Development – means any land disturbance that does not meet the definition of Redevelopment Activity included in this appendix.

New York State Erosion and Sediment Control Certificate Program – a certificate program that establishes and maintains a process to identify and recognize individuals who are capable of developing, designing, inspecting and maintaining erosion and sediment control plans on projects that disturb soils in New York State. The certificate program is administered by the New York State Conservation District Employees Association.

NOI Acknowledgment Letter - means the letter that the Department sends to an owner or operator to acknowledge the Department's receipt and acceptance of a complete Notice of Intent. This letter documents the owner's or operator's authorization to discharge in accordance with the general permit for stormwater discharges from *construction activity*.

Nonpoint Source - means any source of water pollution or pollutants which is not a discrete conveyance or *point source* permitted pursuant to Title 7 or 8 of Article 17 of the Environmental Conservation Law (see ECL Section 17-1403).

Overbank –means flow events that exceed the capacity of the stream channel and spill out into the adjacent floodplain.

Owner or Operator - means the person, persons or legal entity which owns or leases the property on which the *construction activity* is occurring; an entity that has operational control over the construction plans and specifications, including the ability to make modifications to the plans and specifications; and/or an entity that has day-to-day operational control of those activities at a project that are necessary to ensure compliance with the permit conditions.

Performance Criteria – means the design criteria listed under the "Required Elements" sections in Chapters 5, 6 and 10 of the technical standard, New York State Stormwater Management Design Manual, dated January 2015. It does not include the Sizing Criteria (i.e. WQv, RRv, Cpv, Qp and Qf) in Part I.C.2. of the permit.

Point Source - means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, vessel or other floating craft, or landfill leachate collection system from which *pollutants* are or may be discharged.

Pollutant - means dredged spoil, filter backwash, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand and industrial, municipal, agricultural waste and ballast discharged into water; which may cause or might reasonably be expected to cause pollution of the waters of the state in contravention of the standards or guidance values adopted as provided in 6 NYCRR Parts 700 et seq .

Qualified Inspector - means a person that is knowledgeable in the principles and practices of erosion and sediment control, such as a licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, New York State Erosion and Sediment Control Certificate Program holder or other Department endorsed individual(s).

It can also mean someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided that person has training in the principles and practices of erosion and sediment control. Training in the principles and practices of erosion and sediment control means that the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect has received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. After receiving the initial training, the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect shall receive four (4) hours of training every three (3) years.

It can also mean a person that meets the *Qualified Professional* qualifications in addition to the *Qualified Inspector* qualifications.

Note: Inspections of any post-construction stormwater management practices that include structural components, such as a dam for an impoundment, shall be performed by a licensed Professional Engineer.

Qualified Professional - means a person that is knowledgeable in the principles and practices of stormwater management and treatment, such as a licensed Professional Engineer, Registered Landscape Architect or other Department endorsed individual(s). Individuals preparing SWPPPs that require the post-construction stormwater management practice component must have an understanding of the principles of hydrology, water quality management practice design, water quantity control design, and, in many cases, the principles of hydraulics. All components of the SWPPP that involve the practice of engineering, as defined by the NYS Education Law (see Article 145), shall be prepared by, or under the direct supervision of, a professional engineer licensed to practice in the State of New York.

Redevelopment Activity(ies) – means the disturbance and reconstruction of existing impervious area, including impervious areas that were removed from a project site within five (5) years of preliminary project plan submission to the local government (i.e. site plan, subdivision, etc.).

Regulated, Traditional Land Use Control MS4 - means a city, town or village with land use control authority that is authorized to discharge under New York State DEC's

SPDES General Permit For Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s) or the City of New York's Individual SPDES Permit for their Municipal Separate Storm Sewer Systems (NY-0287890).

Routine Maintenance Activity - means *construction activity* that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility, including, but not limited to:

- Re-grading of gravel roads or parking lots,
- Cleaning and shaping of existing roadside ditches and culverts that maintains the approximate original line and grade, and hydraulic capacity of the ditch,
- Cleaning and shaping of existing roadside ditches that does not maintain the approximate original grade, hydraulic capacity and purpose of the ditch if the changes to the line and grade, hydraulic capacity or purpose of the ditch are installed to improve water quality and quantity controls (e.g. installing grass lined ditch),
- Placement of aggregate shoulder backing that stabilizes the transition between the road shoulder and the ditch or *embankment*,
- Full depth milling and filling of existing asphalt pavements, replacement of concrete pavement slabs, and similar work that does not expose soil or disturb the bottom six (6) inches of subbase material,
- Long-term use of equipment storage areas at or near highway maintenance facilities,
- Removal of sediment from the edge of the highway to restore a previously existing sheet-flow drainage connection from the highway surface to the highway ditch or *embankment*,
- Existing use of Canal Corp owned upland disposal sites for the canal, and
- Replacement of curbs, gutters, sidewalks and guide rail posts.

Site limitations – means site conditions that prevent the use of an infiltration technique and or infiltration of the total WQv. Typical site limitations include: seasonal high groundwater, shallow depth to bedrock, and soils with an infiltration rate less than 0.5 inches/hour. The existence of site limitations shall be confirmed and documented using actual field testing (i.e. test pits, soil borings, and infiltration test) or using information from the most current United States Department of Agriculture (USDA) Soil Survey for the County where the project is located.

Sizing Criteria – means the criteria included in Part I.C.2 of the permit that are used to size post-construction stormwater management control practices. The criteria include; Water Quality Volume (WQv), Runoff Reduction Volume (RRv), Channel Protection Volume (Cpv), *Overbank* Flood (Qp), and Extreme Flood (Qf).

State Pollutant Discharge Elimination System (SPDES) - means the system established pursuant to Article 17 of the ECL and 6 NYCRR Part 750 for issuance of permits authorizing discharges to the waters of the state.

Steep Slope – means land area designated on the current United States Department of Agriculture ("USDA") Soil Survey as Soil Slope Phase "D", (provided the map unit name is inclusive of slopes greater than 25%) , or Soil Slope Phase E or F, (regardless of the map unit name), or a combination of the three designations.

Streambank – as used in this permit, means the terrain alongside the bed of a creek or stream. The bank consists of the sides of the channel, between which the flow is confined.

Stormwater Pollution Prevention Plan (SWPPP) – means a project specific report, including construction drawings, that among other things: describes the construction activity(ies), identifies the potential sources of pollution at the *construction site*; describes and shows the stormwater controls that will be used to control the pollutants (i.e. erosion and sediment controls; for many projects, includes post-construction stormwater management controls); and identifies procedures the *owner or operator* will implement to comply with the terms and conditions of the permit. See Part III of the permit for a complete description of the information that must be included in the SWPPP.

Surface Waters of the State - shall be construed to include lakes, bays, sounds, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic ocean within the territorial seas of the state of New York and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface waters), which are wholly or partially within or bordering the state or within its jurisdiction. Waters of the state are further defined in 6 NYCRR Parts 800 to 941.

Temporarily Ceased – means that an existing disturbed area will not be disturbed again within 14 calendar days of the previous soil disturbance.

Temporary Stabilization - means that exposed soil has been covered with material(s) as set forth in the technical standard, New York Standards and Specifications for Erosion and Sediment Control, to prevent the exposed soil from eroding. The materials can include, but are not limited to, mulch, seed and mulch, and erosion control mats (e.g. jute twisted yarn, excelsior wood fiber mats).

Total Maximum Daily Loads (TMDLs) - A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and *nonpoint source*s. It is a calculation of the maximum amount of a pollutant that a waterbody can receive on a daily basis and still meet *water quality standards*, and an allocation of that amount to the pollutant's sources. A TMDL stipulates wasteload allocations (WLAs) for *point source* discharges, load allocations (LAs) for *nonpoint source*s, and a margin of safety (MOS).

Trained Contractor - means an employee from the contracting (construction) company, identified in Part III.A.6., that has received four (4) hours of Department endorsed

training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. After receiving the initial training, the *trained contractor* shall receive four (4) hours of training every three (3) years.

It can also mean an employee from the contracting (construction) company, identified in Part III.A.6., that meets the *qualified inspector* qualifications (e.g. licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, New York State Erosion and Sediment Control Certificate Program holder, or someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity).

The *trained contractor* is responsible for the day to day implementation of the SWPPP.

Uniform Procedures Act (UPA) Permit - means a permit required under 6 NYCRR Part 621 of the Environmental Conservation Law (ECL), Article 70.

Water Quality Standard - means such measures of purity or quality for any waters in relation to their reasonable and necessary use as promulgated in 6 NYCRR Part 700 et seq.

APPENDIX B – Required SWPPP Components by Project Type

Table 1
Construction Activities that Require the Preparation of a SWPPP That Only Includes Erosion and Sediment Controls

The following construction activities that involve soil disturbances of one (1) or more acres of land, but less than five (5) acres:

- Single family home not located in one of the watersheds listed in Appendix C or not *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions with 25% or less impervious cover at total site build-out and not located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E
- Construction of a barn or other *agricultural building*, silo, stock yard or pen.

The following construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land:

All construction activities located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- Installation of underground, linear utilities; such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains
- Environmental enhancement projects, such as wetland mitigation projects, stormwater retrofits and stream restoration projects
- Pond construction
- Linear bike paths running through areas with vegetative cover, including bike paths surfaced with an impervious cover
- Cross-country ski trails and walking/hiking trails
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are not part of residential, commercial or institutional development;
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that include incidental shoulder or curb work along an existing highway to support construction of the sidewalk, bike path or walking path.
- Slope stabilization projects
- Slope flattening that changes the grade of the site, but does not significantly change the runoff characteristics

Table 1 (Continued) CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT ONLY INCLUDES EROSION AND SEDIMENT CONTROLS

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- Spoil areas that will be covered with vegetation
- Vegetated open space projects (i.e. recreational parks, lawns, meadows, fields, downhill ski trails) excluding projects that *alter hydrology from pre to post development* conditions,
- Athletic fields (natural grass) that do not include the construction or reconstruction of *impervious area* and do not *alter hydrology from pre to post development* conditions
- Demolition project where vegetation will be established, and no redevelopment is planned
- Overhead electric transmission line project that does not include the construction of permanent access roads or parking areas surfaced with *impervious cover*
- Structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State", excluding projects that involve soil disturbances of greater than five acres and construction activities that include the construction or reconstruction of impervious area
- Temporary access roads, median crossovers, detour roads, lanes, or other temporary impervious areas that will be restored to pre-construction conditions once the construction activity is complete

Table 2

CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT INCLUDES POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- Single family home located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family home that disturbs five (5) or more acres of land
- Single family residential subdivisions located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions that involve soil disturbances of between one (1) and five (5) acres of land with greater than 25% impervious cover at total site build-out
- Single family residential subdivisions that involve soil disturbances of five (5) or more acres of land, and single family residential subdivisions that involve soil disturbances of less than five (5) acres that are part of a larger common plan of development or sale that will ultimately disturb five or more acres of land
- Multi-family residential developments; includes duplexes, townhomes, condominiums, senior housing complexes, apartment complexes, and mobile home parks
- Airports
- Amusement parks
- Breweries, cideries, and wineries, including establishments constructed on agricultural land
- Campgrounds
- Cemeteries that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Commercial developments
- Churches and other places of worship
- Construction of a barn or other *agricultural building* (e.g. silo) and structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State" that include the construction or reconstruction of *impervious area*, excluding projects that involve soil disturbances of less than five acres.
- Golf courses
- Institutional development; includes hospitals, prisons, schools and colleges
- Industrial facilities; includes industrial parks
- Landfills
- Municipal facilities; includes highway garages, transfer stations, office buildings, POTW's, water treatment plants, and water storage tanks
- Office complexes
- Playgrounds that include the construction or reconstruction of impervious area
- Sports complexes
- Racetracks; includes racetracks with earthen (dirt) surface
- Road construction or reconstruction, including roads constructed as part of the construction activities listed in Table 1

Table 2 (Continued)

CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT INCLUDES POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- Parking lot construction or reconstruction, including parking lots constructed as part of the construction activities listed in Table 1
- Athletic fields (natural grass) that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Athletic fields with artificial turf
- Permanent access roads, parking areas, substations, compressor stations and well drilling pads, surfaced with *impervious cover,* and constructed as part of an over-head electric transmission line project, wind-power project, cell tower project, oil or gas well drilling project, sewer or water main project or other linear utility project
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a residential, commercial or institutional development
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a highway construction or reconstruction project
- All other construction activities that include the construction or reconstruction of *impervious area* or *alter the hydrology from pre to post development* conditions, and are not listed in Table 1

APPENDIX C – Watersheds Requiring Enhanced Phosphorus Removal

Watersheds where *owners or operators* of construction activities identified in Table 2 of Appendix B must prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the Enhanced Phosphorus Removal Standards included in the technical standard, New York State Stormwater Management Design Manual ("Design Manual").

- Entire New York City Watershed located east of the Hudson River **-** Figure 1
- Onondaga Lake Watershed **-** Figure 2
- Greenwood Lake Watershed **-**Figure 3
- Oscawana Lake Watershed – Figure 4
- Kinderhook Lake Watershed – Figure 5

