FRENCH & PARRELLO
ASSOCIATES

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December 18, 2023

Stires Associates, P.A.
c/o Craig Stires, P.E.
43 W High Street
Somerville, NJ 08876

RE: Hydraulic Soils Group Reclassification
400 Cottontail Lane
Block 517.06 Lot 15.11
Franklin Township, Somerset County
FPA Project No. 21288.001

Mr. Stires:

An expansion of the existing building on the referenced property has been proposed. The project is regulated as a "major stormwater development" and will require the construction of stormwater BMPs to meet the regulations. As part of the design process, soil testing was conducted on the property. The results of the testing show that the permeability of the existing soils is not consistent with Soil Survey of the property. We are requesting confirmation that the hydraulic soils group (HSG) of the on-site soils should be reclassified as documented.

Existing Conditions
The subject property is currently developed with a 30,000 SF warehouse building with related improvements. A review of aerial photographs shows that the current building was constructed in the mid-1980's. The parking lot on the property was expanded between 2002 and 2006.

According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) online soil data mapping interface Web Soil Survey, the Subject Property is underlain by soils classified as Penn silt loam. The designation for the soil type on the property is PenB - 2 to 6 percent slopes. This soil type is classified as a 'C' HSG soil. Refer to Appendix A.

HSG Reclassification Procedure
In instances where the HSG designation is inaccurate for a soil mapping unit, Chapter 12 of the New Jersey Stormwater Best Management Practices Manual (BMP manual) provides a methodology for reclassifying the HSG of a soil mapping unit. The required number of soil tests in each mapping unit is based upon the area of the mapping unit on the site. The disturbance area of the mapping unit on the site is 5 acres and therefore 3 soil profile pits and 8 soil borings are required. A soil boring can be substituted with a profile pit. The soil profile pits and borings are required to be advanced to at least 40" below the ground surface unless the seasonal high groundwater is encountered within the first 24", in which case it may be terminated at that depth.

Upon completion of the soil testing, the classification of HSG is performed in accordance with the NRCS National Engineering Handbook, Part 630 – Hydrology (NEH), Chapter 7b Hydrologic Soil Groups, January 2009. Each soil test location is evaluated independently against the criteria listed in the manual and the HSG is the highest rating within each mapping unit.

Investigation and Results

The site contains 1 soil type which requires 11 tests in the disturbance area. Testing was conducted on November 14, 2023; with 13 soil profile pits advanced to a minimum depth of 40 inches below grade. Samples were collected within each soil layer of each profile pit for the performance of tube permeameter test to determine the permeability of each layer. The soil logs and test results are attached to this report as Appendix B and C, respectively.

The Penn silt loam soils should correctly be classified as a "D" HSG. Refer to Appendix D for the NEH assessment tables for each log within the mapping unit. The testing locations are all classified as "D" HSG and therefore this is the appropriate designation for the mapping unit on site. This result is a result of the low permeability of the soils in this mapping unit.

Conclusions

Based upon our investigation of the subject property following the procedures set forth in the BMP Manual, the HSG designation of the soils on site should be reclassified as "D" HSG soils.

If you have any questions regarding this assessment, please feel free to reach out to me to discuss them.

Respectfully submitted,
FRENCH & PARRELLO ASSOCIATES

Wayne J. Ingram, PE, PLS, PP
Project Consultant
NJPE#24GB04258200

Appendix A

USDA Web Soil Survey Map

Appendix B

Soil Logs and Location Map

Appendix C

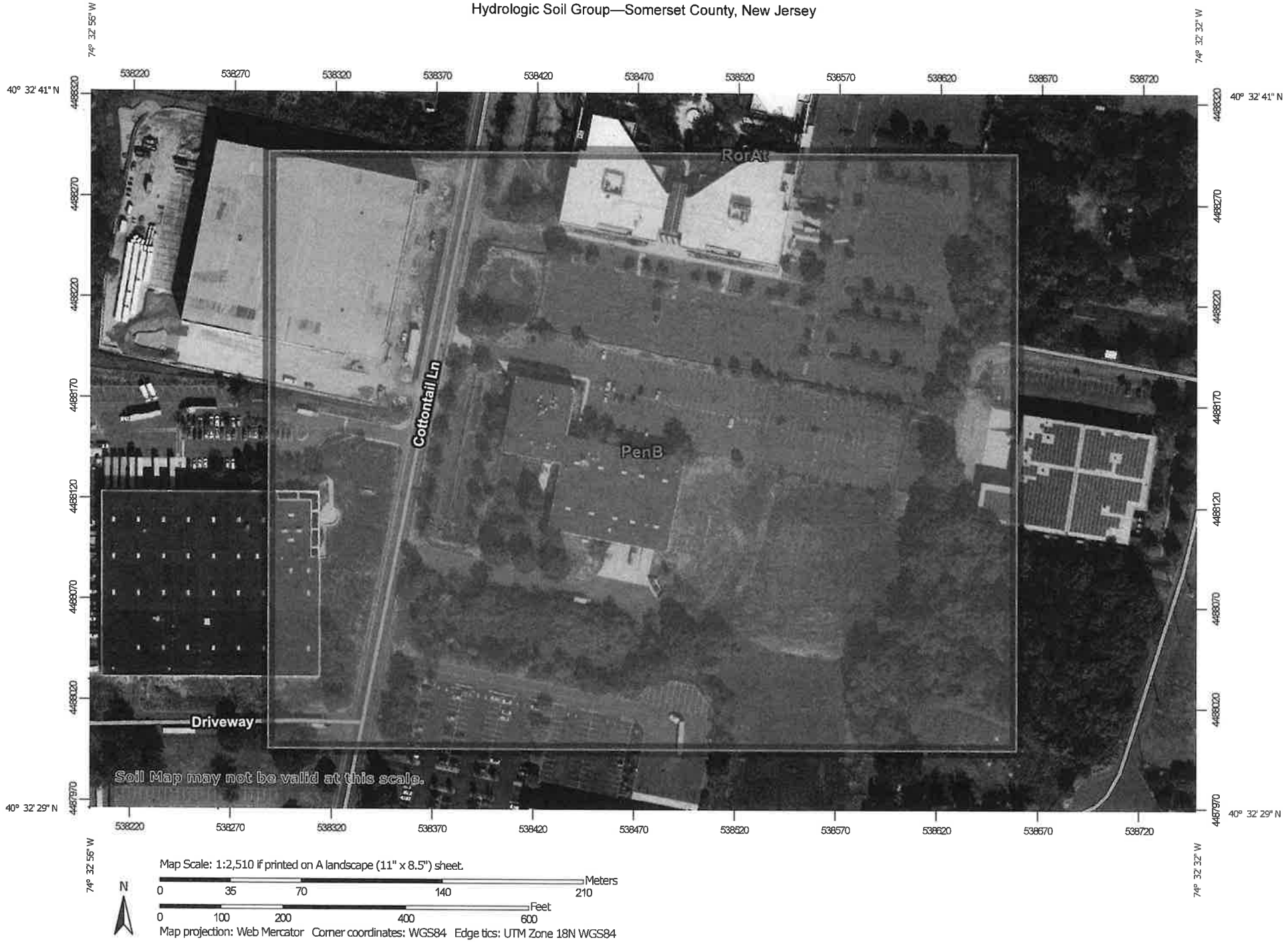
Tube Permeameter Results

Appendix D

NEH HSG Worksheets

Appendix A
USDA Web Soil Survey Map

FPA



Map Scale: 1:2,510 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
PenB	Penn silt loam, 2 to 6 percent slopes	C	27.2	100.0%
RorAt	Rowland silt loam, 0 to 2 percent slopes, frequently flooded	C	0.0	0.0%
Totals for Area of Interest			**27.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Appendix B
Soil Logs and Location Map

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Municipality: Franklin Township Block: 517.06 Lot: 15.11