Figure 1 - New York City Watershed East of the Hudson

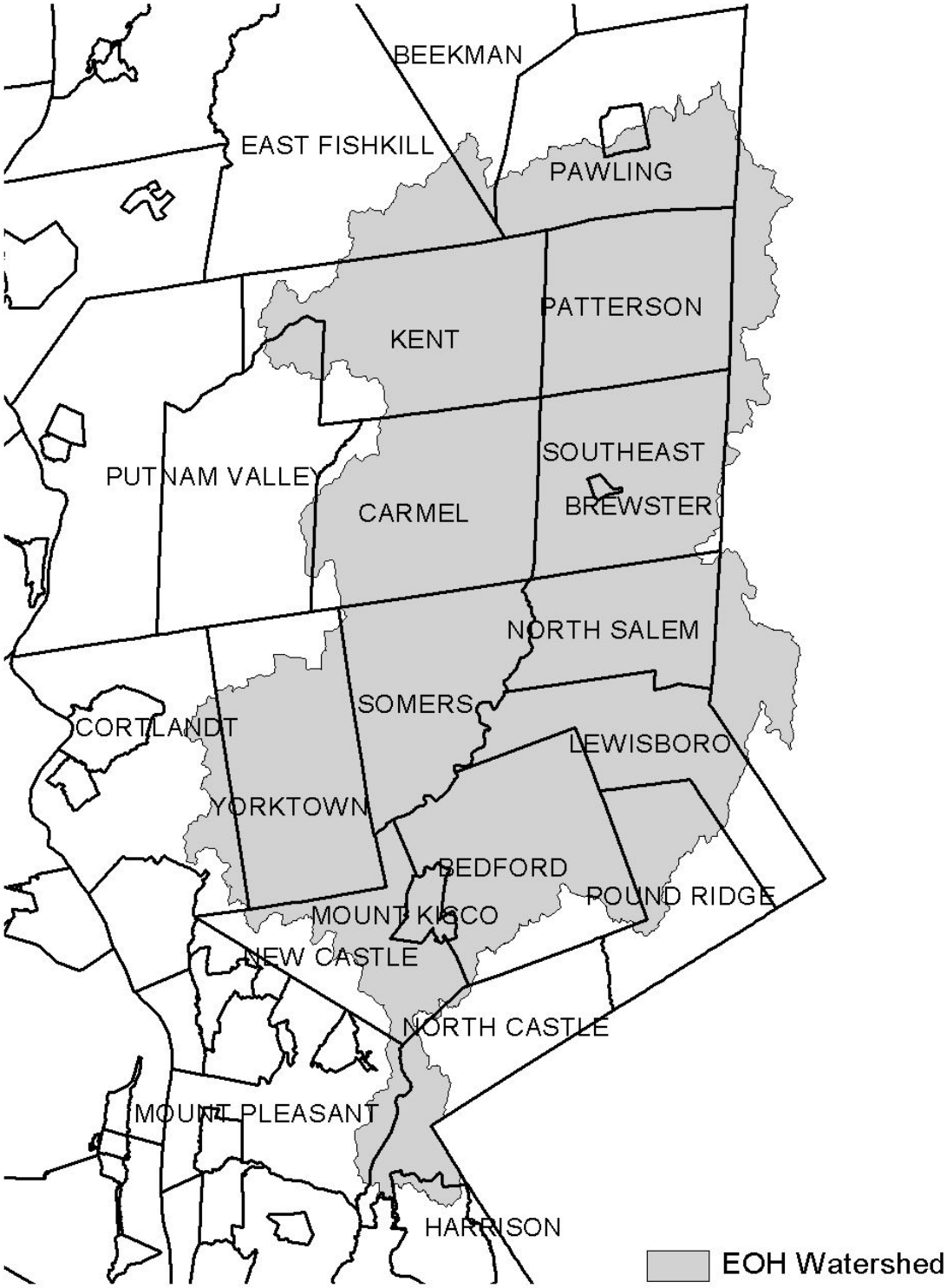


Figure 2 - Onondaga Lake Watershed

Figure 3 - Greenwood Lake Watershed

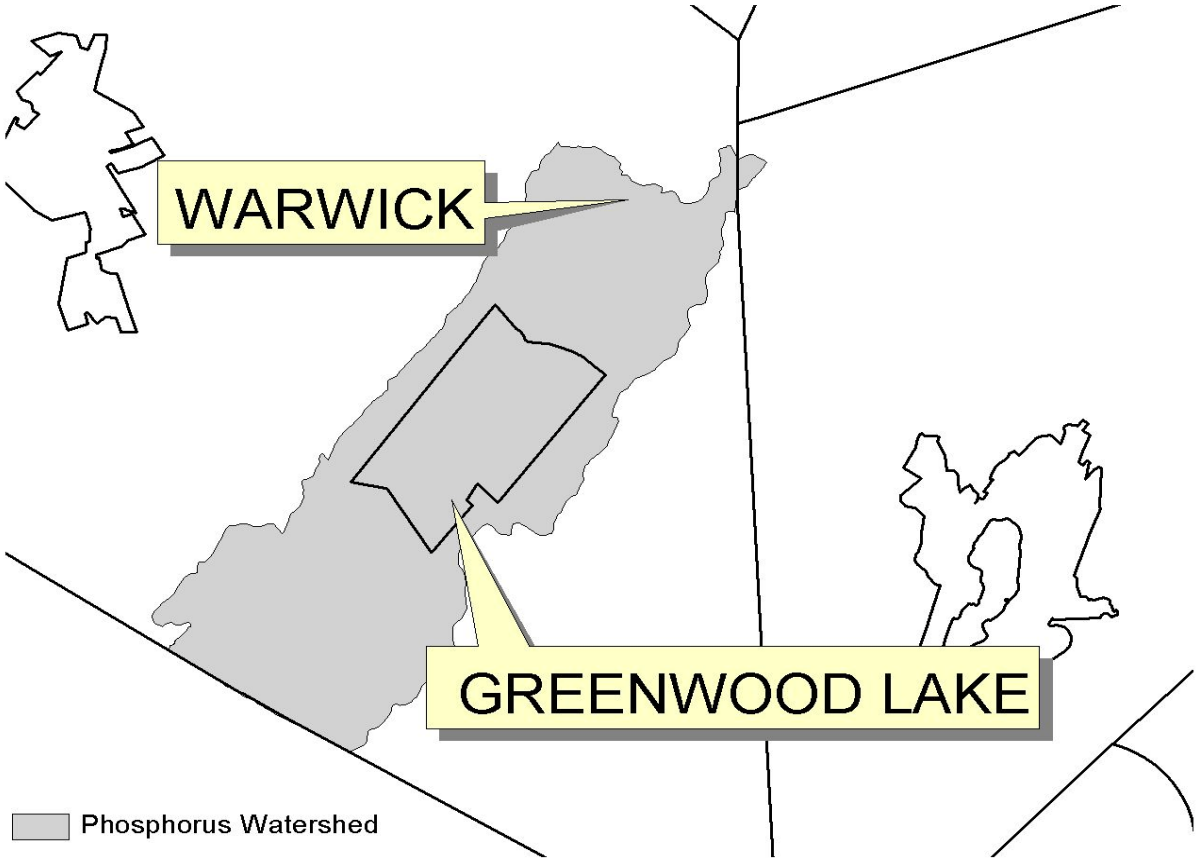


Figure 4 - Oscawana Lake Watershed

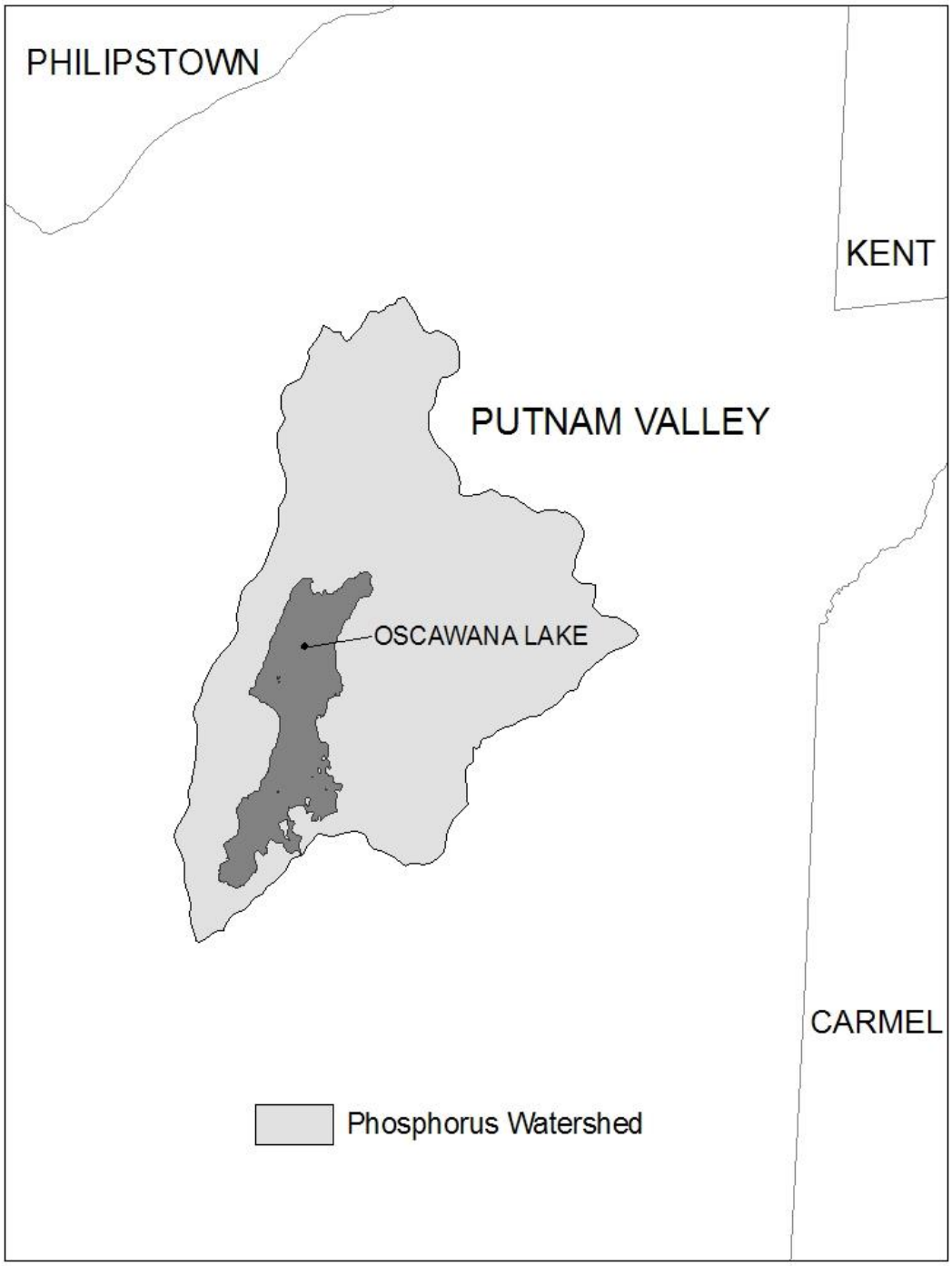
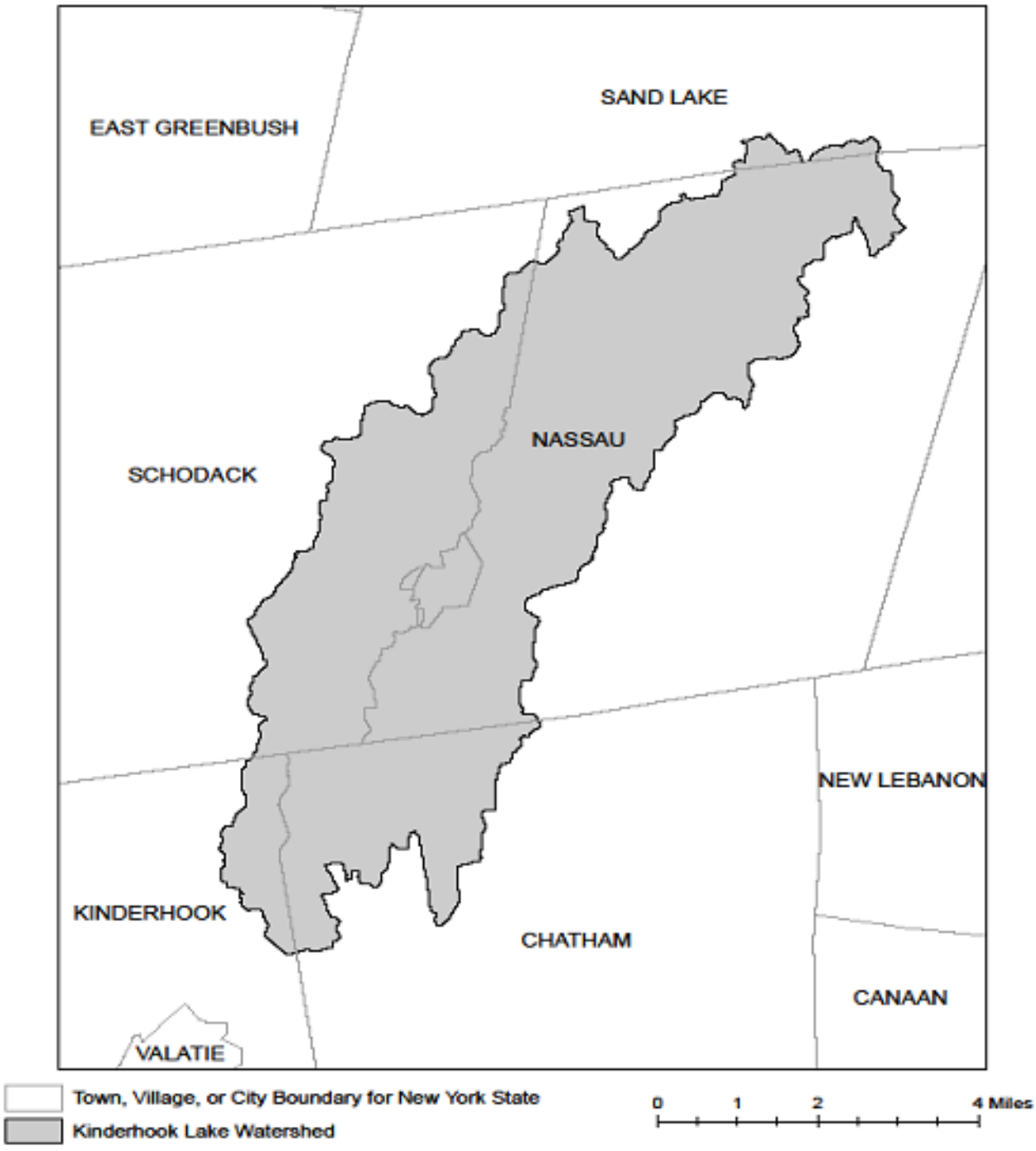


Figure 5 - Kinderhook Lake Watershed



APPENDIX D – Watersheds with Lower Disturbance Threshold

Watersheds where *owners or operators* of construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land must obtain coverage under this permit.

Entire New York City Watershed that is located east of the Hudson River **-** See Figure 1 in Appendix C

APPENDIX E – 303(d) Segments Impaired by Construction Related Pollutant(s)

List of 303(d) segments impaired by pollutants related to *construction activity* (e.g. silt, sediment or nutrients). The list was developed using "The Final New York State 2016 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy" dated November 2016. *Owners or operators* of single family home and single family residential subdivisions with 25% or less total impervious cover at total site build-out that involve soil disturbances of one or more acres of land, but less than 5 acres, and *directly discharge* to one of the listed segments below shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the New York State Stormwater Management Design Manual ("Design Manual"), dated January 2015.

COUNTY	WATERBODY	POLLUTANT
Albany	Ann Lee (Shakers) Pond, Stump Pond	Nutrients
Albany	Basic Creek Reservoir	Nutrients
Allegany	Amity Lake, Saunders Pond	Nutrients
Bronx	Long Island Sound, Bronx	Nutrients
Bronx	Van Cortlandt Lake	Nutrients
Broome	Fly Pond, Deer Lake, Sky Lake	Nutrients
Broome	Minor Tribs to Lower Susquehanna (north)	Nutrients
Broome	Whitney Point Lake/Reservoir	Nutrients
Cattaraugus	Allegheny River/Reservoir	Nutrients
Cattaraugus	Beaver (Alma) Lake	Nutrients
Cattaraugus	Case Lake	Nutrients
Cattaraugus	Linlyco/Club Pond	Nutrients
Cayuga	Duck Lake	Nutrients
Cayuga	Little Sodus Bay	Nutrients
Chautauqua	Bear Lake	Nutrients
Chautauqua	Chadakoin River and tribs	Nutrients
Chautauqua	Chautauqua Lake, North	Nutrients
Chautauqua	Chautauqua Lake, South	Nutrients
Chautauqua	Findley Lake	Nutrients
Chautauqua	Hulburt/Clymer Pond	Nutrients
Clinton	Great Chazy River, Lower, Main Stem	Silt/Sediment
Clinton	Lake Champlain, Main Lake, Middle	Nutrients
Clinton	Lake Champlain, Main Lake, North	Nutrients
Columbia	Kinderhook Lake	Nutrients
Columbia	Robinson Pond	Nutrients
Cortland	Dean Pond	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Dutchess	Fall Kill and tribs	Nutrients
Dutchess	Hillside Lake	Nutrients
Dutchess	Wappingers Lake	Nutrients
Dutchess	Wappingers Lake	Silt/Sediment
Erie	Beeman Creek and tribs	Nutrients
Erie	Ellicott Creek, Lower, and tribs	Silt/Sediment
Erie	Ellicott Creek, Lower, and tribs	Nutrients
Erie	Green Lake	Nutrients
Erie	Little Sister Creek, Lower, and tribs	Nutrients
Erie	Murder Creek, Lower, and tribs	Nutrients
Erie	Rush Creek and tribs	Nutrients
Erie	Scajaquada Creek, Lower, and tribs	Nutrients
Erie	Scajaquada Creek, Middle, and tribs	Nutrients
Erie	Scajaquada Creek, Upper, and tribs	Nutrients
Erie	South Branch Smoke Cr, Lower, and tribs	Silt/Sediment
Erie	South Branch Smoke Cr, Lower, and tribs	Nutrients
Essex	Lake Champlain, Main Lake, South	Nutrients
Essex	Lake Champlain, South Lake	Nutrients
Essex	Willsboro Bay	Nutrients
Genesee	Bigelow Creek and tribs	Nutrients
Genesee	Black Creek, Middle, and minor tribs	Nutrients
Genesee	Black Creek, Upper, and minor tribs	Nutrients
Genesee	Bowen Brook and tribs	Nutrients
Genesee	LeRoy Reservoir	Nutrients
Genesee	Oak Orchard Cr, Upper, and tribs	Nutrients
Genesee	Tonawanda Creek, Middle, Main Stem	Nutrients
Greene	Schoharie Reservoir	Silt/Sediment
Greene	Sleepy Hollow Lake	Silt/Sediment
Herkimer	Steele Creek tribs	Silt/Sediment
Herkimer	Steele Creek tribs	Nutrients
Jefferson	Moon Lake	Nutrients
Kings	Hendrix Creek	Nutrients
Kings	Prospect Park Lake	Nutrients
Lewis	Mill Creek/South Branch, and tribs	Nutrients
Livingston	Christie Creek and tribs	Nutrients
Livingston	Conesus Lake	Nutrients
Livingston	Mill Creek and minor tribs	Silt/Sediment
Monroe	Black Creek, Lower, and minor tribs	Nutrients
Monroe	Buck Pond	Nutrients
Monroe	Cranberry Pond	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Monroe	Lake Ontario Shoreline, Western	Nutrients
Monroe	Long Pond	Nutrients
Monroe	Mill Creek and tribs	Nutrients
Monroe	Mill Creek/Blue Pond Outlet and tribs	Nutrients
Monroe	Minor Tribs to Irondequoit Bay	Nutrients
Monroe	Rochester Embayment - East	Nutrients
Monroe	Rochester Embayment - West	Nutrients
Monroe	Shipbuilders Creek and tribs	Nutrients
Monroe	Thomas Creek/White Brook and tribs	Nutrients
Nassau	Beaver Lake	Nutrients
Nassau	Camaans Pond	Nutrients
Nassau	East Meadow Brook, Upper, and tribs	Silt/Sediment
Nassau	East Rockaway Channel	Nutrients
Nassau	Grant Park Pond	Nutrients
Nassau	Hempstead Bay	Nutrients
Nassau	Hempstead Lake	Nutrients
Nassau	Hewlett Bay	Nutrients
Nassau	Hog Island Channel	Nutrients
Nassau	Long Island Sound, Nassau County Waters	Nutrients
Nassau	Massapequa Creek and tribs	Nutrients
Nassau	Milburn/Parsonage Creeks, Upp, and tribs	Nutrients
Nassau	Reynolds Channel, west	Nutrients
Nassau	Tidal Tribs to Hempstead Bay	Nutrients
Nassau	Tribs (fresh) to East Bay	Nutrients
Nassau	Tribs (fresh) to East Bay	Silt/Sediment
Nassau	Tribs to Smith/Halls Ponds	Nutrients
Nassau	Woodmere Channel	Nutrients
New York	Harlem Meer	Nutrients
New York	The Lake in Central Park	Nutrients
Niagara	Bergholtz Creek and tribs	Nutrients
Niagara	Hyde Park Lake	Nutrients
Niagara	Lake Ontario Shoreline, Western	Nutrients
Niagara	Lake Ontario Shoreline, Western	Nutrients
Oneida	Ballou, Nail Creeks and tribs	Nutrients
Onondaga	Harbor Brook, Lower, and tribs	Nutrients
Onondaga	Ley Creek and tribs	Nutrients
Onondaga	Minor Tribs to Onondaga Lake	Nutrients
Onondaga	Ninemile Creek, Lower, and tribs	Nutrients
Onondaga	Onondaga Creek, Lower, and tribs	Nutrients
Onondaga	Onondaga Creek, Middle, and tribs	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Onondaga	Onondaga Lake, northern end	Nutrients
Onondaga	Onondaga Lake, southern end	Nutrients
Ontario	Great Brook and minor tribs	Silt/Sediment
Ontario	Great Brook and minor tribs	Nutrients
Ontario	Hemlock Lake Outlet and minor tribs	Nutrients
Ontario	Honeoye Lake	Nutrients
Orange	Greenwood Lake	Nutrients
Orange	Monhagen Brook and tribs	Nutrients
Orange	Orange Lake	Nutrients
Orleans	Lake Ontario Shoreline, Western	Nutrients
Orleans	Lake Ontario Shoreline, Western	Nutrients
Oswego	Lake Neatahwanta	Nutrients
Oswego	Pleasant Lake	Nutrients
Putnam	Bog Brook Reservoir	Nutrients
Putnam	Boyd Corners Reservoir	Nutrients
Putnam	Croton Falls Reservoir	Nutrients
Putnam	Diverting Reservoir	Nutrients
Putnam	East Branch Reservoir	Nutrients
Putnam	Lake Carmel	Nutrients
Putnam	Middle Branch Reservoir	Nutrients
Putnam	Oscawana Lake	Nutrients
Putnam	Palmer Lake	Nutrients
Putnam	West Branch Reservoir	Nutrients
Queens	Bergen Basin	Nutrients
Queens	Flushing Creek/Bay	Nutrients
Queens	Jamaica Bay, Eastern, and tribs (Queens)	Nutrients
Queens	Kissena Lake	Nutrients
Queens	Meadow Lake	Nutrients
Queens	Willow Lake	Nutrients
Rensselaer	Nassau Lake	Nutrients
Rensselaer	Snyders Lake	Nutrients
Richmond	Grasmere Lake/Bradys Pond	Nutrients
Rockland	Congers Lake, Swartout Lake	Nutrients
Rockland	Rockland Lake	Nutrients
Saratoga	Ballston Lake	Nutrients
Saratoga	Dwaas Kill and tribs	Silt/Sediment
Saratoga	Dwaas Kill and tribs	Nutrients
Saratoga	Lake Lonely	Nutrients
Saratoga	Round Lake	Nutrients
Saratoga	Tribs to Lake Lonely	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Schenectady	Collins Lake	Nutrients
Schenectady	Duane Lake	Nutrients
Schenectady	Mariaville Lake	Nutrients
Schoharie	Engleville Pond	Nutrients
Schoharie	Summit Lake	Nutrients
Seneca	Reeder Creek and tribs	Nutrients
St.Lawrence	Black Lake Outlet/Black Lake	Nutrients
St.Lawrence	Fish Creek and minor tribs	Nutrients
Steuben	Smith Pond	Nutrients
Suffolk	Agawam Lake	Nutrients
Suffolk	Big/Little Fresh Ponds	Nutrients
Suffolk	Canaan Lake	Silt/Sediment
Suffolk	Canaan Lake	Nutrients
Suffolk	Flanders Bay, West/Lower Sawmill Creek	Nutrients
Suffolk	Fresh Pond	Nutrients
Suffolk	Great South Bay, East	Nutrients
Suffolk	Great South Bay, Middle	Nutrients
Suffolk	Great South Bay, West	Nutrients
Suffolk	Lake Ronkonkoma	Nutrients
Suffolk	Long Island Sound, Suffolk County, West	Nutrients
Suffolk	Mattituck (Marratooka) Pond	Nutrients
Suffolk	Meetinghouse/Terrys Creeks and tribs	Nutrients
Suffolk	Mill and Seven Ponds	Nutrients
Suffolk	Millers Pond	Nutrients
Suffolk	Moriches Bay, East	Nutrients
Suffolk	Moriches Bay, West	Nutrients
Suffolk	Peconic River, Lower, and tidal tribs	Nutrients
Suffolk	Quantuck Bay	Nutrients
Suffolk	Shinnecock Bay and Inlet	Nutrients
Suffolk	Tidal tribs to West Moriches Bay	Nutrients
Sullivan	Bodine, Montgomery Lakes	Nutrients
Sullivan	Davies Lake	Nutrients
Sullivan	Evens Lake	Nutrients
Sullivan	Pleasure Lake	Nutrients
Tompkins	Cayuga Lake, Southern End	Nutrients
Tompkins	Cayuga Lake, Southern End	Silt/Sediment
Tompkins	Owasco Inlet, Upper, and tribs	Nutrients
Ulster	Ashokan Reservoir	Silt/Sediment
Ulster	Esopus Creek, Upper, and minor tribs	Silt/Sediment
Warren	Hague Brook and tribs	Silt/Sediment

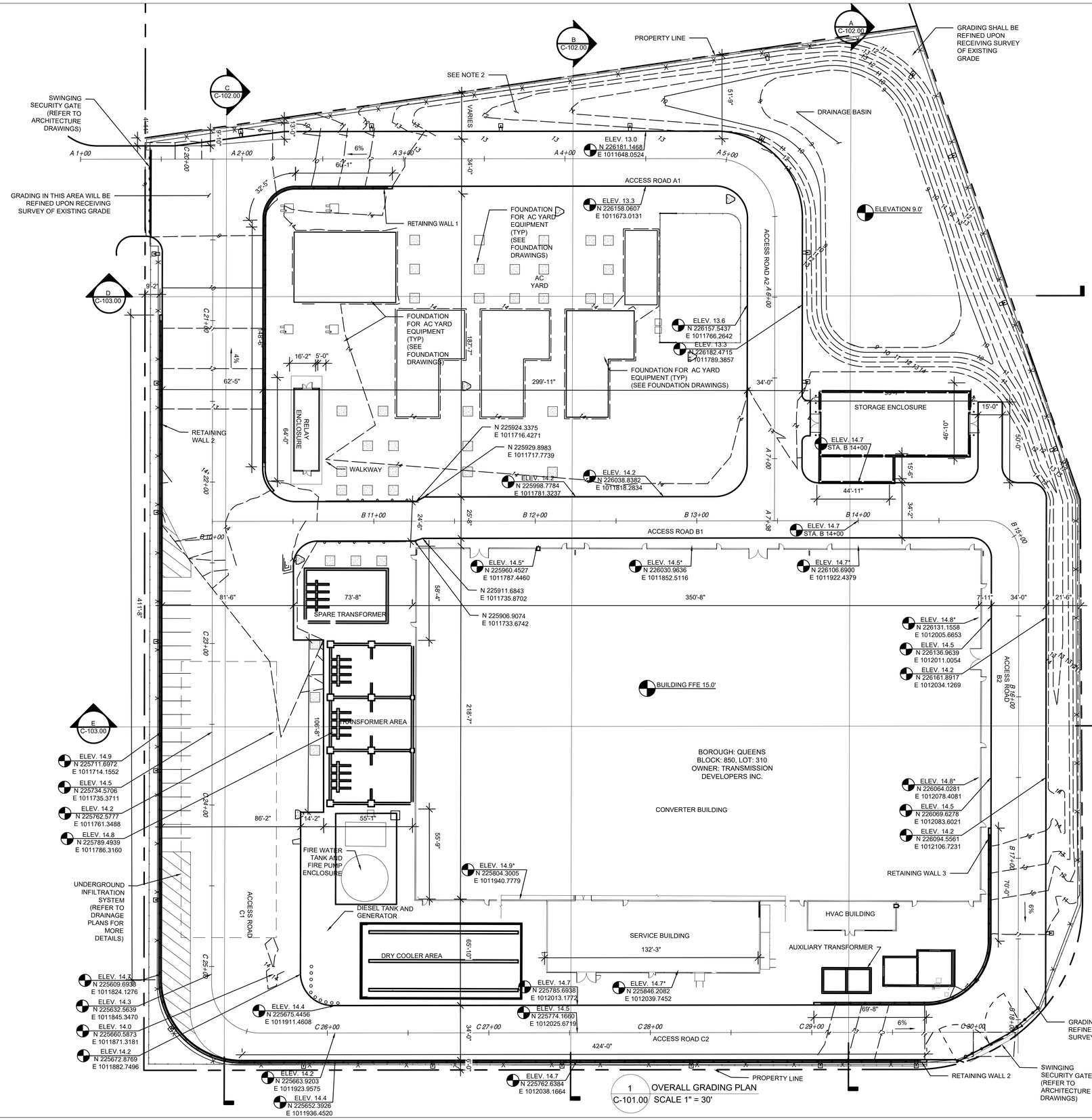
303(d) Segments Impaired by Construction Related Pollutant(s)

Warren	Huddle/Finkle Brooks and tribs	Silt/Sediment
Warren	Indian Brook and tribs	Silt/Sediment
Warren	Lake George	Silt/Sediment
Warren	Tribs to L.George, Village of L George	Silt/Sediment
Washington	Cossayuna Lake	Nutrients
Washington	Lake Champlain, South Bay	Nutrients
Washington	Tribs to L.George, East Shore	Silt/Sediment
Washington	Wood Cr/Champlain Canal and minor tribs	Nutrients
Wayne	Port Bay	Nutrients
Westchester	Amawalk Reservoir	Nutrients
Westchester	Blind Brook, Upper, and tribs	Silt/Sediment
Westchester	Cross River Reservoir	Nutrients
Westchester	Lake Katonah	Nutrients
Westchester	Lake Lincolndale	Nutrients
Westchester	Lake Meahagh	Nutrients
Westchester	Lake Mohegan	Nutrients
Westchester	Lake Shenorock	Nutrients
Westchester	Long Island Sound, Westchester (East)	Nutrients
Westchester	Mamaroneck River, Lower	Silt/Sediment
Westchester	Mamaroneck River, Upper, and minor tribs	Silt/Sediment
Westchester	Muscoot/Upper New Croton Reservoir	Nutrients
Westchester	New Croton Reservoir	Nutrients
Westchester	Peach Lake	Nutrients
Westchester	Reservoir No.1 (Lake Isle)	Nutrients
Westchester	Saw Mill River, Lower, and tribs	Nutrients
Westchester	Saw Mill River, Middle, and tribs	Nutrients
Westchester	Sheldrake River and tribs	Silt/Sediment
Westchester	Sheldrake River and tribs	Nutrients
Westchester	Silver Lake	Nutrients
Westchester	Teatown Lake	Nutrients
Westchester	Titicus Reservoir	Nutrients
Westchester	Truesdale Lake	Nutrients
Westchester	Wallace Pond	Nutrients
Wyoming	Java Lake	Nutrients
Wyoming	Silver Lake	Nutrients

APPENDIX F – List of NYS DEC Regional Offices

Region	Covering the following counties:	DIVISION OF ENVIRONMENTAL PERMITS (DEP) Permit Administrators	DIVISION OF WATER (DOW) Water (SPDES) Program
1	Nassau and Suffolk	50 Circle Road Stony Brook, NY 11790 Tel. (631) 444-0365	50 Circle Road Stony Brook, NY 11790-3409 Tel. (631) 444-0405
2	Bronx, Kings, New York, Queens and Richmond	1 Hunters Point Plaza, 47-40 21st St. Long Island City, NY 11101-5407 Tel. (718) 482-4997	1 Hunters Point Plaza, 47-40 21st St. Long Island City, NY 11101-5407 Tel. (718) 482-4933
3	Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster and Westchester	21 South Putt Corners Road New Paltz, NY 12561-1696 Tel. (845) 256-3059	100 Hillside Avenue, Suite 1w White Plains, NY 10603 Tel. (914) 428 - 2505
4	Albany, Columbia, Delaware, Greene, Montgomery, Otsego, Rensselaer, Schenectady and Schoharie	1150 North Westcott Road Schenectady, NY 12306-2014 Tel. (518) 357-2069	1130 North Westcott Road Schenectady, NY 12306-2014 Tel. (518) 357-2045
5	Clinton, Essex, Franklin, Fulton, Hamilton, Saratoga, Warren and Washington	1115 State Route 86, Po Box 296 Ray Brook, NY 12977-0296 Tel. (518) 897-1234	232 Golf Course Road Warrensburg, NY 12885-1172 Tel. (518) 623-1200
6	HERKIMER, JEFFERSON, LEWIS, ONEIDA AND ST. LAWRENCE	STATE OFFICE BUILDING 317 WASHINGTON STREET WATERTOWN, NY 13601-3787 TEL. (315) 785-2245	STATE OFFICE BUILDING 207 GENESEE STREET UTICA, NY 13501-2885 TEL. (315) 793-2554
7	BROOME, CAYUGA, CHENANGO, CORTLAND, MADISON, ONONDAGA, OSWEGO, TIOGA AND TOMPKINS	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7438	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7500
8	CHEMUNG, GENESEE, LIVINGSTON, MONROE, ONTARIO, ORLEANS, SCHUYLER, SENECA, STEUBEN, WAYNE AND YATES	6274 EAST AVON-LIMA ROADAVON, NY 14414-9519 TEL. (585) 226-2466	6274 EAST AVON-LIMA RD. AVON, NY 14414-9519 TEL. (585) 226-2466
9	ALLEGANY, CATTARAUGUS, CHAUTAUQUA, ERIE, NIAGARA AND WYOMING	270 MICHIGAN AVENUE BUFFALO, NY 14203-2999 TEL. (716) 851-7165	270 MICHIGAN AVENUE BUFFALO, NY 14203-2999 TEL. (716) 851-7070

Appendix M – Required Drawings



1 C-101.00 OVERALL GRADING PLAN
SCALE 1" = 30'

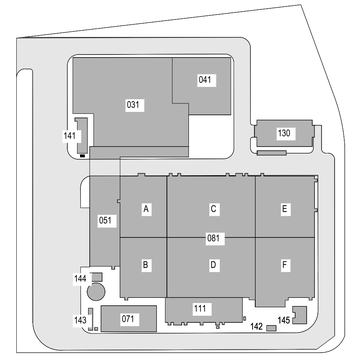
NOTES:

1. GRADING AT THE SITE PERIMETER WILL BE REFINED AFTER RECEIVING THE SURVEY OF THE EXISTING GRADE.
2. REFER TO PAVEMENT PLAN FOR PROPOSED FINISHED GRADING MATERIAL

LEGEND:

SPOT ELEVATION: ELEV. XX.X N XXX.XX E XXX.XX

*SPOT ELEVATION IS OUTSIDE THE BUILDING AT THE BUILDING FACE



KEY PLAN N.T.S.