Form 2b - Soil Log and Interpretation

1 Soil Log #: 1 Date of Soil Log: 11/14/23 Method: Profile Pit

2 Log:

Depth (inches)	Munsell Color Name & Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragments; Structure; Consistence; Mottling Abundance, Size and Contrast
0-8"	Topsoil;
8-41"	5YR3/4; Clay Loam; 20% Gravel, 15% Cobble, 5% Stone; Common, Medium, Distinct Mottling @ 15-18", 10YR 7/1 in Color; SAB, Moist, Friable
	Sample taken @ 30"

3 Ground Water Observations:

____ Seepage Observed - Depth (inches): ____

____ Pit Flooded - Depth (inches): ____ after ____ hours of observation

4 Soil Limiting Zones (Check ALL applicable categories):

____ Fractured Rock Substratum - Depth to Top: ____

____ Massive Rock Substratum - Depth to Top: ____

____ Excessively Coarse Horizon - Depth Top to Bottom: ____

____ Excessively Coarse Substratum - Depth to Top: ____

____ Hydraulically Restrictive Horizon - Depth Top to Bottom: ____

____ Hydraulically Restrictive Substratum - Depth to Top: ____

____ Perched Zone of Saturation - Depth Top to Bottom: ____

X Regional Zone of Saturation - Depth to Top: 15"

5 Soil Suitability Classification: _____

6 I hereby certify that the information furnished on form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator: _____ Date: 11/27/23

Signature and Seal of Professional Engineer: _____

License #: 24GB042582 Date: 11/27/23

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Municipality: Franklin Township Block: 517.06 Lot: 15.11

Form 2b - Soil Log and Interpretation

1 Soil Log #: 2 Date of Soil Log: 11/14/23 Method: Profile Pit

2 Log:

Depth (inches)	Munsell Color Name & Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragments; Structure; Consistence; Mottling Abundance, Size and Contrast
0-8"	Topsoil;
8-40"	5YR3/4; Clay Loam; 20% Gravel, 20% Cobble, 5% Stone; SAB, Moist, Friable
	Sample taken @ 28"

3 Ground Water Observations:

_____ Seepage Observed - Depth (inches): _____

_____ Pit Flooded - Depth (inches): _____ after _____ hours of observation

4 Soil Limiting Zones (Check ALL applicable categories):

_____ Fractured Rock Substratum - Depth to Top: _____

_____ Massive Rock Substratum - Depth to Top: _____

_____ Excessively Coarse Horizon - Depth Top to Bottom: _____

_____ Excessively Coarse Substratum - Depth to Top: _____

_____ Hydraulically Restrictive Horizon - Depth Top to Bottom: _____

_____ Hydraulically Restrictive Substratum - Depth to Top: _____

_____ Perched Zone of Saturation - Depth Top to Bottom: _____

_____ Regional Zone of Saturation - Depth to Top: _____

5 Soil Suitability Classification: _____

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Form 2b - Soil Log and Interpretation

1 Soil Log #: 3 Date of Soil Log: 11/14/23 Method: Profile Pit

2 Log:

Depth (inches)	Munsell Color Name & Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragments; Structure; Consistence; Mottling Abundance, Size and Contrast
0-8"	Topsoil;
8-45"	5YR3/4; Clay Loam; 20% Gravel, 15% Cobble, 2% Stone; SAB, Moist, Friable
	Sample taken @ 33"

3 Ground Water Observations:

_____ Seepage Observed - Depth (inches): _____

_____ Pit Flooded - Depth (inches): _____ after _____ hours of observation

4 Soil Limiting Zones (Check ALL applicable categories):

_____ Fractured Rock Substratum - Depth to Top: _____

_____ Massive Rock Substratum - Depth to Top: _____

_____ Excessively Coarse Horizon - Depth Top to Bottom: _____

_____ Excessively Coarse Substratum - Depth to Top: _____

_____ Hydraulically Restrictive Horizon - Depth Top to Bottom: _____

_____ Hydraulically Restrictive Substratum - Depth to Top: _____

_____ Perched Zone of Saturation - Depth Top to Bottom: _____

_____ Regional Zone of Saturation - Depth to Top: _____

5 Soil Suitability Classification: _____

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Signature of Site Evaluator: _____ Date: 11/27/23

Signature and Seal of Professional Engineer _____

License #: 24GB042582 Date: 11/27/23

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Form 2b - Soil Log and Interpretation

1 Soil Log #: 4 Date of Soil Log: 11/14/23 Method: Profile Pit

2 Log:

Depth (inches)	Munsell Color Name & Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragments; Structure; Consistence; Mottling Abundance, Size and Contrast
0-8"	Topsoil;
8-41"	5YR3/4; Clay Loam; 20% Gravel, 15% Cobble, 2% Stone; SAB, Moist, Friable
	Sample taken @ 32"

3 Ground Water Observations:

_____ Seepage Observed - Depth (inches): _____

_____ Pit Flooded - Depth (inches): _____ after _____ hours of observation

4 Soil Limiting Zones (Check ALL applicable categories):

_____ Fractured Rock Substratum - Depth to Top: _____

_____ Massive Rock Substratum - Depth to Top: _____

_____ Excessively Coarse Horizon - Depth Top to Bottom: _____

_____ Excessively Coarse Substratum - Depth to Top: _____

_____ Hydraulically Restrictive Horizon - Depth Top to Bottom: _____

_____ Hydraulically Restrictive Substratum - Depth to Top: _____

_____ Perched Zone of Saturation - Depth Top to Bottom: _____

_____ Regional Zone of Saturation - Depth to Top: _____

5 Soil Suitability Classification: _____

6 I hereby certify that the information furnished on form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator: _____ Date: 11/27/23

Signature and Seal of Professional Engineer: _____

License #: 24GB042582 Date: 11/27/23

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Form 2b - Soil Log and Interpretation

1 Soil Log #: 5 Date of Soil Log: 11/14/23 Method: Profile Pit

2 Log:

Depth (inches)	Munsell Color Name & Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragments; Structure; Consistence; Mottling Abundance, Size and Contrast
0-8"	Topsoil;
8-41"	5YR3/4; Clay Loam; 20% Gravel, 15% Cobble, 2% Stone; SAB, Moist, Friable
	Sample taken @ 30"

3 Ground Water Observations:

_____ Seepage Observed - Depth (inches): _____

_____ Pit Flooded - Depth (inches): _____ after _____ hours of observation

4 Soil Limiting Zones (Check ALL applicable categories):

_____ Fractured Rock Substratum - Depth to Top: _____

_____ Massive Rock Substratum - Depth to Top: _____

_____ Excessively Coarse Horizon - Depth Top to Bottom: _____

_____ Excessively Coarse Substratum - Depth to Top: _____

_____ Hydraulically Restrictive Horizon - Depth Top to Bottom: _____

_____ Hydraulically Restrictive Substratum - Depth to Top: _____

_____ Perched Zone of Saturation - Depth Top to Bottom: _____

_____ Regional Zone of Saturation - Depth to Top: _____

5 Soil Suitability Classification: _____

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Signature of Site Evaluator: _____ Date: 11/27/23

Signature and Seal of Professional Engineer _____

License #: 24GB042582 Date: 11/27/23

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Form 2b - Soil Log and Interpretation

1 Soil Log #: 6 Date of Soil Log: 11/14/23 Method: Profile Pit

2 Log:

Depth (inches)	Munsell Color Name & Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragments; Structure; Consistence; Mottling Abundance, Size and Contrast
0-8"	Topsoil;
8-44"	5YR3/4; Clay Loam; 20% Gravel, 15% Cobble, 2% Stone; SAB; Moist; Friable
	Sample taken @ 36"

3 Ground Water Observations:

_____ Seepage Observed - Depth (inches): _____

_____ Pit Flooded - Depth (inches): _____ after _____ hours of observation

4 Soil Limiting Zones (Check ALL applicable categories):

_____ Fractured Rock Substratum - Depth to Top: _____

_____ Massive Rock Substratum - Depth to Top: _____

_____ Excessively Coarse Horizon - Depth Top to Bottom: _____

_____ Excessively Coarse Substratum - Depth to Top: _____

_____ Hydraulically Restrictive Horizon - Depth Top to Bottom: _____

_____ Hydraulically Restrictive Substratum - Depth to Top: _____

_____ Perched Zone of Saturation - Depth Top to Bottom: _____

_____ Regional Zone of Saturation - Depth to Top: _____

5 Soil Suitability Classification: _____

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Signature of Site Evaluator: _____ Date: 11/27/23