PLAN NORTH N

Engineering and Land Surveying, P.C.
370 7th Avenue
SUITE 1604
New York, NY 10001

SOWINSKI SULLIVAN ARCHITECTURE+ENGINEERING
25 Mohawk Avenue
Sparta, NJ 07871

REV	DESCRIPTION	DRW BY	CHK BY	DATE
B	FINAL SUBMISSION	MP	NP	11/8/22
A	INTERIM SUBMISSION	MP	NP	8/29/22

Kiewit
470 Chestnut Ridge Rd # 2,
Woodcliff Lake, NJ 07677

Hitachi Energy
901 Main Campus Drive
Raleigh, North Carolina 27606

PROJECT

CHPE
Champlain Hudson Power Express

Astoria HVDC Converter Station

31-45 20th Avenue, Astoria, Queens NY 11105
Block #850 - Lot #310 - BIN #4624437

OVERALL GRADING PLAN

DATE	November 8, 2022
PROJECT NO	105121
DRAWING BY	M. PATEL
CHECKED BY	N. PATEL
DRAWING NO	C-101.00
CADD FILE N0	

PIPE TABLE				
PIPE NAME	SIZE	LENGTH	SLOPE	MATERIAL
P-1	12.000	38.092	0.32%	DIP
P-2	16.000	300.594	0.25%	DIP
P-3	16.000	47.050	0.28%	DIP
P-4	21.000	15.747	1.00%	RCP
P-5	21.000	26.329	1.00%	RCP
P-6	12.000	72.688	0.62%	DIP
P-7	12.000	52.703	1.52%	DIP
P-8	6.000	24.834	2.01%	DIP
P-9	18.000	52.618	0.76%	RCP
P-10	12.000	161.495	0.62%	DIP
P-11	18.000	7.274	2.06%	RCP
P-12	16.000	8.269	0.60%	DIP

STRUCTURE TABLE	
STRUCTURE NAME	STRUCTURE DETAILS
S-1 CATCH BASIN	RIM = 14.100 P-1 INV OUT = 11.500
S-2 CATCH BASIN	RIM = 14.360 P-1 INV IN = 11.380 P-2 INV OUT = 11.380
S-3 4' DIA MANHOLE	RIM = 14.200 P-2 INV IN = 10.630 P-3 INV OUT = 10.630
S-4 CATCH BASIN	RIM = 13.950 P-12 INV OUT = 10.550
S-5 4' DIA MANHOLE	RIM = 14.050 P-3 INV IN = 10.500 P-12 INV IN = 10.500
S-6 5' DIA MANHOLE	RIM = 13.820 P-7 INV IN = 9.700 P-9 INV OUT = 9.400
S-7 CATCH BASIN	RIM = 13.000 P-7 INV OUT = 10.500
S-8 FLARED END SECTION W/ 6" DIA FIELDSTONE COBBLE AND GEOFABRIC LINER INSTALLED PER ROCK OUTFALL DETAIL	RIM = 10.612 F
S-9 CATCH BASIN	RIM = 13.000 P-10 INV OUT = 10.000
S-10 FLARED END SECTION W/ 6" DIA FIELDSTONE COBBLE AND GEOFABRIC LINER INSTALLED PER ROCK OUTFALL DETAIL	RIM = 10.076 F)
S-11 FLARED END SECTION W/ 6" DIA FIELDSTONE COBBLE AND GEOFABRIC LINER INSTALLED PER ROCK OUTFALL DETAIL	RIM = 12.462 F ;0
S-12 OUTLET CONTROL STRUCTURE (SEE DETAIL)	RIM = 14.460 P-4 INV OUT = 10.500
S-13 5' DIA MANHOLE	RIM = 14.410 P-4 INV IN = 10.343 P-5 INV OUT = 10.343
S-14 FLARED END SECTION W/ 6" DIA FIELDSTONE COBBLE AND GEOFABRIC LINER INSTALLED PER ROCK OUTFALL DETAIL	RIM = 14.550 0
S-15 4' DIA MANHOLE	RIM = 14.020 P-6 INV IN = 10.500 P-8 INV IN = 11.000
S-16 4' DIA MANHOLE	RIM = 14.310 P-8 INV OUT = 11.500
S-17 CATCH BASIN	RIM = 13.500 P-6 INV OUT = 10.950

NOTES:

1. ALL DRAINAGE CONSTRUCTION SHALL BE DONE IN CONFORMANCE WITH THE LATEST STANDARDS OF THE NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION (NYCDEP).
2. ALL SITE DRAINAGE SHALL BE VERIFIED WITH THE ARCHITECTURAL PLANS PRIOR TO CONSTRUCTION.
3. PROPOSED DRAINAGE PIPES LESS THAN 18" DIAMETER SHALL BE DIP. ALL PROPOSED DRAINAGE PIPES GREATER THAN 18" SHALL BE RCP.
4. ALL DUCTILE IRON SEWER PIPE SHALL BE CLASS 56 WITH EPOXY LINING < INSTALLED ON BROKEN STONE.
5. ALL RCP SHALL BE CLASS III UNLESS OTHERWISE INDICATED.
6. SEE ARCHITECTURAL PLANS FOR EXACT BUILDING & FOUNDATION DETAILS AND ORIENTATION.
7. CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE OWNER WITH A SET OF MARKED UP PLANS (AS-BUILTS) SHOWING ANY CHANGE DURING CONSTRUCTION.
8. GRASS SWALE AND INFILTRATION BASIN IS PENDING COORDINATION AND MAY CHANGE IN FINAL DESIGN.
9. GROUND ALL METALLIC COVERS IN THE SITE BY CONNECTING THEM TO THE STATION GROUNDING GRID WITH MINIMUM 4/0 AWG GROUNDING WIRE AND PROVIDING MINIMUM OF 2 FEET OF SLACK FOR LARGER COVERS SO THAT THE COVERS CAN BE MOVED ASIDE, IF REQUIRED, WITHOUT NEED FOR UNBOLTING THE GROUNDING COVERS.

Engineering and Land Surveying, P.C.
370 7th Avenue
SUITE 1604
New York, NY 10001

SOWINSKI SULLIVAN ARCHITECTURE+ENGINEERING
25 Mohawk Avenue
Sparta, NJ 07871

REV	DESCRIPTION	DRW BY	CHK BY	DATE
B	FINAL SUBMISSION	AJ	NH	11/08/22
A	INTERIM SUBMISSION	AJ	NH	08/29/22

Kiewit
470 Chestnut Ridge Rd # 2,
Woodcliff Lake, NJ 07677

Hitachi Energy
901 Main Campus Drive
Raleigh, North Carolina 27606

PROJECT

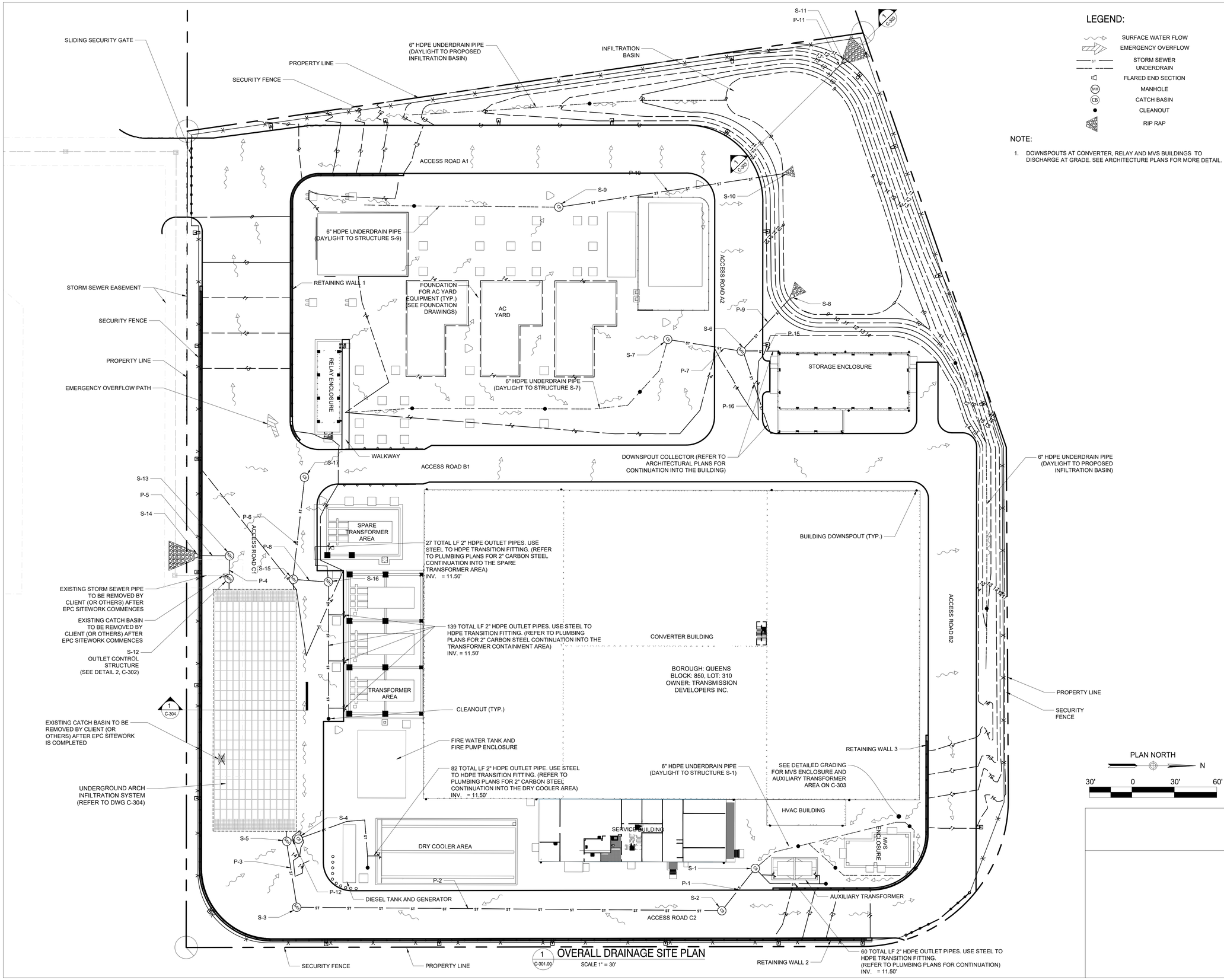
CHPE
Champlain Hudson Power Express

Astoria HVDC Converter Station

31-45 20th Avenue, Astoria, Queens NY 11105
Block #850 - Lot #310 - BIN #4624437

DRAINAGE STRUCTURES TABLE AND NOTES

DATE	November 8, 2022
PROJECT NO	105121
DRAWING BY	A. JALLOW
CHECKED BY	N. HAVENER
DRAWING NO	C-300.00
CADD FILE N0	



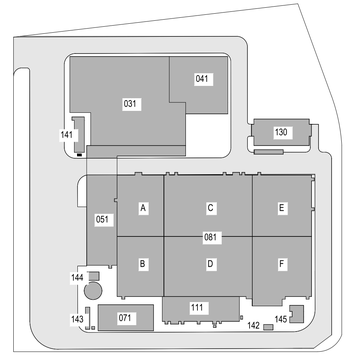
1 C-301.00 OVERALL DRAINAGE SITE PLAN
SCALE 1" = 30'

LEGEND:

- SURFACE WATER FLOW
- EMERGENCY OVERFLOW
- ST — STORM SEWER
- UNDERDRAIN
- FLARED END SECTION
- MH MANHOLE
- CB CATCH BASIN
- CLEANOUT
- RIP RAP

NOTE:

1. DOWNSPOUTS AT CONVERTER, RELAY AND MVS BUILDINGS TO DISCHARGE AT GRADE. SEE ARCHITECTURE PLANS FOR MORE DETAIL.



KEY PLAN N.T.S.

PLAN NORTH

PLAN NORTH
30' 0 30' 60'

Engineering and Land Surveying, P.C.
370 7th Avenue
SUITE 1604
New York, NY 10001

SOWINSKI SULLIVAN ARCHITECTURE+ENGINEERING
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Sparta, NJ 07871

REV	DESCRIPTION	DRW BY	CHK BY	DATE
A	INTERIM SUBMISSION	AJ	NH	8/29/22

Kiewit
470 Chestnut Ridge Rd # 2,
Woodcliff Lake, NJ 07677

Hitachi Energy
901 Main Campus Drive
Raleigh, North Carolina 27606

PROJECT

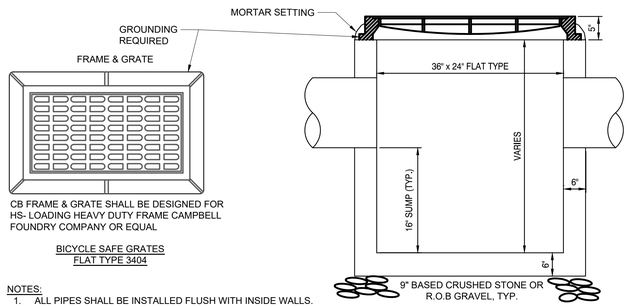
CHPE
Champlain Hudson Power Express

Astoria HVDC Converter Station

31-45 20th Avenue, Astoria, Queens NY 11105
Block #850 - Lot #310 - BIN #4624437

OVERALL DRAINAGE SITE PLAN

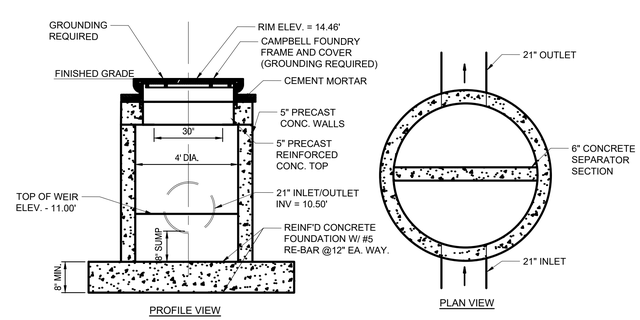
DATE	November 4, 2022
PROJECT NO	
DRAWING BY	A. JALLOW
CHECKED BY	N. HAVENER
DRAWING NO	C-301.00
CADD FILE NO	



NOTES:
1. ALL PIPES SHALL BE INSTALLED FLUSH WITH INSIDE WALLS.

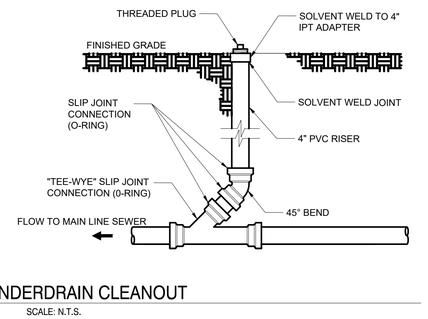
1 C-302.00 PRECAST CONCRETE CATCHBASIN DETAIL

SCALE: N.T.S.



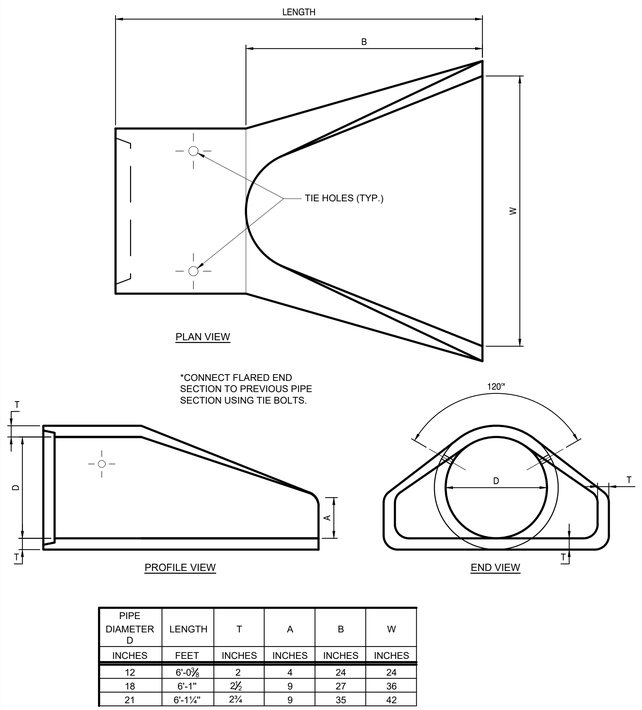
2 C-302.00 OUTLET CONTROL STRUCTURE - UNDERGROUND INFILTRATION BASIN

SCALE: N.T.S.



3 C-302.00 UNDERDRAIN CLEANOUT

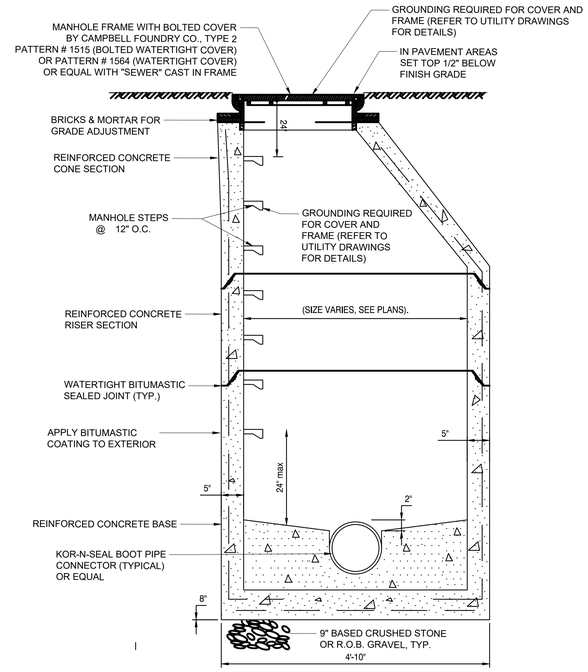
SCALE: N.T.S.



PIPE DIAMETER D	LENGTH	T	A	B	W
INCHES	FEET	INCHES	INCHES	INCHES	INCHES
12	6'-0⅞	2	4	24	24
18	6'-1"	2⅛	9	27	36
21	6'-1¼"	2¼	9	35	42

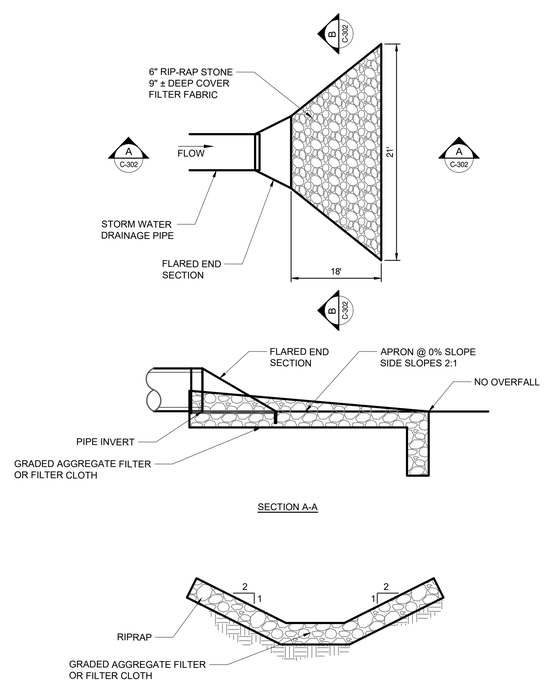
4 C-302.00 FLARED END SECTION

SCALE: N.T.S.



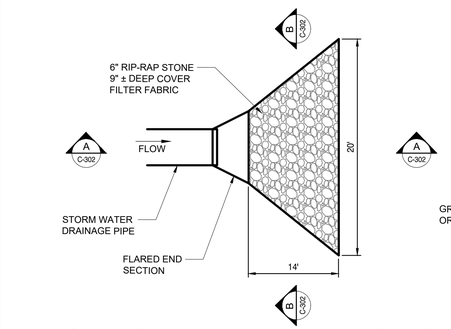
5 C-302.00 STORM SEWER MANHOLE

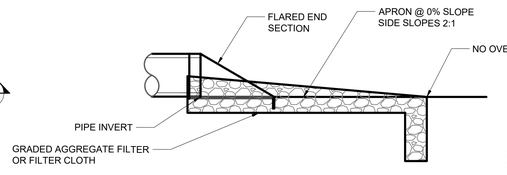
SCALE: N.T.S.

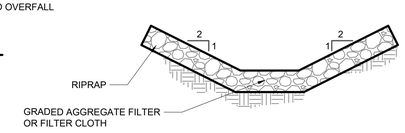


6 C-302.00 OUTLET CULVERT RIP RAP (UNDERGROUND ARCH INFILTRATION BASIN)

SCALE: N.T.S.

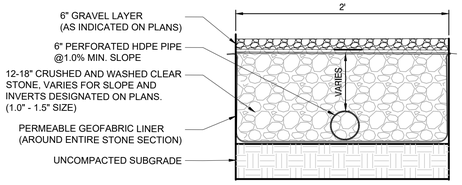






7 C-302.00 OUTLET CULVERT RIP RAP (INFILTRATION BASIN)

SCALE: N.T.S.



8 C-302.00 UNDERDRAIN

SCALE: N.T.S.

Engineering and Land Surveying, P.C.
370 7th Avenue
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SOWINSKI SULLIVAN ARCHITECTURE+ENGINEERING
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REV	DESCRIPTION	DRW BY	CHK BY	DATE
B	FINAL SUBMISSION	AJ	NH	11/8/22
A	INTERIM SUBMISSION	AJ	NH	8/29/22

Kiewit
470 Chestnut Ridge Rd # 2,
Woodcliff Lake, NJ 07677

Hitachi Energy
901 Main Campus Drive
Raleigh, North Carolina 27606

PROJECT

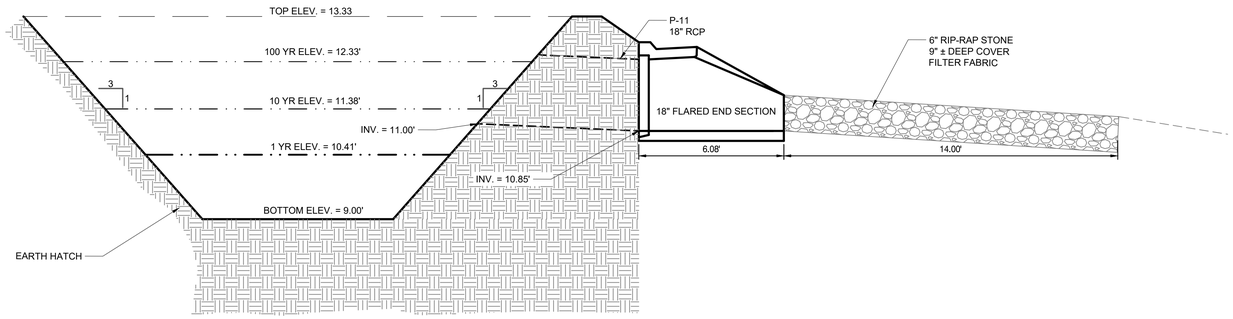
CHPE Champlain Hudson Power Express

Astoria HVDC Converter Station

31-45 20th Avenue, Astoria, Queens NY 11105
Block #850 - Lot #310 - BIN #4624437

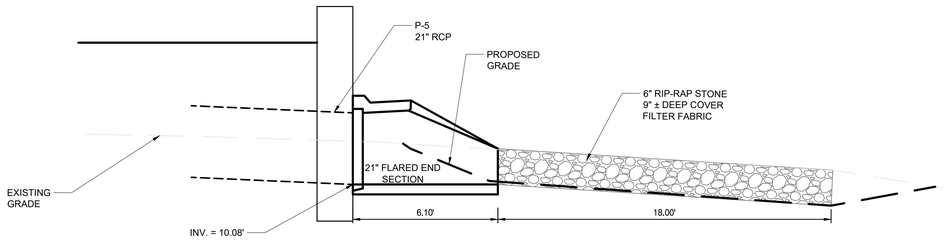
DRAINAGE DETAILS 1

DATE	November 8, 2022
PROJECT NO	105121
DRAWING BY	A. JALLOW
CHECKED BY	N. HAVENER
DRAWING NO	C-302.00
CADD FILE N0	



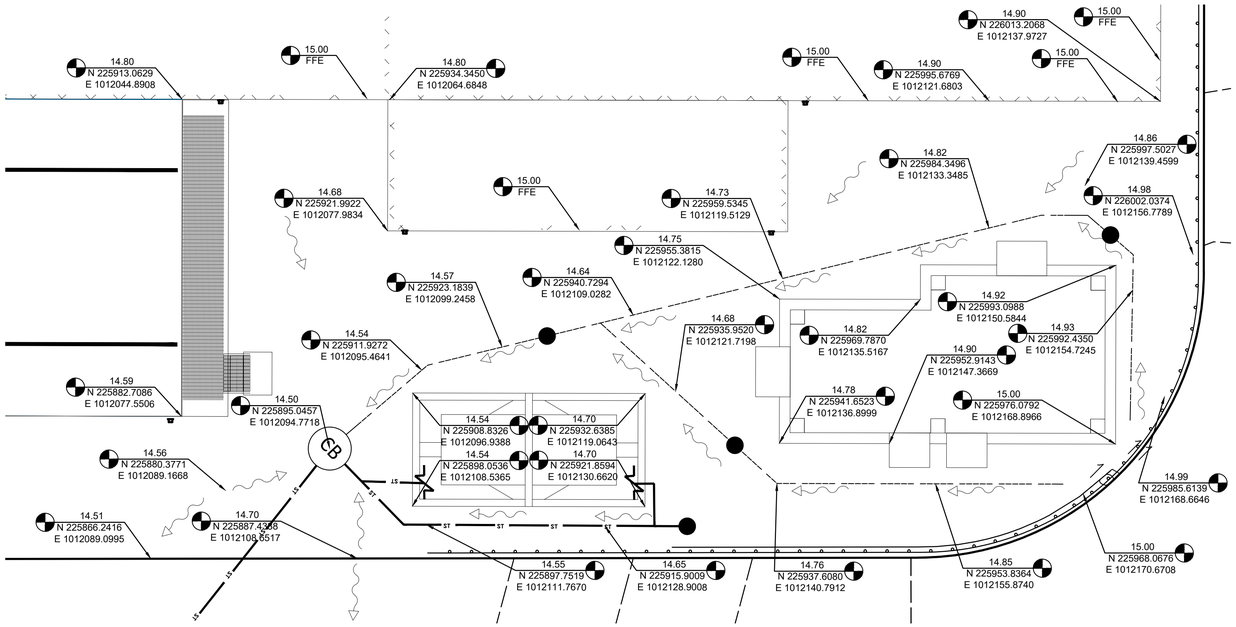
1 C-303.00 **INFILTRATION BASIN**

SCALE: N.T.S.



2 C-303.00 **OUTLET DETAIL FROM UNDERGROUND ARCH SYSTEM**

SCALE: N.T.S.



3 C-303.00 **DETAILED GRADING AROUND AUXILIARY TRANSFORMER AND MVS ENCLOSURE**

SCALE: 1"=10'

PLAN NORTH

N

Engineering and Land Surveying, P.C.
370 7th Avenue
SUITE 1604
New York, NY 10001

SOWINSKI SULLIVAN ARCHITECTURE+ENGINEERING
25 Mohawk Avenue
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REV	DESCRIPTION	DRW BY	CHK BY	DATE
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Block #850 - Lot #310 - BIN #4624437

DRAINAGE DETAILS 2

DATE	November 8, 2022
PROJECT NO	105121
DRAWING BY	A. JALLOW
CHECKED BY	N. HAVENER
DRAWING NO	C-303.00
CADD FILE N0	

CULTEC RECHARGER® 280HD SPECIFICATIONS

GENERAL

CULTEC RECHARGER 280HD CHAMBERS ARE DESIGNED FOR UNDERGROUND STORMWATER MANAGEMENT. THE CHAMBERS MAY BE USED FOR RETENTION, RECHARGING, DETENTION OR CONTROLLING THE FLOW OF ON-SITE STORMWATER RUNOFF.

CONTACT CULTEC AT LEAST THIRTY DAYS PRIOR TO SYSTEM INSTALLATION TO ARRANGE FOR A PRE-CONSTRUCTION MEETING.

CHAMBER PARAMETERS

1. THE CHAMBERS WILL BE MANUFACTURED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE CHAMBER SHALL BE VACUUM THERMOFORMED OF HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HMWHDPE) WITH A BLACK INTERIOR AND BLUE EXTERIOR.
3. THE CHAMBER WILL BE ARCHED IN SHAPE.
4. THE CHAMBER WILL BE OPEN-BOTTOMED.
5. THE CHAMBER WILL BE JOINED USING AN INTERLOCKING OVERLAPPING RIB METHOD. CONNECTIONS MUST BE FULLY SHOULDERED OVERLAPPING RIBS, HAVING NO SEPARATE COUPLINGS OR SEPARATE END WALLS.
6. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC RECHARGER 280HD SHALL BE 26.5 INCHES (673 mm) TALL, 47 INCHES (1194 mm) WIDE AND 8 FEET (2.44 m) LONG. THE INSTALLED LENGTH OF A JOINED RECHARGER 280HD SHALL BE 7 FEET (2.13 m).
7. MAXIMUM INLET OPENING ON THE CHAMBER ENDWALL IS 21 INCHES (525 mm) HDPE.
8. THE CHAMBER WILL HAVE TWO SIDE PORTALS TO ACCEPT CULTEC HVLV® FC-24 FEED CONNECTORS TO CREATE AN INTERNAL MANIFOLD. NOMINAL INSIDE DIMENSIONS OF THE SIDE PORTAL SHALL HAVE A WIDTH OF 11.25" [286 mm] AND HEIGHT OF 11.5" [292 mm]. THE SIDE PORTAL CAN ACCEPT A MAXIMUM OUTER DIAMETER (O.D.) PIPE SIZE OF 12.25 INCHES [311 mm].
9. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV® FC-24 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 24.2 INCHES (614 mm) LONG.
10. THE NOMINAL STORAGE VOLUME OF THE RECHARGER 280HD CHAMBER WILL BE 6.079 FT3 / FT (0.565 m^3 / m) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF A JOINED RECHARGER 280HD SHALL BE 42.553 FT^3 / UNIT (1.205 m^3 / UNIT) - WITHOUT STONE.
11. THE NOMINAL STORAGE VOLUME OF THE HVLV FC-24 FEED CONNECTOR WILL BE 0.913 FT^3 / FT (0.085 m^3 / m) - WITHOUT STONE.
12. THE RECHARGER 280HD CHAMBER WILL SEVENTY-TWO DISCHARGE HOLES BORED INTO THE SIDEWALLS OF THE UNIT'S CORE TO PROMOTE LATERAL CONVEYANCE OF WATER.
13. THE RECHARGER 280HD CHAMBER SHALL HAVE 15 CORRUGATIONS.
14. THE ENDWALL OF THE CHAMBER, WHEN PRESENT, WILL BE AN INTEGRAL PART OF THE CONTINUOUSLY FORMED UNIT. SEPARATE END PLATES CANNOT BE USED WITH THIS UNIT.
15. THE RECHARGER 280RHD STAND ALONE UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO FULLY FORMED INTEGRAL ENDWALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS.
16. THE RECHARGER 280SHD STARTER UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING ONE FULLY FORMED INTEGRAL ENDWALL AND ONE PARTIALLY FORMED INTEGRAL ENDWALL WITH A LOWER TRANSFER OPENING OF 9 INCHES (229 mm) HIGH X 35 INCHES (889 mm) WIDE.
17. THE RECHARGER 280IHD INTERMEDIATE UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING ONE FULLY OPEN ENDWALL AND ONE PARTIALLY FORMED INTEGRAL ENDWALL WITH A LOWER TRANSFER OPENING OF 9 INCHES (229 mm) HIGH X 35 INCHES (889 mm) WIDE.
18. THE RECHARGER 280EHD END UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING ONE FULLY FORMED INTEGRAL ENDWALL AND ONE FULLY OPEN END WALL AND HAVING NO SEPARATE END PLATES OR END WALLS.
19. THE HVLV FC-24 FEED CONNECTOR MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO OPEN END WALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS. THE UNIT WILL FIT INTO THE SIDE PORTALS OF THE RECHARGER 280HD AND ACT AS CROSS FEED CONNECTIONS.
20. CHAMBERS MUST HAVE HORIZONTAL STIFFENING FLEX REDUCTION STEPS BETWEEN THE RIBS.
21. THE CHAMBER WILL HAVE A RAISED INTEGRAL CAP AT THE TOP OF THE ARCH IN THE CENTER OF EACH UNIT TO BE USED AS AN OPTIONAL INSPECTION PORT OR CLEAN-OUT.
22. THE UNITS MAY BE TRIMMED TO CUSTOM LENGTHS BY CUTTING BACK TO ANY CORRUGATION.
23. THE CHAMBER SHALL BE MANUFACTURED IN AN IN AN ISO 9001:2015 CERTIFIED FACILITY
24. THE CHAMBER WILL BE DESIGNED TO WITHSTAND TRAFFIC LOADS WHEN INSTALLED ACCORDING TO CULTEC'S INSTALLATION INSTRUCTIONS.
25. THE CHAMBER SHALL BE DESIGNED AND MANUFACTURED TO MEET THE MATERIAL AND STRUCTURAL REQUIREMENTS OF IAPMO PS 83-2019, INCLUDING RESISTANCE TO AASHTO H-10 AND H-20 HIGHWAY LIVE LOADS, WHEN INSTALLED IN ACCORDANCE WITH CULTEC'S INSTALLATION INSTRUCTIONS.
26. MAXIMUM ALLOWED COVER OVER TOP OF UNIT SHALL BE 12 FEET (3.65 m).

CULTEC HVLV® FC-24 FEED CONNECTOR PRODUCT SPECIFICATIONS

GENERAL

CULTEC HVLV FC-24 FEED CONNECTORS ARE DESIGNED TO CREATE AN INTERNAL MANIFOLD FOR CULTEC RECHARGER 280HD STORMWATER CHAMBERS.

CHAMBER PARAMETERS

1. THE CHAMBERS WILL BE MANUFACTURED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE CHAMBER SHALL BE VACUUM THERMOFORMED OF HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HMWHDPE) WITH A BLACK INTERIOR AND BLUE EXTERIOR.
3. THE CHAMBER WILL BE ARCHED IN SHAPE.
4. THE CHAMBER WILL BE OPEN-BOTTOMED.
5. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV FC-24 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 24.2 INCHES (614 mm) LONG.
6. THE NOMINAL STORAGE VOLUME OF THE HVLV FC-24 FEED CONNECTOR WILL BE 0.913 FT^3 / FT (0.085 m^3 / m) - WITHOUT STONE.
7. THE HVLV FC-24 FEED CONNECTOR CHAMBER SHALL HAVE 2 CORRUGATIONS.
8. THE HVLV FC-24 FEED CONNECTOR MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO OPEN END WALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS. THE UNIT WILL FIT INTO THE SIDE PORTALS OF THE CULTEC RECHARGER STORMWATER CHAMBER AND ACT AS CROSS FEED CONNECTIONS CREATING AN INTERNAL MANIFOLD.
9. THE CHAMBER WILL BE DESIGNED TO WITHSTAND TRAFFIC LOADS WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.
10. THE CHAMBER SHALL BE MANUFACTURED IN AN ISO 9001:2015 CERTIFIED FACILITY.

CULTEC NO. 410™ NON-WOVEN GEOTEXTILE

CULTEC NO. 410™ NON-WOVEN GEOTEXTILE MAY BE USED WITH CULTEC CONTACTOR® AND RECHARGER® STORMWATER INSTALLATIONS TO PROVIDE A BARRIER THAT PREVENTS SOIL INTRUSION INTO THE STONE.