Signature and Seal of Professional Engineer: _____

License #: 24GB042582 Date: 11/27/23

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Form 2b - Soil Log and Interpretation

1 Soil Log #: 7 Date of Soil Log: 11/14/23 Method: Profile Pit

2 Log:

Depth (inches)	Munsell Color Name & Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragments; Structure; Consistence; Mottling Abundance, Size and Contrast
0-8"	Topsoil;
8-41"	5YR3/4; Clay Loam; 20% Gravel, 15% Cobble, 2% Stone; SAB, Moist, Friable
	Sample taken @ 33"

3 Ground Water Observations:

_____ Seepage Observed - Depth (inches): _____

_____ Pit Flooded - Depth (inches): _____ after _____ hours of observation

4 Soil Limiting Zones (Check ALL applicable categories):

_____ Fractured Rock Substratum - Depth to Top: _____

_____ Massive Rock Substratum - Depth to Top: _____

_____ Excessively Coarse Horizon - Depth Top to Bottom: _____

_____ Excessively Coarse Substratum - Depth to Top: _____

_____ Hydraulically Restrictive Horizon - Depth Top to Bottom: _____

_____ Hydraulically Restrictive Substratum - Depth to Top: _____

_____ Perched Zone of Saturation - Depth Top to Bottom: _____

_____ Regional Zone of Saturation - Depth to Top: _____

5 Soil Suitability Classification: _____

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Signature of Site Evaluator: _____ Date: 11/27/23

Signature and Seal of Professional Engineer: _____

License #: 24GB042582 Date: 11/27/23

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Form 2b - Soil Log and Interpretation

1 Soil Log #: 8 Date of Soil Log: 11/14/23 Method: Profile Pit

2 Log:

Depth (inches)	Munsell Color Name & Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragments; Structure; Consistence; Mottling Abundance, Size and Contrast
0-8"	Topsoil;
8-41"	5YR3/4; Clay Loam; 20% Gravel, 15% Cobble, 5% Stone; Few, Fine, Faint Mottling @ 31-35", 10YR 7/1 in Color; SAB, Moist, Friable
	Sample taken @ 29"

3 Ground Water Observations:

____ Seepage Observed - Depth (inches): ____

____ Pit Flooded - Depth (inches): ____ after ____ hours of observation

4 Soil Limiting Zones (Check ALL applicable categories):

____ Fractured Rock Substratum - Depth to Top: ____

____ Massive Rock Substratum - Depth to Top: ____

____ Excessively Coarse Horizon - Depth Top to Bottom: ____

____ Excessively Coarse Substratum - Depth to Top: ____

____ Hydraulically Restrictive Horizon - Depth Top to Bottom: ____

____ Hydraulically Restrictive Substratum - Depth to Top: ____

____ Perched Zone of Saturation - Depth Top to Bottom: ____

X Regional Zone of Saturation - Depth to Top: 31"

5 Soil Suitability Classification: _____

6 I hereby certify that the information furnished on form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator: _____ Date: 11/27/23

Signature and Seal of Professional Engineer: _____

License #: 24GB042582 Date: 11/27/23

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Municipality: Franklin Township Block: 517.06 Lot: 15.11

Form 2b - Soil Log and Interpretation

1 Soil Log #: 9 Date of Soil Log: 11/14/23 Method: Profile Pit

2 Log:

Depth (inches)	Munsell Color Name & Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragments; Structure; Consistence; Mottling Abundance, Size and Contrast
0-8"	Topsoil;
8-41"	5YR3/4; Clay Loam; 20% Gravel, 15% Cobble, 2% Stone; SAB, Moist, Friable
	Sample taken @ 32"

3 Ground Water Observations:

_____ Seepage Observed - Depth (inches): _____

_____ Pit Flooded - Depth (inches): _____ after _____ hours of observation

4 Soil Limiting Zones (Check ALL applicable categories):

_____ Fractured Rock Substratum - Depth to Top: _____

_____ Massive Rock Substratum - Depth to Top: _____

_____ Excessively Coarse Horizon - Depth Top to Bottom: _____

_____ Excessively Coarse Substratum - Depth to Top: _____

_____ Hydraulically Restrictive Horizon - Depth Top to Bottom: _____

_____ Hydraulically Restrictive Substratum - Depth to Top: _____

_____ Perched Zone of Saturation - Depth Top to Bottom: _____

_____ Regional Zone of Saturation - Depth to Top: _____

5 Soil Suitability Classification: _____

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Signature of Site Evaluator: _____ Date: 11/27/23

Signature and Seal of Professional Engineer _____

License #: 24GB042582 Date: 11/27/23

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Form 2b - Soil Log and Interpretation

1 Soil Log #: 10 Date of Soil Log: 11/14/23 Method: Profile Pit

2 Log:

Depth (inches)	Munsell Color Name & Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragments; Structure; Consistence; Mottling Abundance, Size and Contrast
0-8"	Topsoil;
8-42"	5YR3/4; Clay Loam; 20% Gravel, 15% Cobble, 2% Stone; SAB, Moist, Friable
	Sample taken @ 35"

3 Ground Water Observations:

____ Seepage Observed - Depth (inches): ____

____ Pit Flooded - Depth (inches): ____ after ____ hours of observation

4 Soil Limiting Zones (Check ALL applicable categories):

____ Fractured Rock Substratum - Depth to Top: ____

____ Massive Rock Substratum - Depth to Top: ____

____ Excessively Coarse Horizon - Depth Top to Bottom: ____

____ Excessively Coarse Substratum - Depth to Top: ____

____ Hydraulically Restrictive Horizon - Depth Top to Bottom: ____

____ Hydraulically Restrictive Substratum - Depth to Top: ____

____ Perched Zone of Saturation - Depth Top to Bottom: ____

____ Regional Zone of Saturation - Depth to Top: ____

5 Soil Suitability Classification: ____

6 I hereby certify that the information furnished on form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator: _____ Date: 11/27/23

Signature and Seal of Professional Engineer: _____

License #: 24GB042582 Date: 11/27/23

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Municipality: Franklin Township Block: 517.06 Lot: 15.11

Form 2b - Soil Log and Interpretation

1 Soil Log #: 11 Date of Soil Log: 11/14/23 Method: Profile Pit

2 Log:

Depth (inches)	Munsell Color Name & Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragments; Structure; Consistence; Mottling Abundance, Size and Contrast
0-8"	Topsoil
8-41"	5YR3/4; Clay Loam; 20% Gravel, 15% Cobble, 2% Stone; SAB, Moist, Friable
	Sample taken @ 32"

3 Ground Water Observations:

_____ Seepage Observed - Depth (inches): _____

_____ Pit Flooded - Depth (inches): _____ after _____ hours of observation

4 Soil Limiting Zones (Check ALL applicable categories):

_____ Fractured Rock Substratum - Depth to Top: _____

_____ Massive Rock Substratum - Depth to Top: _____

_____ Excessively Coarse Horizon - Depth Top to Bottom: _____

_____ Excessively Coarse Substratum - Depth to Top: _____

_____ Hydraulically Restrictive Horizon - Depth Top to Bottom: _____

_____ Hydraulically Restrictive Substratum - Depth to Top: _____

_____ Perched Zone of Saturation - Depth Top to Bottom: _____

_____ Regional Zone of Saturation - Depth to Top: _____

5 Soil Suitability Classification: _____

6 I hereby certify that the information furnished on form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator: _____ Date: 11/27/23

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Municipality: Franklin Township Block: 517.06 Lot: 15.11