GEOTEXTILE PARAMETERS

1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TYPICAL WEIGHT OF 4.5 OZ/SY (142 G/M).
4. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH VALUE OF 120 LBS (533 N) PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE AN ELONGATION @ BREAK VALUE OF 50% PER ASTM D4632 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A MULLEN BURST VALUE OF 225 PSI (1551 KPA) PER ASTM D3786 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A PUNCTURE STRENGTH VALUE OF 65 LBS (289 N) PER ASTM D4833 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE VALUE OF 340 LBS (1513 N) PER ASTM D6241 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A TRAPEZOID TEAR VALUE OF 50 LBS (222 N) PER ASTM D4533 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A AOS VALUE OF 70 U.S. SIEVE (0.212 MM) PER ASTM D4751 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY VALUE OF 1.7 SEC-1 PER ASTM D4491 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATE VALUE OF 135 GAL/MIN/SF (5500 L/MIN/SM) PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A UV STABILITY @ 500 HOURS VALUE OF 70% PER ASTM D4355 TESTING METHOD.

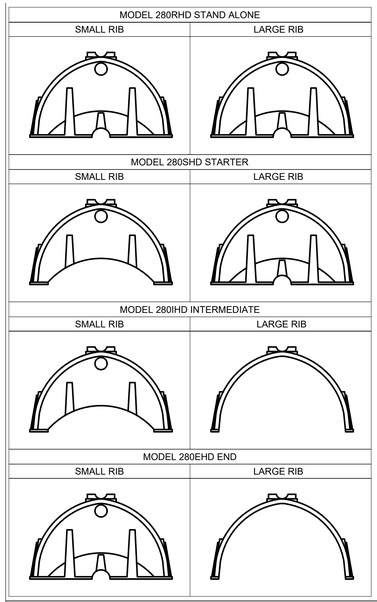
CULTEC NO. 4800™ WOVEN GEOTEXTILE

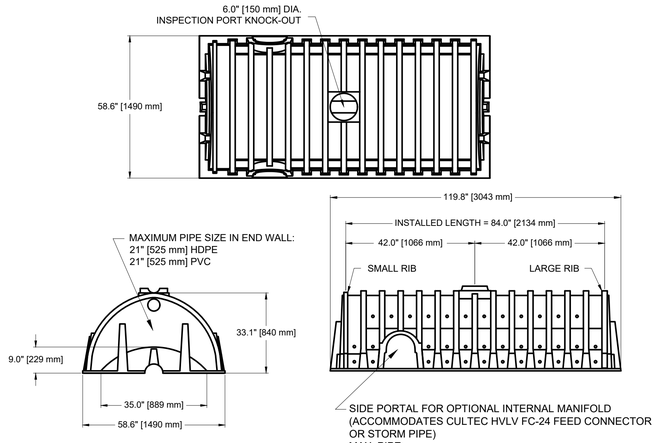
CULTEC NO. 4800 WOVEN GEOTEXTILE IS DESIGNED AS A UNDERLAYMENT TO PREVENT SCOURING CAUSED BY WATER MOVEMENT WITHIN THE CULTEC CHAMBERS AND FEED CONNECTORS UTILIZING THE CULTEC MANIFOLD FEATURE. IT MAY ALSO BE USED AS A COMPONENT OF THE CULTEC SEPARATOR ROW TO ACT AS A BARRIER TO PREVENT SOIL/CONTAMINANT INTRUSION INTO THE STONE WHILE ALLOWING FOR MAINTENANCE.

GEOTEXTILE PARAMETERS

1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH OF 550 X 550 LBS (2,448 X 2,448 N) PER ASTM D4632 TESTING METHOD.
4. THE GEOTEXTILE SHALL HAVE A ELONGATION @ BREAK RESISTANCE OF 20 X 20% PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE OF 5,070 X 5,070 LBS/FT (74 X 74 KN/M) PER ASTM D4595 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 2% STRAIN OF 960 X 1,096 LBS/FT (14 X 16 KN/M) PER ASTM D4595 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 5% STRAIN OF 2,740 X 2, 740 LBS/FT (40 X 40 KN/M) PER ASTM D4595 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 10% STRAIN OF 4,800 X 4,800 LBS/FT (70 X 70 KN/M) PER ASTM D4595 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE RESISTANCE OF 1,700 LBS (7,560 N) PER ASTM D6241 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A TRAPEZOIDAL TEAR RESISTANCE OF 180 X 180 LBS (801 X 801 N) PER ASTM D4533 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE AN APPARENT OPENING SIZE OF 40 US STD. SIEVE (0.425 MM) PER ASTM D4751 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY RATING OF 0.15 SEC-1 PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATING OF 11.5 GPM/FT2 (470 LPM/M2) PER ASTM D4491 TESTING METHOD.
14. THE GEOTEXTILE SHALL HAVE A UV RESISTANCE OF 80% @ 500 HRS. PER ASTM D4355 TESTING METHOD.
1.

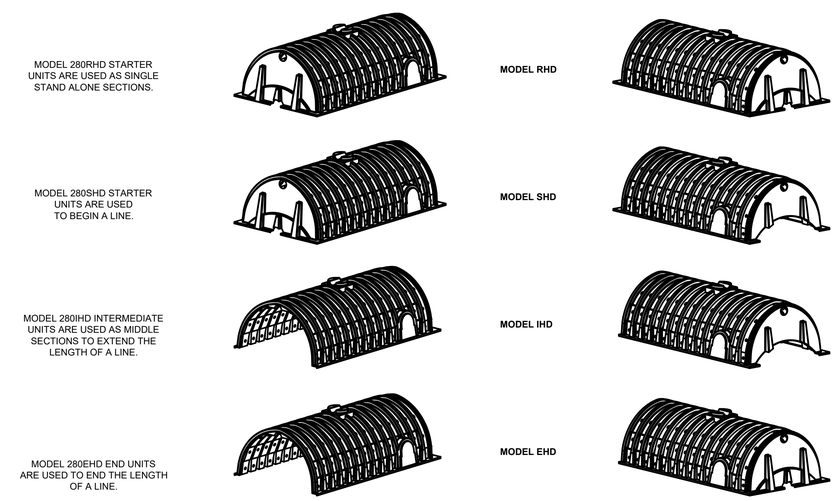
GENERAL NOTES





CULTEC RECHARGER 280HD CHAMBER STORAGE = 6.079 CF/FT [0.565 m^3/m]
INSTALLED LENGTH ADJUSTMENT = 1.0' [0.3048 m]

CULTEC RECHARGER 280HD HEAVY DUTY THREE VIEW



CULTEC RECHARGER 280HD HEAVY DUTY END DETAIL INFORMATION

1 C-304.00 UNDERGROUND INFILTRATION SYSTEM (CULTEC RECHARGER 280HD)
NOT TO SCALE

Engineering and Land Surveying, P.C.
370 7th Avenue
SUITE 1604
New York, NY 10001

SOWINSKI SULLIVAN ARCHITECTURE+ENGINEERING
25 Mohawk Avenue
Sparta, NJ 07871

REV	DESCRIPTION	DRW BY	CHK BY	DATE
B	FINAL SUBMISSION	AJ	NH	11/8/22
A	INTERIM SUBMISSION	AJ	NH	8/29/22

Kiewit
470 Chestnut Ridge Rd # 2,
Woodcliff Lake, NJ 07677

Hitachi Energy
901 Main Campus Drive
Raleigh, North Carolina 27606

PROJECT

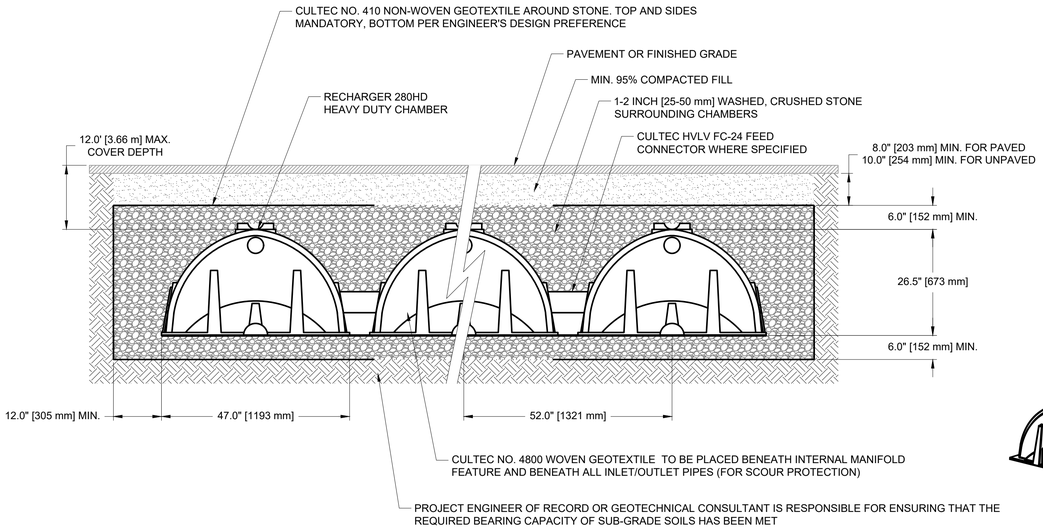
CHPE
Champlain Hudson Power Express

Astoria HVDC Converter Station

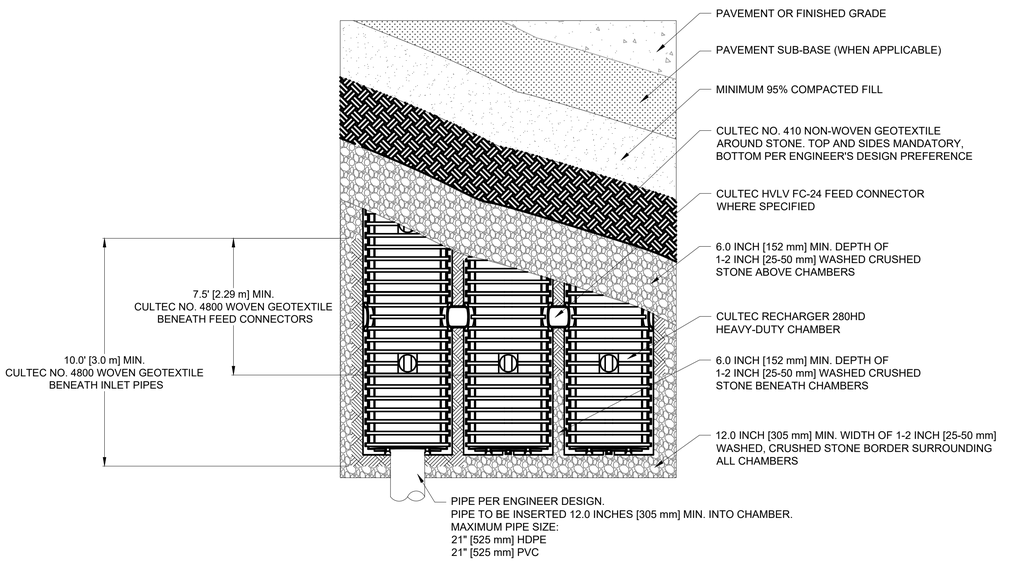
31-45 20th Avenue, Astoria, Queens NY 11105
Block #850 - Lot #310 - BIN #4624437

DRAINAGE DETAILS 3

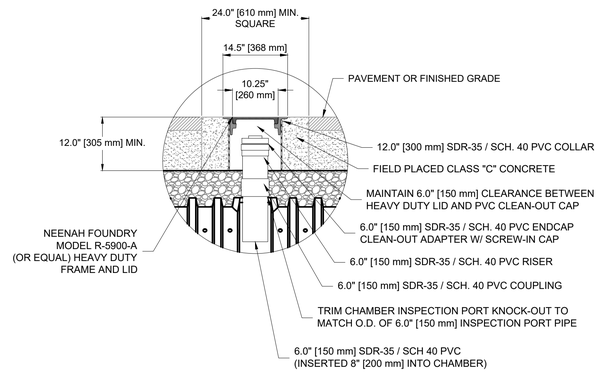
DATE	November 8, 2022
PROJECT NO	105121
DRAWING BY	A. JALLOW
CHECKED BY	N. HAVENER
DRAWING NO	C-304.00
CADD FILE N0	



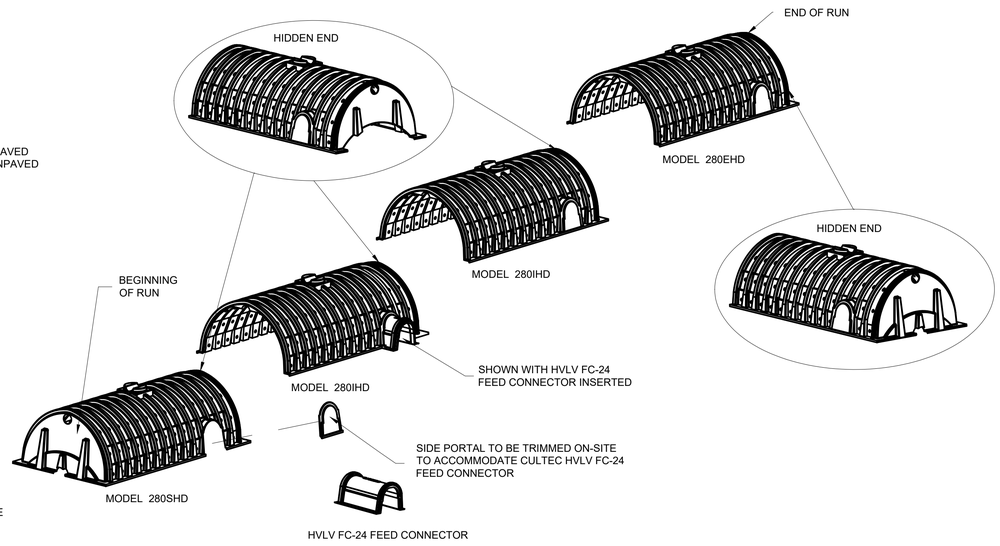
CULTEC RECHARGER 280HD HEAVY DUTY CROSS SECTION



CULTEC RECHARGER 280HD HEAVY DUTY PLAN VIEW



OPTIONAL INSPECTION PORT - ZOOM DETAIL



CULTEC RECHARGER 280HD HEAVY DUTY TYPICAL INTERLOCK

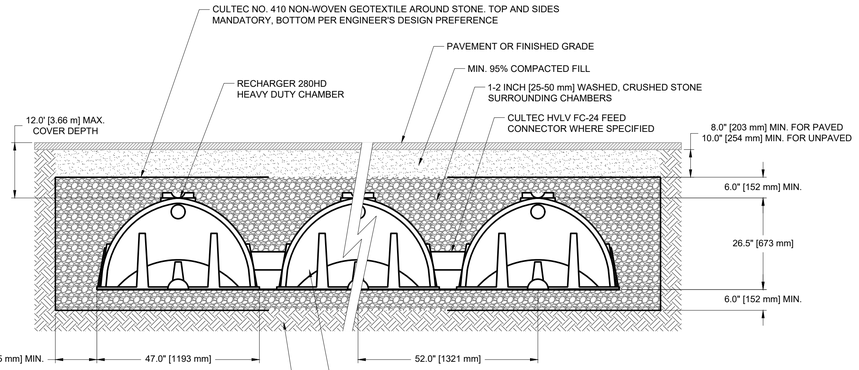
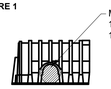
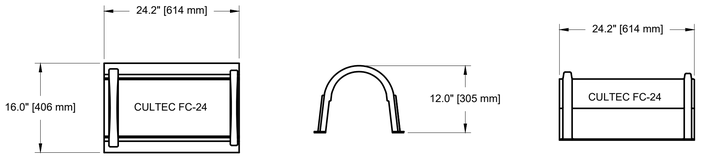


FIGURE 1



ZOOM OF SIDE PORTAL SHOWING MAX. PIPE O.D.

CULTEC INTERNAL MANIFOLD - OPTIONAL INSPECTION PORT DETAIL



CULTEC HVLV FC-24 FEED CONNECTOR THREE VIEW

1 C-305.00 UNDERGROUND INFILTRATION SYSTEM (CULTEC RECHARGER 280HD)
NOT TO SCALE

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370 7th Avenue
SUITE 1604
New York, NY 10001

SOWINSKI SULLIVAN ARCHITECTURE+ENGINEERING
25 Mohawk Avenue
Sparta, NJ 07871

REV	DESCRIPTION	DRW BY	CHK BY	DATE
B	FINAL SUBMISSION	AJ	NH	11/8/22
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Kiewit
470 Chestnut Ridge Rd # 2,
Woodcliff Lake, NJ 07677

Hitachi Energy
901 Main Campus Drive
Raleigh, North Carolina 27606

PROJECT

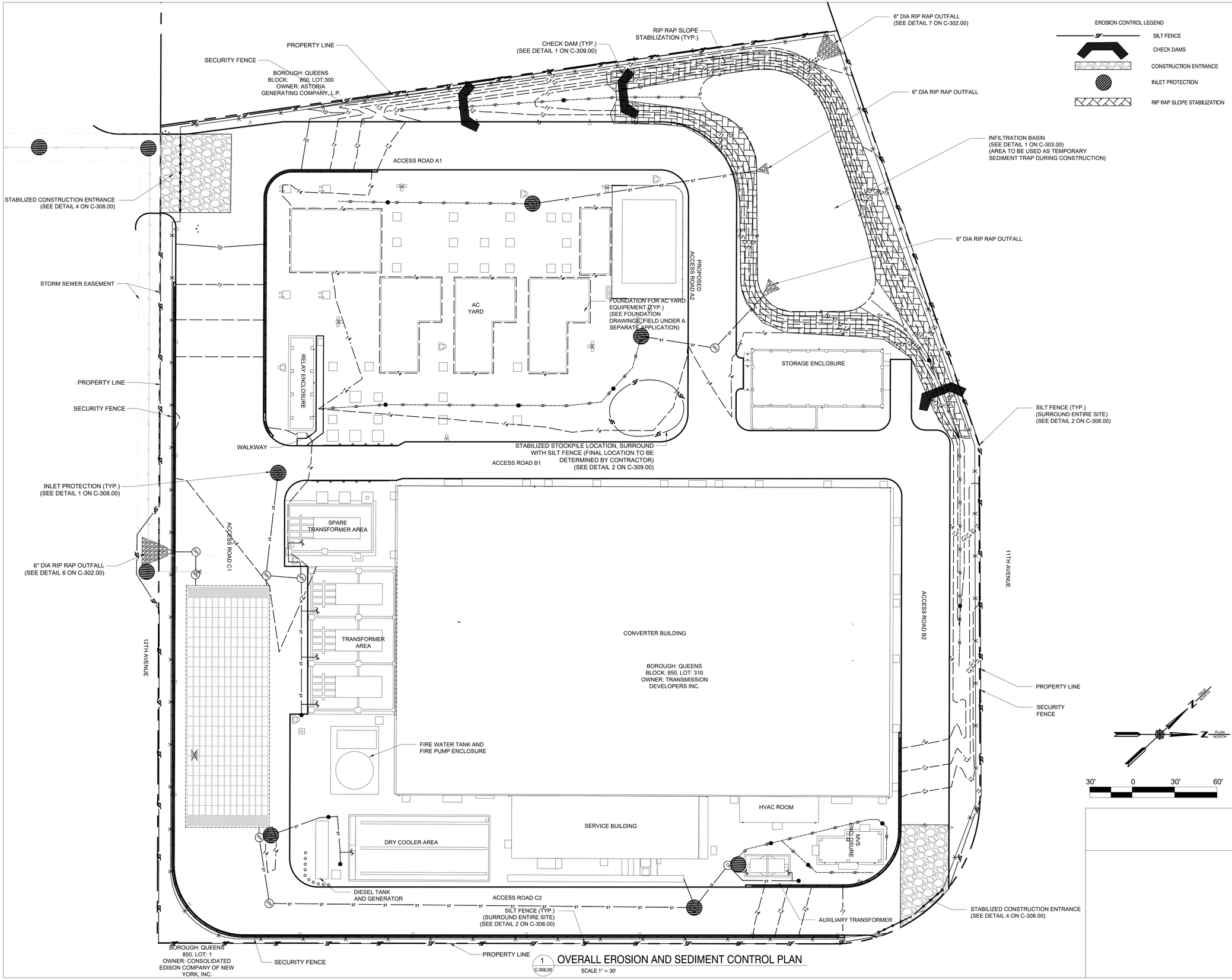
CHPE
Champlain Hudson Power Express

Astoria HVDC Converter Station

31-45 20th Avenue, Astoria, Queens NY 11105
Block #850 - Lot #310 - BIN #4624437

DRAINAGE DETAILS 4

DATE	November 8, 2022
PROJECT NO	105121
DRAWING BY	A. JALLOW
CHECKED BY	N. HAVENER
DRAWING NO	C-305.00
CADD FILE N0	



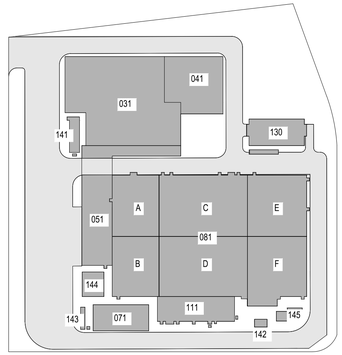
1 C-306.00 OVERALL EROSION AND SEDIMENT CONTROL PLAN

SCALE 1" = 30'

EROSION CONTROL LEGEND

- SILT FENCE
- CHECK DAMS
- CONSTRUCTION ENTRANCE
- INLET PROTECTION
- RIP RAP SLOPE STABILIZATION

ISSUED FOR PERMIT



KEY PLAN
N.T.S.

PLAN NORTH

Engineering and Land Surveying, P.C.
370 7th Avenue
SUITE 1604
New York, NY 10001

SOWINSKI SULLIVAN ARCHITECTURE+ENGINEERING
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OVERALL EROSION AND SEDIMENT CONTROL PLAN

DATE	November 8, 2022
PROJECT NO	105121
DRAWING BY	A. JALLOW
CHECKED BY	N. HAVENER
DRAWING NO	C-306.00
CADD FILE N0	

GENERAL EROSION CONTROL NOTES

1. THE PROJECT WILL USE NYSDEC STANDARD EROSION AND SEDIMENT CONTROL MEASURES TO PROTECT THE ENTIRE SITE AND THE SURROUNDING ENVIRONMENT FROM SILTATION AND RUNOFF DURING THE ENTIRE CONSTRUCTION PROJECT.

2. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES WILL BE USED TO ADDRESS CONDITIONS THAT ARE PRESENTED IN THE FIELD DUE TO TEMPORARY CONSTRUCTION CONDITIONS. DAILY OBSERVATION OF EROSION CONTROL MEASURES BY THE CONTRACTOR PERFORMING CONSTRUCTION ACTIVITIES IS REQUIRED. THE OWNER/APPLICANT IS OBLIGATED TO PERFORM INSPECTIONS AND REPORTING AS OUTLINED IN THE CURRENT EDITION OF THE SPDES GENERAL PERMIT FOR CONSTRUCTION ACTIVITIES. VARIANCES TO THE CONSTRUCTION PRACTICES SHOWN ON THIS EROSION CONTROL PLAN IDENTIFIED DURING THESE INSPECTIONS MUST BE ADDRESSED AT THE EARLIEST OPPORTUNITY.

3. PLANNED EROSION CONTROL MEASURES INCLUDE BUT MAY NOT BE LIMITED TO THE FOLLOWING:

   A. SILT FENCE: SILT FENCE SHALL BE INSTALLED AND LOCATED ALONG THE PROPOSED LIMIT OF DISTURBANCE, AROUND STOCKPILE AREA AND AS DIRECTED BY THE CONSULTANT ENGINEER.

   B. SURFACE STABILIZATION: ROADWAY AND BUILDING BASE COURSES WILL BE INSTALLED AS SOON AS FINISHED GRADE IS REACHED.

   C. INLET PROTECTION: INLET PROTECTION SHALL BE INSTALLED AT ALL STORMWATER INLETS RECEIVING RUNOFF FROM DISTURBED AREAS OF THE SITE.

   D. SEDIMENT TRAPS: SEDIMENT TRAPS SHALL BE INSTALLED TO INTERCEPT SEDIMENT-LADEN RUNOFF AND REDUCE THE AMOUNT OF SEDIMENT LEAVING THE DISTURBED AREA.

   E. GEOTEXTILE FILTER BAGS: GEOTEXTILE FILTER BAGS SHALL BE INSTALLED TO TRAP AND RETAIN SEDIMENT PRIOR TO LEAVING THE DISTURBED AREA.

   F. STABILIZED CONSTRUCTION ENTRANCE/EXIT: A TEMPORARY STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE INSTALLED FOR ACCESS TO AND FROM THE CONSTRUCTION SITE. WASH-DOWN WATER AND RUNOFF FROM THE CONSTRUCTION ENTRANCE SHALL BE DIRECTED TO APPROPRIATE SOIL EROSION AND SEDIMENT CONTROL MEASURES.

   G. STAGING AND LAYDOWN AREAS: STAGING AND LAYDOWN AREAS FOR VEHICLES AND EQUIPMENT SHALL BE LOCATED ON STABILIZED PORTION OF THE SITE. VEHICLES AND EQUIPMENT SHALL BE WASHED DOWN IN STABILIZED ARES PRIOR TO EXISTING THE SITE.

   H. SOIL STOCKPILE: SOIL STOCKPILES AND EXPOSED SOIL SHALL BE STABILIZED BY SEED, MULCH, OR OTHER APPROPRIATE MEASURES. WHEN ACTIVITIES TEMPORARILY CEASE DURING CONSTRUCTION FOR 7 DAYS OR MORE IN ACCORDANCE WITH NYSDEC REQUIREMENTS.

   I. DUST CONTROL: SHOULD EXCESSIVE DUST BE GENERATED, IT SHALL BE CONTROLLED BY SPRINKLING WATER.

   J. DEWATERING: TEMPORARY DEWATERING PRACTICES SHALL BE USED TO PREVENT PONDING OF RAINWATER OR GROUNDWATER DURING CONSTRUCTION OF EXCAVATED AREAS.

4. ALL SOIL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED AND REPAIRED AS NEEDED AFTER EACH RAINFALL EVENT BY THE CONTRACTOR. NO ADDITIONAL ALLOWANCES WILL BE MADE TO THE CONTRACTOR FOR REPAIRS TO SOIL EROSION AND SEDIMENT CONTROL DEVICES THROUGHOUT THE TERM OF CONSTRUCTION FOR THIS PROJECT.

SOIL RESTORATION NOTES:

1. SOIL RESTORATION SHALL BE COMPLETED IN THE AREA OF THE PROPOSED PREVIOUS SURFACES ONCE FINAL GRADE HAS BEEN ACHIEVED IN THESE AREAS.

2. THE TYPE OF SOIL RESTORATION WILL DEPEND ON THE TYPE OF SOIL DISTURBANCE AND THE TYPE OF HYDROLOGIC SOIL GROUP. CONTRACTOR WILL BE REQUIRED TO COMPLETE SOIL RESTORATION IN CONFORMANCE WITH THE VARIOUS METHODS OUTLINED IN TABLE 5.3 OF NYS STOMRWATER MANAGEMENT DESIGN MANUAL.

CONSTRUCTION NOTES:

1. DISTURBED AREAS, CONSTRUCTION ROADS AND ENTRANCES SHALL BE STABILIZED IN ACCORDANCE WITH THE DESIGN CRITERIA OUTLINED IN THE NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL (2005). DISTURBED AND EXPOSED SOIL AREAS SHALL BE PROMPTLY STABILIZED WITH MULCH AND SEED AND SUPPLEMENTED WITH A SILT FENCE AT THE LIMITS OF DISTURBANCE. FINAL SITE STABILIZATION WILL BE ACHIEVED USING DENSE GRADED AGGREGATE (DGA).

2. APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES SHALL BE PROVIDED ALONG THE CONSTRUCTION ACCESS WAYS AND IN THE STAGING AREAS AS NECESSARY TO AVOID ON-SITE OR OFF-SITE EROSION AND SEDIMENTATION PROBLEMS.

3. NO MORE THAN 5 ACRES OF SOIL WILL BE DISTURBED AT ANY GIVEN TIME DURING THE CONSTRUCTION DURATION.

PRE-CONSTRUCTION ESC ACTIVITIES:

1. ESTABLISH WORK AREA AND CONTRACTOR STAGING AREAS.

2. INSTALL STABILIZED CONSTRUCTION ENTRANCE AND TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES.

3. IDENTIFY ALL NATURAL RESOURCES AND MARK UP AND PROTECT THEM AS NECESSARY INCLUDING TREES, EXISTING POINT OF DISCHARGE OFF-SITE, ETC..

4. INSTALL PERIMETER SEDIMENT CONTROL SUCH AS SILT FENCES AND CONSTRUCTION FENCE AS SHOWN ON THE SOIL EROSION AND SEDIMENT CONTROL PLANS.

CONSTRUCTION SEQUENCING:

1. INSTALL ALL TEMPORARY ESC ACTIVITIES INCLUDING SILT FENCE, INLET PROTECTION, SEDIMENT TRAP AND GEOTEXTILE FILTER BAGS.

2. ONCE ALL TEMPORARY ESC ACTIVITIES ARE ESTABLISHED, PERFORM EXCAVATION AND TRENCHING AND INSTALL ALL UTILITIES.

3. BEGIN ROUGH GRADING OF THE INFILTRATION BASIN AND CONTROL STRUCTURE IN THE BASIN. TEMPORARILY SEED/STABILIZE. PROTECT THE BASIN AREA WITH CONSTRUCTION FENCING TO PREVENT CONSTRUCTION TRAFFIC IN THE AREA. THIS AREA WILL BE USED AS A SEDIMENT TRAP DURING CONSTRUCTION (SEE DETAILS). AFTER FINAL SITE GRADING/STABILIZATION THE INFILTRATION SECTIONS WILL BE INSTALLED.

4. PLACE GEO-FABRIC AND ROCK AT OUTFALLS AS INDICATED ON PLANS.

5. STRIP TOPSOIL FROM REMAINDER OF SITE (WHERE PROPOSED IMPROVEMENTS OR GRADING IS SHOWN ONLY). TOPSOIL STOCKPILES(S) REMAINING FOR MORE THAN SEVEN DAYS SHALL BE STABILIZED WITH VEGETATIVE COVER, MULCH, TARPS OR OTHER APPROVED PRACTICE. EROSION FROM TOPSOIL PILES LEFT FOR LESS THAN SEVEN DAYS SHALL BE CONTROLLED WITH SILT FENCE OR OTHER APPROVED METHODS. ANY TOPSOIL STOCKPILE WITHIN 25' OF A ROADWAY OR DRAINAGE DITCH SHALL BE COVERED WITH TARPS OR OTHER APPROVED METHODS. ALL DISTURBED GROUND LEFT INACTIVE FOR SEVEN OR MORE DAYS IS TO BE STABILIZED BY SEED, SOD, MULCH, OR OTHER APPROVED METHODS.

6. SURPLUS TOPSOIL SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR. FINAL GRADE THE SITE.

7. INSTALL AGGREGATE BASE COURSE IN AREAS TO BE ASPHALT AND/OR CONCRETE PAVED.

8. REMOVE ACCUMULATED SEDIMENT IN THE INFILTRATION SYSTEMS AND STONE LAYER AS SPECIFIED IN THE DETAILS. MINIMIZE COMPACTION AND CONSTRUCTION TRAFFIC IN THESE AREAS.

9. UPON SITE STABILIZATION, REMOVE TEMPORARY EROSION CONTROL PRACTICES. CLEAN STRUCTURES OF ANY SEDIMENT AND/OR CONSTRUCTION DEBRIS AND REMOVE CONSTRUCTION DEBRIS AND ACCUMULATED SEDIMENT FROM THE INFILTRATION BASIN.

ISSUED FOR PERMIT

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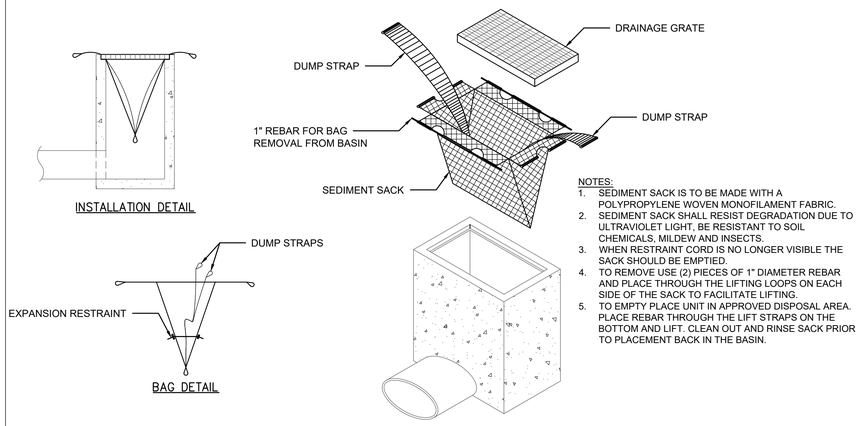
CHPE
Champlain Hudson Power Express

Astoria HVDC Converter Station

31-45 20th Avenue, Astoria, Queens NY 11105
Block #850 - Lot #310 - BIN #4624437

EROSION AND SEDIMENT CONTROL NOTES

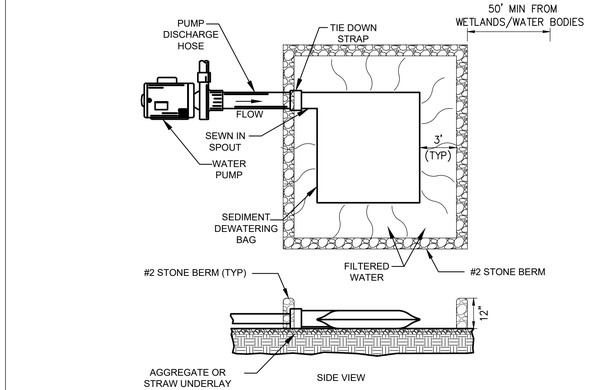
DATE	November 8, 2022
PROJECT NO	105121
DRAWING BY	A. JALLOW
CHECKED BY	N. HAVENER
DRAWING NO	C-307.00
CADD FILE N0	



NOTES:
1. SEDIMENT SACK IS TO BE MADE WITH A POLYPROPYLENE WOVEN MONOFILAMENT FABRIC.
2. SEDIMENT SACK SHALL RESIST DEGRADATION DUE TO ULTRAVIOLET LIGHT, BE RESISTANT TO SOIL CHEMICALS, MILDEW AND INSECTS.
3. WHEN RESTRAINT CORD IS NO LONGER VISIBLE THE SACK SHOULD BE EMPTIED.
4. TO REMOVE USE (2) PIECES OF 1" DIAMETER REBAR AND PLACE THROUGH THE LIFTING LOOPS ON EACH SIDE OF THE SACK TO FACILITATE LIFTING.
5. TO EMPTY PLACE UNIT IN APPROVED DISPOSAL AREA. PLACE REBAR THROUGH THE LIFT STRAPS ON THE BOTTOM AND LIFT. CLEAN OUT AND RINSE SACK PRIOR TO PLACEMENT BACK IN THE BASIN.