Form 2b - Soil Log and Interpretation

1 Soil Log #: 12 Date of Soil Log: 11/14/23 Method: Profile Pit

2 Log:

Depth (inches)	Munsell Color Name & Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragments; Structure; Consistence; Mottling Abundance, Size and Contrast
0-8"	Topsoil;
8-46"	5YR3/4; Clay Loam; 20% Gravel, 15% Cobble, 2% Stone; SAB, Moist, Friable
	Sample taken @ 40"

3 Ground Water Observations:

____ Seepage Observed - Depth (inches): ____

____ Pit Flooded - Depth (inches): ____ after ____ hours of observation

4 Soil Limiting Zones (Check ALL applicable categories):

____ Fractured Rock Substratum - Depth to Top: ____

____ Massive Rock Substratum - Depth to Top: ____

____ Excessively Coarse Horizon - Depth Top to Bottom: ____

____ Excessively Coarse Substratum - Depth to Top: ____

____ Hydraulically Restrictive Horizon - Depth Top to Bottom: ____

____ Hydraulically Restrictive Substratum - Depth to Top: ____

____ Perched Zone of Saturation - Depth Top to Bottom: ____

____ Regional Zone of Saturation - Depth to Top: ____

5 Soil Suitability Classification: ____

6 I hereby certify that the information furnished on form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator: _____ Date: 11/27/23

Signature and Seal of Professional Engineer: _____

License #: 24GB042582 Date: 11/27/23

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Municipality: Franklin Township Block: 517.06 Lot: 15.11

Form 2b - Soil Log and Interpretation

1 Soil Log #: 13 Date of Soil Log: 11/14/23 Method: Profile Pit

2 Log:

Depth (inches)	Munsell Color Name & Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragments; Structure; Consistence; Mottling Abundance, Size and Contrast
0-8"	Topsoil;
8-41"	5YR3/4; Clay Loam; 20% Gravel, 15% Cobble, 2% Stone; SAB, Moist, Friable

3 Ground Water Observations:

_____ Seepage Observed - Depth (inches): _____

_____ Pit Flooded - Depth (inches): _____ after _____ hours of observation

4 Soil Limiting Zones (Check ALL applicable categories):

_____ Fractured Rock Substratum - Depth to Top: _____

_____ Massive Rock Substratum - Depth to Top: _____

_____ Excessively Coarse Horizon - Depth Top to Bottom: _____

_____ Excessively Coarse Substratum - Depth to Top: _____

_____ Hydraulically Restrictive Horizon - Depth Top to Bottom: _____

_____ Hydraulically Restrictive Substratum - Depth to Top: _____

_____ Perched Zone of Saturation - Depth Top to Bottom: _____

_____ Regional Zone of Saturation - Depth to Top: _____

5 Soil Suitability Classification: _____

6 I hereby certify that the information furnished on form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator: _____ Date: 11/27/23

Signature and Seal of Professional Engineer: _____

License #: 24GB042582 Date: 11/27/23

Appendix C
Tube Permeameter Results

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	A
Test By:	JBM	Log Number:	SL1
		Depth:	30"

L=	4.000	T1=		Tube Weight	
H1=	6.000	T2=		Gross Weight	
H2=	4.000	T3=		Net Weight	0
r=	0.750	T4=	432000		
R=	0.750	T5=	432000	Sample Vol. (in³)	7.065
		T(sec.)=	432000	(cm³)	115.79535
		T(min.)=	7200.00		
				Bulk Density	0

Soil Permeability: 0.014

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

Signature of Engineer: _____ Date: 11/17/2023

License #: 24GB42582

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	B
Test By:	JBM	Log Number:	SL1
		Depth:	30"

L=	4.000	T1=		Tube Weight	
H1=	6.000	T2=		Gross Weight	
H2=	4.000	T3=		Net Weight	0
r=	0.750	T4=	432000		
R=	0.750	T5=	432000	Sample Vol. (in^3)	7.065
		T(sec.)=	432000	(cm^3)	115.79535
		T(min.)=	7200.00		
				Bulk Density	0

Soil Permeability: 0.014

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	A
Test By:	JBM	Log Number:	SL2
		Depth:	28"

L=	4.000	T1=		Tube Weight	
H1=	5.000	T2=		Gross Weight	
H2=	4.000	T3=		Net Weight	0
r=	0.750	T4=	259200		
R=	0.750	T5=	259200	Sample Vol. (in^3)	7.065
		T(sec.)=	259200	(cm^3)	115.79535
		T(min.)=	4320.00		
				Bulk Density	0

Soil Permeability: 0.012

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	B
Test By:	JBM	Log Number:	SL2
		Depth:	28"

L=	4.000	T1=		Tube Weight	
H1=	5.000	T2=		Gross Weight	
H2=	4.000	T3=		Net Weight	0
r=	0.750	T4=	259200		
R=	0.750	T5=	259200	Sample Vol. (in³)	7.065
		T(sec.)=	259200	(cm³)	115.79535
		T(min.)=	4320.00		
				Bulk Density	0

Soil Permeability: 0.012

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	A
Test By:	JBM	Log Number:	SL3
		Depth:	33"

L=	3.500	T1=		Tube Weight	
H1=	5.000	T2=		Gross Weight	
H2=	3.500	T3=		Net Weight	0
r=	0.750	T4=			
R=	0.750	T5=	432000	Sample Vol. (in³)	6.181875
		T(sec.)=	432000	(cm³)	101.3209313
		T(min.)=	7200.00		
				Bulk Density	0

Soil Permeability: 0.010

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	B
Test By:	JBM	Log Number:	SL3
		Depth:	33"

L=	3.500	T1=		Tube Weight	
H1=	5.000	T2=		Gross Weight	
H2=	3.500	T3=		Net Weight	0
r=	0.750	T4=			
R=	0.750	T5=	432000	Sample Vol. (in³)	6.181875
		T(sec.)=	432000	(cm³)	101.3209313
		T(min.)=	7200.00		
				Bulk Density	0

Soil Permeability: 0.010

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	A
Test By:	JBM	Log Number:	SL4
		Depth:	32"

L=	4.500	T1=		Tube Weight	
H1=	5.000	T2=		Gross Weight	
H2=	4.500	T3=		Net Weight	0
r=	0.750	T4=			
R=	0.750	T5=	216000	Sample Vol. (in³)	7.948125
		T(sec.)=	216000	(cm³)	130.2697688
		T(min.)=	3600.00		
				Bulk Density	0

Soil Permeability: 0.008

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

Signature of Engineer: _____ Date: 11/27/2023

License #: 24GB042582

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	B
Test By:	JBM	Log Number:	SL4
		Depth:	32"

L=	4.500	T1=		Tube Weight	
H1=	5.000	T2=		Gross Weight	
H2=	4.500	T3=		Net Weight	0
r=	0.750	T4=			
R=	0.750	T5=	216000	Sample Vol. (in³)	7.948125
		T(sec.)=	216000	(cm³)	130.2697688
		T(min.)=	3600.00		
				Bulk Density	0

Soil Permeability: 0.008

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

Signature of Engineer: _____ Date: 11/27/2023

License #: 24GB042582

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	A
Test By:	JBM	Log Number:	SL5
		Depth:	30"

L=	5.000	T1=		Tube Weight	
H1=	6.000	T2=		Gross Weight	
H2=	5.000	T3=		Net Weight	0
r=	0.750	T4=	216000		
R=	0.750	T5=	216000	Sample Vol. (in³)	8.83125
		T(sec.)=	216000	(cm³)	144.7441875
		T(min.)=	3600.00		
				Bulk Density	0

Soil Permeability: 0.015

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

Signature of Engineer: _____ Date: 11/27/2023

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	B
Test By:	JBM	Log Number:	SL5
		Depth:	30"

L=	5.000	T1=		Tube Weight	
H1=	6.000	T2=		Gross Weight	
H2=	5.000	T3=		Net Weight	0
r=	0.750	T4=	216000		
R=	0.750	T5=	216000	Sample Vol. (in^3)	8.83125
		T(sec.)=	216000	(cm^3)	144.7441875
		T(min.)=	3600.00		
				Bulk Density	0

Soil Permeability: 0.015

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

Signature of Engineer: _____ Date: 11/27/2023

License #: 24GB42582

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	A
Test By:	JBM	Log Number:	SL6
		Depth:	36"

L=	4.500	T1=		Tube Weight	
H1=	5.500	T2=		Gross Weight	
H2=	4.500	T3=		Net Weight	0
r=	0.750	T4=	216000		
R=	0.750	T5=	216000	Sample Vol. (in³)	7.948125
		T(sec.)=	216000	(cm³)	130.2697688
		T(min.)=	3600.00		
				Bulk Density	0

Soil Permeability: 0.015

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

Signature of Engineer: _____ Date: 11/27/2023

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	B
Test By:	JBM	Log Number:	SL6
		Depth:	36"

L=	4.500	T1=		Tube Weight	
H1=	5.500	T2=		Gross Weight	
H2=	4.500	T3=		Net Weight	0
r=	0.750	T4=	216000		
R=	0.750	T5=	216000	Sample Vol. (in³)	7.948125
		T(sec.)=	216000	(cm³)	130.2697688
		T(min.)=	3600.00		
				Bulk Density	0

Soil Permeability: 0.015

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

Signature of Engineer: _____ Date: 11/27/2023

License #: 24GB042582

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	A
Test By:	JBM	Log Number:	SL7
		Depth:	33"

L=	4.500	T1=		Tube Weight	
H1=	5.500	T2=		Gross Weight	
H2=	4.500	T3=		Net Weight	0
r=	0.750	T4=			
R=	0.750	T5=	216000	Sample Vol. (in³)	7.948125
		T(sec.)=	216000	(cm³)	130.2697688
		T(min.)=	3600.00		
				Bulk Density	0

Soil Permeability: 0.015

Soil Class: K0

$$K(in/hr) = 60\,\text{min/hr} \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

Signature of Engineer: _____ Date: 11/27/2023

License #: 24GB042582

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	B
Test By:	JBM	Log Number:	SL7
		Depth:	33"

L=	4.500	T1=		Tube Weight	
H1=	5.500	T2=		Gross Weight	
H2=	4.500	T3=		Net Weight	0
r=	0.750	T4=			
R=	0.750	T5=	216000	Sample Vol. (in³)	7.948125
		T(sec.)=	216000	(cm³)	130.2697688
		T(min.)=	3600.00		
				Bulk Density	0

Soil Permeability: 0.015

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

Signature of Engineer: _____ Date: 11/27/2023

License #: 24GB042582

FPA

Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	A
Test By:	JBM	Log Number:	SL8
		Depth:	29"

L=	5.000	T1=		Tube Weight	
H1=	6.000	T2=		Gross Weight	
H2=	5.000	T3=		Net Weight	0
r=	0.750	T4=	216000		
R=	0.750	T5=	216000	Sample Vol. (in^3)	8.83125
		T(sec.)=	216000	(cm^3)	144.7441875
		T(min.)=	3600.00		
				Bulk Density	0

Soil Permeability: 0.015

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	B
Test By:	JBM	Log Number:	SL8
		Depth:	29"

L=	5.000	T1=		Tube Weight	
H1=	6.000	T2=		Gross Weight	
H2=	5.000	T3=		Net Weight	0
r=	0.750	T4=	216000		
R=	0.750	T5=	216000	Sample Vol. (in^3)	8.83125
		T(sec.)=	216000	(cm^3)	144.7441875
		T(min.)=	3600.00		
				Bulk Density	0

Soil Permeability: 0.015

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	A
Test By:	JBM	Log Number:	SL9
		Depth:	32"

L=	4.000	T1=		Tube Weight	
H1=	5.500	T2=		Gross Weight	
H2=	4.000	T3=		Net Weight	0
r=	0.750	T4=	259200		
R=	0.750	T5=	259200	Sample Vol. (in³)	7.065
		T(sec.)=	259200	(cm³)	115.79535
		T(min.)=	4320.00		
				Bulk Density	0

Soil Permeability: 0.018

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	B
Test By:	JBM	Log Number:	SL9
		Depth:	32"

L=	4.000	T1=		Tube Weight	
H1=	5.500	T2=		Gross Weight	
H2=	4.000	T3=		Net Weight	0
r=	0.750	T4=	259200		
R=	0.750	T5=	259200	Sample Vol. (in³)	7.065
		T(sec.)=	259200	(cm³)	115.79535
		T(min.)=	4320.00		
				Bulk Density	0

Soil Permeability: 0.018

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	A
Test By:	JBM	Log Number:	SL10
		Depth:	35"

L=	4.500	T1=		Tube Weight	
H1=	5.000	T2=		Gross Weight	
H2=	4.500	T3=		Net Weight	0
r=	0.750	T4=			
R=	0.750	T5=	216000	Sample Vol. (in³)	7.948125
		T(sec.)=	216000	(cm³)	130.2697688
		T(min.)=	3600.00		
				Bulk Density	0

Soil Permeability: 0.008

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	B
Test By:	JBM	Log Number:	SL10
		Depth:	35"

L=	4.500	T1=		Tube Weight	
H1=	5.000	T2=		Gross Weight	
H2=	4.500	T3=		Net Weight	0
r=	0.750	T4=			
R=	0.750	T5=	216000	Sample Vol. (in³)	7.948125
		T(sec.)=	216000	(cm³)	130.2697688
		T(min.)=	3600.00		
				Bulk Density	0

Soil Permeability: 0.008

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	A
Test By:	JBM	Log Number:	SL11
		Depth:	32"

L=	4.750	T1=		Tube Weight	
H1=	5.500	T2=		Gross Weight	
H2=	4.750	T3=		Net Weight	0
r=	0.750	T4=			
R=	0.750	T5=	172800	Sample Vol. (in^3)	8.3896875
		T(sec.)=	172800	(cm^3)	137.5069781
		T(min.)=	2880.00		
				Bulk Density	0

Soil Permeability: 0.015

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	B
Test By:	JBM	Log Number:	SL11
		Depth:	32"

L=	4.750	T1=		Tube Weight	
H1=	5.500	T2=		Gross Weight	
H2=	4.750	T3=		Net Weight	0
r=	0.750	T4=			
R=	0.750	T5=	172800	Sample Vol. (in³)	8.3896875
		T(sec.)=	172800	(cm³)	137.5069781
		T(min.)=	2880.00		
				Bulk Density	0

Soil Permeability: 0.015

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	A
Test By:	JBM	Log Number:	SL12
		Depth:	38"

L=	4.000	T1=		Tube Weight	
H1=	5.500	T2=		Gross Weight	
H2=	4.000	T3=		Net Weight	0
r=	0.750	T4=			
R=	0.750	T5=	216000	Sample Vol. (in³)	7.065
		T(sec.)=	216000	(cm³)	115.79535
		T(min.)=	3600.00		
				Bulk Density	0

Soil Permeability: 0.021

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	B
Test By:	JBM	Log Number:	SL12
		Depth:	38"

L=	4.000	T1=		Tube Weight	
H1=	5.500	T2=		Gross Weight	
H2=	4.000	T3=		Net Weight	0
r=	0.750	T4=			
R=	0.750	T5=	216000	Sample Vol. (in³)	7.065
		T(sec.)=	216000	(cm³)	115.79535
		T(min.)=	3600.00		
				Bulk Density	0

Soil Permeability: 0.021

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	A
Test By:	JBM	Log Number:	SL13
		Depth:	36"

L=	4.000	T1=		Tube Weight	
H1=	5.500	T2=		Gross Weight	
H2=	4.000	T3=		Net Weight	0
r=	0.750	T4=			
R=	0.750	T5=	216000	Sample Vol. (in³)	7.065
		T(sec.)=	216000	(cm³)	115.79535
		T(min.)=	3600.00		
				Bulk Density	0