1 INLET PROTECTION DETAIL
C-308.00

SCALE: N.T.S.



NOTE: THE SEDIMENT DEWATERING BAG WILL BE MANUFACTURED IN THE U.S.A. FROM A NONWOVEN POLYPROPYLENE FABRIC THAT MEETS OR EXCEEDS THE FOLLOWING SPECIFICATIONS:

SEDIMENT DEWATERING BAG SPECIFICATIONS

Mechanical Properties	Test Method	Units	MARV
Grab Tensile Strength	ASTM D 4632	kN (lbs)	0.9 (205) x 0.9 (205)
Grab Tensile Elongation	ASTM D 4632	%	50 x 50
Puncture Strength	ASTM D 4833	kN (lbs)	0.58 (130)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	2618 (380)
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.36 (80) X 0.36 (80)
UV Resistence	ASTM D 4355	%	70
Apparent Opening Size	ASTM D 4751	Mm (US Std Sieve)	0.180 (80)
Flow Rate	ASTM D 4491	1/min/m^2(gal/min/ft^2)	3866 (95)
Permittivity	ASTM D 4491	Sec^{-1}	1.2

3 SEDIMENT DEWATERING BAG DETAIL
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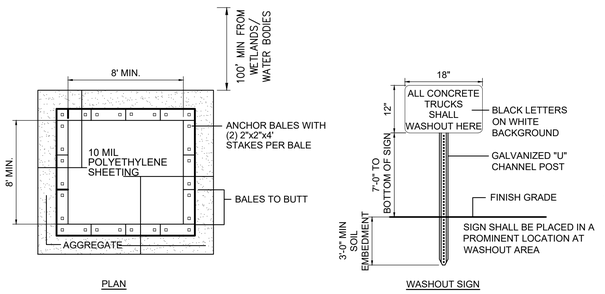

5 CONCRETE WASHOUT AREA DETAIL
C-308.00

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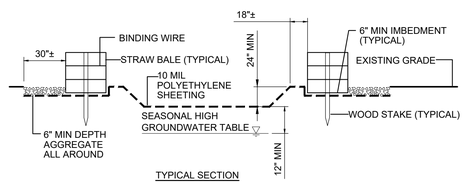
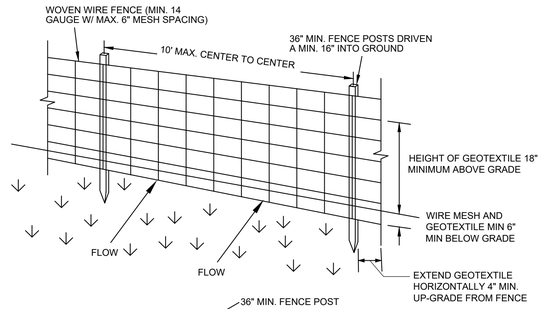
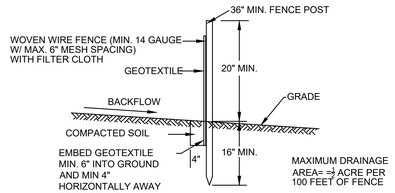


MAINTENACE NOTES:
1. ALL CONCRETE WASHOUT FACILITIES SHALL BE INSPECTED DAIL.Y. DAMAGED OR LEAKING FACILITATES SHALL BE DEACTIVATED AND REPAIRED OR REPLACED IMMEDIATELY. EXCESS RAINWATER THAT HAS ACCUMULATED OVER HARDENED CONCRETE SHALL BE PUMPED TO A STABILIZED AREA SUCH AS A GRASS FILTER STRIP.
2. ACCUMULATED HARDENED MATERIAL SHALL BE REMOVED WHEN 75% OF THE STORAGE CAPACITY OF THE STRUCTURE IS FILLED. ANY EXCESS WASH WATER SHALL BE PUMPED INTO A CONTAINMENT VESSEL AND PROPERLY DISPOSED OF OFF SITE.
3. DISPOSE OF THE HARDENED MATERIAL OFF-SITE IN A CONSTRUCITON/DEMOLION LANDFILL.
4. THE PLASTIC LINER SHALL BE REPLACED WITH EACH CLEANING OF THE WASHOUT FACILITY.
5. INSPECT THE PROJECT SITE FREQUENTLY TO ENSURE THAT NO CONCRETE DISCHARGES ARE TAKING PLACE IN NON-DESIGNATED AREAS.
6. LOCATION(S) TO BE DETERMINED IN THE FIELD BY THE OWNER'S REPRESENTATIVE.





NOTES:
1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 14 GAUGE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BLUGES" DEVELOP IN THE SILT FENCE.

2 REINFORCED SILT FENCE DETAIL
C-308.00

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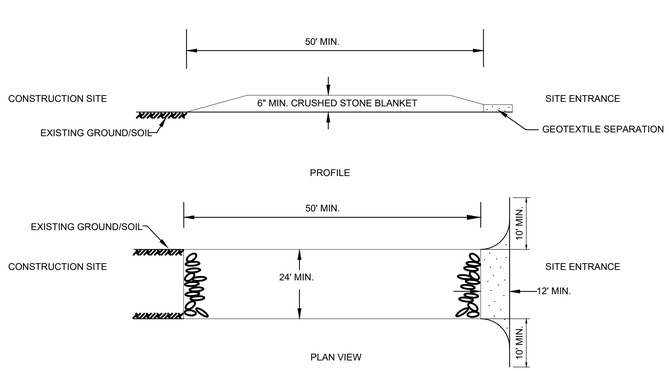

NOTES:
1. THE WHEEL-CLEANING BLANKET SHALL BE A MINIMUM 6" DEPTH OF 1" - 1 1/2" CRUSHED STONE, AT LEAST 24' X 50' (FOR STREETS) AND SHOULD BE PLACED ON COMPACTED SUB-GRADE.
2. ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
3. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
4. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

4 STABILIZED CONSTRUCTION ENTRANCE DETAIL
C-308.00

SCALE: N.T.S.

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REV	DESCRIPTION	DRW BY	CHK BY	DATE
A	INTERIM SUBMISSION	AJ	NH	8/29/22

Kiewit
470 Chestnut Ridge Rd # 2,
Woodcliff Lake, NJ 07677

Hitachi Energy
901 Main Campus Drive
Raleigh, North Carolina 27606

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EROSION AND SEDIMENT CONTROL DETAILS 1

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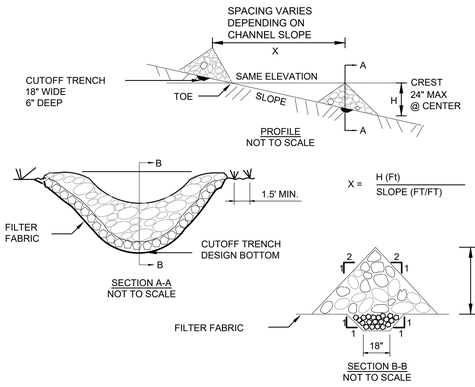

X = H (Ft) / SLOPE (FT/FT)

STONE CHECK DAM PLACEMENT INTERVAL	
DITCH SLOPE	TEMPORARY CHECK DAM PLACEMENT INTERVAL (BASED ON 2' HEIGHT)
1%	200'-0"
2%	100'-0"
3%	66'-0"
4%	50'-0"
5%	40'-0"
6%	33'-0"
8%	25'-0"
10%	20'-0"

CONSTRUCTION SPECIFICATIONS:

1. STONE WILL BE PLACED ON A FILTER FABRIC FOUNDATION TO THE LINES, GRADES AND LOCATIONS SHOWN IN THE PLAN.
2. SET SPACING OF CHECK DAMS TO ASSUME THAT THE ELEVATIONS OF THE CREST OF THE DOWNSTREAM DAM IS AT THE SAME ELEVATION OF THE TOE OF THE UPSTREAM DAM.
3. EXTEND THE STONE A MINIMUM OF 1.5 FEET BEYOND THE DITCH BANKS TO PREVENT CUTTING AROUND THE DAM.
4. PROTECT THE CHANNEL DOWNSTREAM OF THE LOWEST CHECK DAM FROM SCOUR AND EROSION WITH STONE OR LINER AS APPROPRIATE.
5. ENSURE THAT CHANNEL APPURTENANCES SUCH AS CULVERT ENTRANCES BELOW CHECK DAMS ARE NOT SUBJECT TO DAMAGE OR BLOCKAGE FROM DISPLACED STONE. MAXIMUM DRAINAGE AREA 2 ACRES.
6. USE A WELL GRADED STONE MATRIX 2 TO 9 INCHES IN SIZE (NYS - DOT LIGHT STONE FILL MEETS THESE REQUIREMENTS).

1 TEMPORARY CHECK DAM DETAIL

C-309.00

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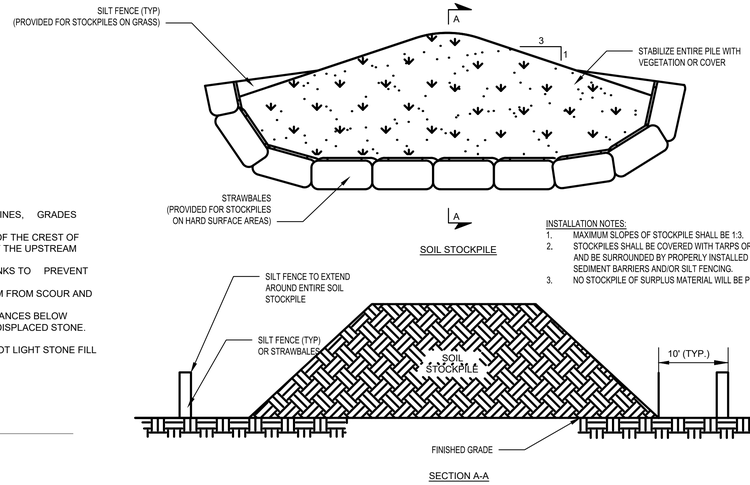

INSTALLATION NOTES:

1. MAXIMUM SLOPES OF STOCKPILE SHALL BE 1:3.
2. STOCKPILES SHALL BE COVERED WITH TARPS OR TEMPORARY SEEDING AND BE SURROUNDED BY PROPERLY INSTALLED HAYBALE/STRAWBALE SEDIMENT BARRIERS AND/OR SILT FENCING.
3. NO STOCKPILE OF SURPLUS MATERIAL WILL BE PERMITTED.

2 TEMPORARY SOIL STOCKPILE DETAIL

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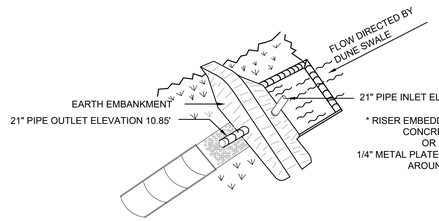
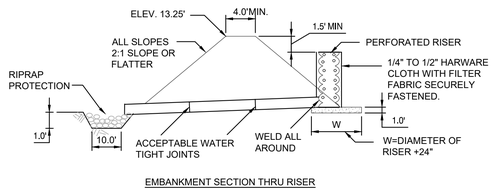


SIZES OF PIPE NEEDED:
END OF WETLAND
BARREL DIAMETER: 21 INCH
RISER DIAMETER: 27 INCH

NOTE:
CONSTRUCTION SPECIFICATION SHOULD BE ATTACHED TO THIS DETAIL TO COMPLETE DESIGN.

MAXIMUM DRAINAGE AREA: 5.0 ACRES



EMBANKMENT SECTION THRU RISER

TEMPORARY SEDIMENT TRAP NOTES:

1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS OR OTHER WOODY VEGETATION AS WELL AS OVER-SIZED STONES, ROCKS, ORGANIC MATERIAL, OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. VOLUME OF SEDIMENT STORAGE SHALL BE 1800 CUBIC FEET PER ACRE OF CONTRIBUTORY DRAINAGE.
4. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA AND IN SUCH A MANNER THAT IT WILL NOT ERODE.
5. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
6. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND WATER POLLUTION ARE MINIMIZED.
7. THE STRUCTURE SHALL BE REMOVED AND AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
8. ALL FILL SLOPES SHALL BE 2:1 OR FLATTER; CUT SLOPES 1:1 OR FLATTER.
9. ALL PIPE CONNECTIONS SHALL BE WATERTIGHT.
10. THE TOP 2/3 OF THE RISER SHALL BE PERFORATED WITH ONE (1) INCH DIAMETER HOLES OR SLITS SPACED SIX (6) INCHES VERTICALLY AND HORIZONTALLY AND PLACED IN THE CONCAVE PORTION OF PIPE. NO HOLES WILL BE ALLOWED WITHIN SIX (6) INCHES OF THE HORIZONTAL BARREL.
11. THE RISER SHALL BE WRAPPED WITH 1/4 TO 1/2 INCH HARDWARE CLOTH WIRE THEN WRAPPED WITH FILTER CLOTH (HAVING AN EQUIVALENT SIEVE SIZE OF 40-80). THE FILTER CLOTH SHALL EXTEND SIX (6) INCHES ABOVE THE HIGHEST HOLE AND SIX (6) INCHES BELOW THE LOWEST HOLE. WHERE ENDS OF THE FILTER CLOTH COME TOGETHER, THEY SHALL BE OVER-LAPPED, FOLDED AND STAPLED TO PREVENT BYPASS.
12. STRAPS OR CONNECTING BANDS SHALL BE USED TO HOLD THE FILTER CLOTH AND WIRE FABRIC IN PLACE. THEY SHALL BE PLACED AT THE TOP AND BOTTOM OF THE CLOTH.
13. FILL MATERIAL AROUND THE PIPE SPILLWAY SHALL BE HAND COMPACTED IN FOUR (4) INCH LAYERS. A MINIMUM OF TWO (2) FEET OF HAND COMPACTED BACKFILL SHALL BE PLACED OVER THE PIPE SPILLWAY BEFORE CROSSING IT WITH EQUIPMENT.
14. THE RISER SHALL BE ANCHORED WITH EITHER A CONCRETE BASE OR STEEL PLATE BASE TO PREVENT FLOTATION. FOR CONCRETE BASED THE DEPTH SHALL BE TWELVE (12) INCHES WITH THE RISER EMBEDDED NINE (9) INCHES. A 1/4 INCH MINIMUM THICKNESS STEEL PLATE SHALL BE ATTACHED TO THE RISER BY A CONTINUOUS WELD AROUND THE BOTTOM TO FORM A WATERTIGHT CONNECTION AND THEN PLACE TWO (2) FEET OF STONE, GRAVEL, OR TAMPED EARTH ON THE PLATE.

3 TEMPORARY SEDIMENT TRAP

C-309.00

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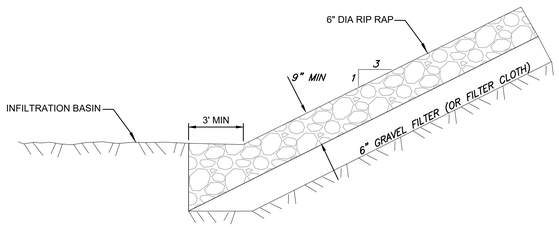

RIP-RAP SLOPE PROTECTION:

1. PREPARE THE SUBGRADE FOR RIPRAP AND FILTER TO THE REQUIRED LINES AND GRADES SHOWN ON THE PLANS
2. PLACE THE GRAVEL FILTER OR FILTER CLOTH IMMEDIATELY AFTER THE GROUND FOUNDATION IS PREPARED. FOR GRAVEL SPREAD FILTER STONE IN A UNIFORM LAYER TO THE SPECIFIED DEPTH.
3. PLACEMENT OF RIPRAP SHALL FOLLOW IMMEDIATELY AFTER PLACEMENT OF THE FILTER.
4. PLACE RIPRAP SO THAT IT FORMS DENSE, WELL-GRADED MASS OF STONE WITH MINIMUM VOIDS.
5. RIPRAP SHALL BE INSPECTED PERIODICALLY FOR SCOUR OR DISLODGED STONES.

4 RIP RAP SLOPE PROTECTION

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Engineering and Land Surveying, P.C.
370 7th Avenue
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EROSION AND SEDIMENT CONTROL DETAILS 2

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Appendix N – FEMA FIRM MAPS