Soil Permeability: 0.021

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

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Tube Permeameter

Project:	Cottontail Road	Date:	11/17/2023
Location:		Sample:	B
Test By:	JBM	Log Number:	SL13
		Depth:	36"

L=	4.000	T1=		Tube Weight	
H1=	5.500	T2=		Gross Weight	
H2=	4.000	T3=		Net Weight	0
r=	0.750	T4=			
R=	0.750	T5=	216000	Sample Vol. (in³)	7.065
		T(sec.)=	216000	(cm³)	115.79535
		T(min.)=	3600.00		
				Bulk Density	0

Soil Permeability: 0.021

Soil Class: K0

$$K(in/hr) = 60\,\text{min}/hr \times \frac{L(in)}{T(\text{min})} \times \frac{r^2}{R^2} \times \ln\left(\frac{H_1}{H_2}\right)$$ [Equation 4]

Where:

K = permeability of the soil sample, in inches per hour;
L = length of the soil core, in inches;
T = time required for the water level to drop from H_1 to H_2 during the final test interval, in minutes,;
r = radius of the standpipe, in centimeters or inches;
R = radius of the soil core, in the same units as "r";
H_1 = height of the water level above the rim of the test basin at the beginning of each test interval, in inches; and
H_2 = height of the water level above the rim of the test basin at the end of each test interval, in inches.

[Note: When the standpipe is not used, the term r^2/R^2 is omitted from the equation.]

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Appendix D
NEH HSG Worksheets

FPA

SL-1

Table 7–1 Criteria for assignment of hydrologic soil group (HSG)

Depth to water impermeable layer 1/	Depth to high water table 2/	K_{sat} of least transmissive layer in depth range	K_{sat} depth range	HSG 3/
<50 cm [<20 in]	—	—	—	D
50 to 100 cm [20 to 40 in]	<60 cm [<24 in]	>40.0 µm/s (>5.67 in/h)	0 to 60 cm [0 to 24 in]	A/D
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 60 cm [0 to 24 in]	B/D
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 60 cm [0 to 24 in]	C/D
		≤1.0 µm/s (≤0.14 in/h)	0 to 60 cm [0 to 24 in]	D
	≥60 cm [≥24 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
>100 cm [>40 in]	<60 cm [<24 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A/D
		>4.0 to ≤10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B/D
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C/D
		≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D
	60 to 100 cm [24 to 40 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
	>100 cm [>40 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A
		>4.0 to ≤ 10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C
		≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D

Seasonal High Groundwater at 15"

8"-40"

0.014 in/hr

"D" HSG

1/ An impermeable layer has a K_{sat} less than 0.01 µm/s [0.0014 in/h] or a component restriction of fragipan; duripan; petrocalcic; orstein; petrogypsic; cemented horizon; densic material; placic; bedrock, paralithic; bedrock, lithic; bedrock, densic; or permafrost.

2/ High water table during any month during the year.

3/ Dual HSG classes are applied only for wet soils (water table less than 60 cm [24 in]). If these soils can be drained, a less restrictive HSG can be assigned, depending on the K_{sat}.

SL-2

Table 7–1 Criteria for assignment of hydrologic soil group (HSG)

Depth to water impermeable layer 1/	Depth to high water table 2/	K_{sat} of least transmissive layer in depth range	K_{sat} depth range	HSG 3/
<50 cm [<20 in]	—	—	—	D
50 to 100 cm [20 to 40 in]	<60 cm [<24 in]	>40.0 µm/s (>5.67 in/h)	0 to 60 cm [0 to 24 in]	A/D
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 60 cm [0 to 24 in]	B/D
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 60 cm [0 to 24 in]	C/D
		≤1.0 µm/s (≤0.14 in/h)	0 to 60 cm [0 to 24 in]	D
	≥60 cm [≥24 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
>100 cm [>40 in]	<60 cm [<24 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A/D
		>4.0 to ≤10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B/D
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C/D
		≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D
	60 to 100 cm [24 to 40 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
Groundwater not encountered	>100 cm [>40 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A
		>4.0 to ≤ 10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C
	0.012 in/hr	≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D

8"-40"

"D" HSG

1/ An impermeable layer has a K_{sat} less than 0.01 µm/s [0.0014 in/h] or a component restriction of fragipan; duripan; petrocalcic; orstein; petrogypsic; cemented horizon; densic material; placic; bedrock, paralithic; bedrock, lithic; bedrock, densic; or permafrost.

2/ High water table during any month during the year.

3/ Dual HSG classes are applied only for wet soils (water table less than 60 cm [24 in]). If these soils can be drained, a less restrictive HSG can be assigned, depending on the K_{sat}.

SL-3

Table 7–1 Criteria for assignment of hydrologic soil group (HSG)

Depth to water impermeable layer 1/	Depth to high water table 2/	K_{sat} of least transmissive layer in depth range	K_{sat} depth range	HSG 3/
<50 cm [<20 in]	—	—	—	D
50 to 100 cm [20 to 40 in]	<60 cm [<24 in]	>40.0 µm/s (>5.67 in/h)	0 to 60 cm [0 to 24 in]	A/D
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 60 cm [0 to 24 in]	B/D
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 60 cm [0 to 24 in]	C/D
		≤1.0 µm/s (≤0.14 in/h)	0 to 60 cm [0 to 24 in]	D
	≥60 cm [≥24 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
>100 cm [>40 in]	<60 cm [<24 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A/D
		>4.0 to ≤10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B/D
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C/D
		≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D
	60 to 100 cm [24 to 40 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
Groundwater not encountered	>100 cm [>40 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A
		>4.0 to ≤ 10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C
	0.010 in/hr	≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D

8"-40"

"D" HSG

1/ An impermeable layer has a K_{sat} less than 0.01 µm/s [0.0014 in/h] or a component restriction of fragipan; duripan; petrocalcic; orstein; petrogypsic; cemented horizon; densic material; placic; bedrock, paralithic; bedrock, lithic; bedrock, densic; or permafrost.

2/ High water table during any month during the year.

3/ Dual HSG classes are applied only for wet soils (water table less than 60 cm [24 in]). If these soils can be drained, a less restrictive HSG can be assigned, depending on the K_{sat}.

SL-4

Table 7–1 Criteria for assignment of hydrologic soil group (HSG)

Depth to water impermeable layer 1/	Depth to high water table 2/	K_{sat} of least transmissive layer in depth range	K_{sat} depth range	HSG 3/
<50 cm [<20 in]	—	—	—	D
50 to 100 cm [20 to 40 in]	<60 cm [<24 in]	>40.0 µm/s (>5.67 in/h)	0 to 60 cm [0 to 24 in]	A/D
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 60 cm [0 to 24 in]	B/D
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 60 cm [0 to 24 in]	C/D
		≤1.0 µm/s (≤0.14 in/h)	0 to 60 cm [0 to 24 in]	D
	≥60 cm [≥24 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
>100 cm [>40 in]	<60 cm [<24 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A/D
		>4.0 to ≤10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B/D
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C/D
		≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D
	60 to 100 cm [24 to 40 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
Groundwater not encountered	>100 cm [>40 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A
		>4.0 to ≤ 10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C
	0.008 in/hr	≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D

8"-40"

"D" HSG

1/ An impermeable layer has a K_{sat} less than 0.01 µm/s [0.0014 in/h] or a component restriction of fragipan; duripan; petrocalcic; orstein; petrogypsic; cemented horizon; densic material; placic; bedrock, paralithic; bedrock, lithic; bedrock, densic; or permafrost.

2/ High water table during any month during the year.

3/ Dual HSG classes are applied only for wet soils (water table less than 60 cm [24 in]). If these soils can be drained, a less restrictive HSG can be assigned, depending on the K_{sat}.

SL-5

Table 7–1 Criteria for assignment of hydrologic soil group (HSG)

Depth to water impermeable layer 1/	Depth to high water table 2/	K_{sat} of least transmissive layer in depth range	K_{sat} depth range	HSG 3/
<50 cm [<20 in]	—	—	—	D
50 to 100 cm [20 to 40 in]	<60 cm [<24 in]	>40.0 µm/s (>5.67 in/h)	0 to 60 cm [0 to 24 in]	A/D
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 60 cm [0 to 24 in]	B/D
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 60 cm [0 to 24 in]	C/D
		≤1.0 µm/s (≤0.14 in/h)	0 to 60 cm [0 to 24 in]	D
	≥60 cm [≥24 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
>100 cm [>40 in]	<60 cm [<24 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A/D
		>4.0 to ≤10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B/D
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C/D
		≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D
	60 to 100 cm [24 to 40 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
Groundwater not encountered	>100 cm [>40 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A
		>4.0 to ≤ 10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C
	0.015 in/hr	≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D

8"-40"

"D" HSG

1/ An impermeable layer has a K_{sat} less than 0.01 µm/s [0.0014 in/h] or a component restriction of fragipan; duripan; petrocalcic; orstein; petrogypsic; cemented horizon; densic material; placic; bedrock, paralithic; bedrock, lithic; bedrock, densic; or permafrost.

2/ High water table during any month during the year.

3/ Dual HSG classes are applied only for wet soils (water table less than 60 cm [24 in]). If these soils can be drained, a less restrictive HSG can be assigned, depending on the K_{sat}.

SL-6

Table 7–1 Criteria for assignment of hydrologic soil group (HSG)

Depth to water impermeable layer 1/	Depth to high water table 2/	K_{sat} of least transmissive layer in depth range	K_{sat} depth range	HSG 3/
<50 cm [<20 in]	—	—	—	D
50 to 100 cm [20 to 40 in]	<60 cm [<24 in]	>40.0 µm/s (>5.67 in/h)	0 to 60 cm [0 to 24 in]	A/D
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 60 cm [0 to 24 in]	B/D
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 60 cm [0 to 24 in]	C/D
		≤1.0 µm/s (≤0.14 in/h)	0 to 60 cm [0 to 24 in]	D
	≥60 cm [≥24 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
>100 cm [>40 in]	<60 cm [<24 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A/D
		>4.0 to ≤10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B/D
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C/D
		≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D
	60 to 100 cm [24 to 40 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
Groundwater not encountered	>100 cm [>40 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A
		>4.0 to ≤ 10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C
	0.015 in/hr	≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D

8"-40"

"D" HSG

1/ An impermeable layer has a K_{sat} less than 0.01 µm/s [0.0014 in/h] or a component restriction of fragipan; duripan; petrocalcic; orstein; petrogypsic; cemented horizon; densic material; placic; bedrock, paralithic; bedrock, lithic; bedrock, densic; or permafrost.

2/ High water table during any month during the year.

3/ Dual HSG classes are applied only for wet soils (water table less than 60 cm [24 in]). If these soils can be drained, a less restrictive HSG can be assigned, depending on the K_{sat}.

SL-7

Table 7–1 Criteria for assignment of hydrologic soil group (HSG)

Depth to water impermeable layer 1/	Depth to high water table 2/	K_{sat} of least transmissive layer in depth range	K_{sat} depth range	HSG 3/
<50 cm [<20 in]	—	—	—	D
50 to 100 cm [20 to 40 in]	<60 cm [<24 in]	>40.0 µm/s (>5.67 in/h)	0 to 60 cm [0 to 24 in]	A/D
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 60 cm [0 to 24 in]	B/D
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 60 cm [0 to 24 in]	C/D
		≤1.0 µm/s (≤0.14 in/h)	0 to 60 cm [0 to 24 in]	D
	≥60 cm [≥24 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
>100 cm [>40 in]	<60 cm [<24 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A/D
		>4.0 to ≤10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B/D
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C/D
		≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D
	60 to 100 cm [24 to 40 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
Groundwater not encountered	>100 cm [>40 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A
		>4.0 to ≤ 10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C
	0.015 in/hr	≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D

8"-40"

"D" HSG

1/ An impermeable layer has a K_{sat} less than 0.01 µm/s [0.0014 in/h] or a component restriction of fragipan; duripan; petrocalcic; orstein; petrogypsic; cemented horizon; densic material; placic; bedrock, paralithic; bedrock, lithic; bedrock, densic; or permafrost.

2/ High water table during any month during the year.

3/ Dual HSG classes are applied only for wet soils (water table less than 60 cm [24 in]). If these soils can be drained, a less restrictive HSG can be assigned, depending on the K_{sat}.

SL-8

Table 7–1 Criteria for assignment of hydrologic soil group (HSG)

Depth to water impermeable layer 1/	Depth to high water table 2/	K_{sat} of least transmissive layer in depth range	K_{sat} depth range	HSG 3/
<50 cm [<20 in]	—	—	—	D
50 to 100 cm [20 to 40 in]	<60 cm [<24 in]	>40.0 µm/s (>5.67 in/h)	0 to 60 cm [0 to 24 in]	A/D
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 60 cm [0 to 24 in]	B/D
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 60 cm [0 to 24 in]	C/D
		≤1.0 µm/s (≤0.14 in/h)	0 to 60 cm [0 to 24 in]	D
	≥60 cm [≥24 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
>100 cm [>40 in]	<60 cm [<24 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A/D
		>4.0 to ≤10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B/D
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C/D
		≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D
	60 to 100 cm [24 to 40 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
	>100 cm [>40 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A
		>4.0 to ≤ 10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C
		≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D

Seasonal High Groundwater at 31"

0.015 in/hr

8"-40"

"D" HSG

1/ An impermeable layer has a K_{sat} less than 0.01 µm/s [0.0014 in/h] or a component restriction of fragipan; duripan; petrocalcic; orstein; petrogypsic; cemented horizon; densic material; placic; bedrock, paralithic; bedrock, lithic; bedrock, densic; or permafrost.

2/ High water table during any month during the year.

3/ Dual HSG classes are applied only for wet soils (water table less than 60 cm [24 in]). If these soils can be drained, a less restrictive HSG can be assigned, depending on the K_{sat}.

SL-9

Table 7–1 Criteria for assignment of hydrologic soil group (HSG)

Depth to water impermeable layer 1/	Depth to high water table 2/	K_{sat} of least transmissive layer in depth range	K_{sat} depth range	HSG 3/
<50 cm [<20 in]	—	—	—	D
50 to 100 cm [20 to 40 in]	<60 cm [<24 in]	>40.0 µm/s (>5.67 in/h)	0 to 60 cm [0 to 24 in]	A/D
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 60 cm [0 to 24 in]	B/D
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 60 cm [0 to 24 in]	C/D
		≤1.0 µm/s (≤0.14 in/h)	0 to 60 cm [0 to 24 in]	D
	≥60 cm [≥24 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
>100 cm [>40 in]	<60 cm [<24 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A/D
		>4.0 to ≤10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B/D
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C/D
		≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D
	60 to 100 cm [24 to 40 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
Groundwater not encountered	>100 cm [>40 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A
		>4.0 to ≤ 10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C
	0.018 in/hr	≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D

8"-40"

"D" HSG

1/ An impermeable layer has a K_{sat} less than 0.01 µm/s [0.0014 in/h] or a component restriction of fragipan; duripan; petrocalcic; orstein; petrogypsic; cemented horizon; densic material; placic; bedrock, paralithic; bedrock, lithic; bedrock, densic; or permafrost.

2/ High water table during any month during the year.

3/ Dual HSG classes are applied only for wet soils (water table less than 60 cm [24 in]). If these soils can be drained, a less restrictive HSG can be assigned, depending on the K_{sat}.

SL-10

Table 7–1 Criteria for assignment of hydrologic soil group (HSG)

Depth to water impermeable layer 1/	Depth to high water table 2/	K_{sat} of least transmissive layer in depth range	K_{sat} depth range	HSG 3/
<50 cm [<20 in]	—	—	—	D
50 to 100 cm [20 to 40 in]	<60 cm [<24 in]	>40.0 µm/s (>5.67 in/h)	0 to 60 cm [0 to 24 in]	A/D
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 60 cm [0 to 24 in]	B/D
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 60 cm [0 to 24 in]	C/D
		≤1.0 µm/s (≤0.14 in/h)	0 to 60 cm [0 to 24 in]	D
	≥60 cm [≥24 in]	>40.0 µm/s 67	0 to 50 cm 0 to 20 in	A
		>10.0 to ≤40.0 µm/s >1.42 to ≤5.67	0 to 50 cm to 20 in	B
		>1.0 to ≤10.0 µm/s >0.14 to ≤1.42	0 to 50 cm 0 to 20	C
		≤1.0 µm/s 14	0 to 50 cm 0 to 20	D
>100 cm [>40 in]	<60 cm [<24 in]	>10.0 µm/s >1.42 in/h	0 to 100 cm 0 to 40	A/D
		>4.0 to ≤10.0 µm/s 7 to ≤1.42	0 to 100 cm to 40 in]	B/D
		>0.40 to ≤4.0 µm/s to ≤0.57	0 to 100 cm to 40	C/D
		≤0.40 µm/s	0 to 100 cm to 40	D
	60 to 100 cm [24 to 40 in]	>40.0 µm/s	0 to 50 cm to 20	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67	0 to 50 cm to 20 in]	B
		>1.0 to ≤10.0 µm/s >0.14 to ≤1.42	0 to 50 cm to 20 in	C
		≤1.0 µm/s 14	0 to 50 cm to 20 in	D
Groundwater not encountered	>100 cm [>40 in]	>10.0 µm/s >1.42	0 to 100 cm to 40	A
		>4.0 to ≤ 10.0 µm/s >0.57 to ≤1.42 in/h)	0 to 100 cm to 40 in]	B
		>0.40 to ≤4.0 µm/s >0.06 to ≤0.57	0 to 100 cm [0 to 40 in	
0.008 in/h		≤0.40 µm/s	0 to 100 cm to 40	D

8"-40"

1/ An impermeable layer has a K_{sat} less than 0.01 µm/s [0.0014 in/h] or a component restriction of fragipan; duripan; petrocalcic; orstein; petrogypsic; cemented horizon; densic material; placic; bedrock, paralithic; bedrock, lithic; bedrock, densic; or permafrost.

2/ High water table during any month during the year.

3/ Dual HSG classes are applied only for wet soils (water table less than 60 cm [24 in]). If these soils can be drained, a less restrictive HSG can be assigned, depending on the K_{sat}.

SL-11

Table 7–1 Criteria for assignment of hydrologic soil group (HSG)

Depth to water impermeable layer 1/	Depth to high water table 2/	K_{sat} of least transmissive layer in depth range	K_{sat} depth range	HSG 3/
<50 cm [<20 in]	—	—	—	D
50 to 100 cm [20 to 40 in]	<60 cm [<24 in]	>40.0 µm/s (>5.67 in/h)	0 to 60 cm [0 to 24 in]	A/D
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 60 cm [0 to 24 in]	B/D
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 60 cm [0 to 24 in]	C/D
		≤1.0 µm/s (≤0.14 in/h)	0 to 60 cm [0 to 24 in]	D
	≥60 cm [≥24 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
>100 cm [>40 in]	<60 cm [<24 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A/D
		>4.0 to ≤10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B/D
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C/D
		≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D
	60 to 100 cm [24 to 40 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
Groundwater not encountered	>100 cm [>40 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A
		>4.0 to ≤ 10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C
	0.015 in/hr	≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D

8"-40"

"D" HSG

1/ An impermeable layer has a K_{sat} less than 0.01 µm/s [0.0014 in/h] or a component restriction of fragipan; duripan; petrocalcic; orstein; petrogypsic; cemented horizon; densic material; placic; bedrock, paralithic; bedrock, lithic; bedrock, densic; or permafrost.

2/ High water table during any month during the year.

3/ Dual HSG classes are applied only for wet soils (water table less than 60 cm [24 in]). If these soils can be drained, a less restrictive HSG can be assigned, depending on the K_{sat}.

SL-12

Table 7–1 Criteria for assignment of hydrologic soil group (HSG)

Depth to water impermeable layer 1/	Depth to high water table 2/	K_{sat} of least transmissive layer in depth range	K_{sat} depth range	HSG 3/
<50 cm [<20 in]	—	—	—	D
50 to 100 cm [20 to 40 in]	<60 cm [<24 in]	>40.0 µm/s (>5.67 in/h)	0 to 60 cm [0 to 24 in]	A/D
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 60 cm [0 to 24 in]	B/D
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 60 cm [0 to 24 in]	C/D
		≤1.0 µm/s (≤0.14 in/h)	0 to 60 cm [0 to 24 in]	D
	≥60 cm [≥24 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
>100 cm [>40 in]	<60 cm [<24 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A/D
		>4.0 to ≤10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B/D
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C/D
		≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D
	60 to 100 cm [24 to 40 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
Groundwater not encountered	>100 cm [>40 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A
		>4.0 to ≤ 10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C
	0.021 in/hr	≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D

8"-40"

"D" HSG

1/ An impermeable layer has a K_{sat} less than 0.01 µm/s [0.0014 in/h] or a component restriction of fragipan; duripan; petrocalcic; orstein; petrogypsic; cemented horizon; densic material; placic; bedrock, paralithic; bedrock, lithic; bedrock, densic; or permafrost.

2/ High water table during any month during the year.

3/ Dual HSG classes are applied only for wet soils (water table less than 60 cm [24 in]). If these soils can be drained, a less restrictive HSG can be assigned, depending on the K_{sat}.

SL-13

Table 7–1 Criteria for assignment of hydrologic soil group (HSG)

Depth to water impermeable layer [1/]	Depth to high water table [2/]	K_{sat} of least transmissive layer in depth range	K_{sat} depth range	HSG [3/]
<50 cm [<20 in]	—	—	—	D
50 to 100 cm [20 to 40 in]	<60 cm [<24 in]	>40.0 µm/s (>5.67 in/h)	0 to 60 cm [0 to 24 in]	A/D
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 60 cm [0 to 24 in]	B/D
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 60 cm [0 to 24 in]	C/D
		≤1.0 µm/s (≤0.14 in/h)	0 to 60 cm [0 to 24 in]	D
	≥60 cm [≥24 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
>100 cm [>40 in]	<60 cm [<24 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A/D
		>4.0 to ≤10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B/D
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C/D
		≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D
	60 to 100 cm [24 to 40 in]	>40.0 µm/s (>5.67 in/h)	0 to 50 cm [0 to 20 in]	A
		>10.0 to ≤40.0 µm/s (>1.42 to ≤5.67 in/h)	0 to 50 cm [0 to 20 in]	B
		>1.0 to ≤10.0 µm/s (>0.14 to ≤1.42 in/h)	0 to 50 cm [0 to 20 in]	C
		≤1.0 µm/s (≤0.14 in/h)	0 to 50 cm [0 to 20 in]	D
Groundwater not encountered	>100 cm [>40 in]	>10.0 µm/s (>1.42 in/h)	0 to 100 cm [0 to 40 in]	A
		>4.0 to ≤ 10.0 µm/s (>0.57 to ≤1.42 in/h)	0 to 100 cm [0 to 40 in]	B
		>0.40 to ≤4.0 µm/s (>0.06 to ≤0.57 in/h)	0 to 100 cm [0 to 40 in]	C
	0.021 in/hr	≤0.40 µm/s (≤0.06 in/h)	0 to 100 cm [0 to 40 in]	D

8"-40"

"D" HSG

1/ An impermeable layer has a K_{sat} less than 0.01 µm/s [0.0014 in/h] or a component restriction of fragipan; duripan; petrocalcic; orstein; petrogypsic; cemented horizon; densic material; placic; bedrock, paralithic; bedrock, lithic; bedrock, densic; or permafrost.

2/ High water table during any month during the year.

3/ Dual HSG classes are applied only for wet soils (water table less than 60 cm [24 in]). If these soils can be drained, a less restrictive HSG can be assigned, depending on the K_{sat}.