TETRA TECH

November 13, 2015
103IP3406

Mr. Uriah Sowell
Rooney Engineering
115 Inverness Drive East, Suite 300,
Englewood, CO 80112

Subject: Infiltration Testing – Wyomissing Valve Site
Sunoco Pennsylvania Pipeline Project
Berks County, Cumru Township

Dear Mr. Sowell:

Tetra Tech, Inc. (Tetra Tech) performed infiltration testing within proposed stormwater management feature areas at the proposed Wyomissing Valve Site in Cumru Township, Commonwealth of Pennsylvania. This letter report summarizes results of the infiltration testing.

Three infiltration tests were performed at the site on September 17, 2015, in accordance with ASTM International (ASTM) D5126 for single ring testing, and ASTM D3385 for double ring testing; locations of the tests are shown in Attachment 1. The intended method for infiltration testing was the double-ring constant head test, and was performed at test location IT-01. At locations IT-02 and IT-03, the field water truck used to supply water for testing could not access test locations within reasonable distance because of very steep and wet grades. Therefore, the method used to conduct infiltration testing at IT-02 and IT-03 was the single-ring falling head test. This commonly accepted test method utilizes a considerable amount less water, and the water was reasonably hauled to the test locations with buckets.

Prior to infiltration testing, a hand auger soil boring was advanced adjacent to each test location to log lithology, inspect for evidence of seasonal high water table, and collect representative soil samples. Soil borings were advanced by use of a hand-held auger, and subsurface conditions were logged. Boring logs (Attachment 2) include soil data obtained from the explorations. Bedrock and groundwater were not encountered within 2 feet of the infiltration test depth. The underlying geology is the Hammer Creek conglomerate, a very coarse quartz conglomerate with abundant pebbles and cobbles of gray quartzite.

A soil sample was collected at each of the three infiltration test depths. The samples were inspected and described visually in Tetra Tech's geotechnical laboratory. A Percent Finer than a No. 200 Sieve Test (ASTM D1140) was performed to measure the amount of silt and clay particulate in the soil samples. An Atterberg Limit Test (ASTM D4318) was conducted to aid in classification of the soils. Results of the grain-size analysis and Atterberg Limits testing were referenced to determine the Unified Soil Classification System (USCS) designation for the soils encountered at the infiltration test depth. A summary of the laboratory testing results is in Attachment 3.

As discussed above, infiltration testing via a single-ring falling head test method and double-ring constant head test method were conducted; procedures for these test methods are described in Attachment 4. Results from the infiltration testing are summarized in the attached Infiltration Testing Tables (Attachment 5). Table 1 summarizes investigation and testing depths, results of the infiltration testing, and USCS classifications and descriptions of soils at the infiltration test depths.

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TABLE 1
SUMMARY OF RESULTS FROM INFILTRATION INVESTIGATION

Infiltration Test Location	Infiltration Test Depth (inches)	Off-Set Soil Boring Depth (inches)	Infiltration Testing Results (inches/hour)	USCS Class. at Test Depth	Generalized Description of Soils at Test Depth
IT-01	6	36	1.41	CL	Brown sandy clay, trace fine gravel
IT-02	6.5	36	11.19 (11.52 last hour)	SM	Reddish brown fine to medium sand with a little silt, trace fine to coarse gravel
IT-03	9.75	36	7.80 (8.88 last hour)	SM	Brown fine to medium sand with some silt, trace fine to coarse gravel.

Tetra Tech's services accorded with generally accepted engineering practice. No warranty, expressed or implied, is given. We appreciate the opportunity to provide our professional services to you. If you have any questions regarding the testing we performed, please contact me at (302) 283-2274, or via E-mail at ralph.boedeker@tetratech.com.

Sincerely,

Ralph Boedeker

Ralph Boedeker, P.E.
Geotechnical Project Manager

cc: Karen Gleason (Tetra Tech – Pittsburgh)

Attachments
Attachment 1: Infiltration Test Locations
Attachment 2: Soil Boring Logs
Attachment 3: Laboratory Testing Summary
Attachment 4: Falling Head Singe Ring Infiltration Test Procedures
Attachment 5: Infiltration Testing Tables

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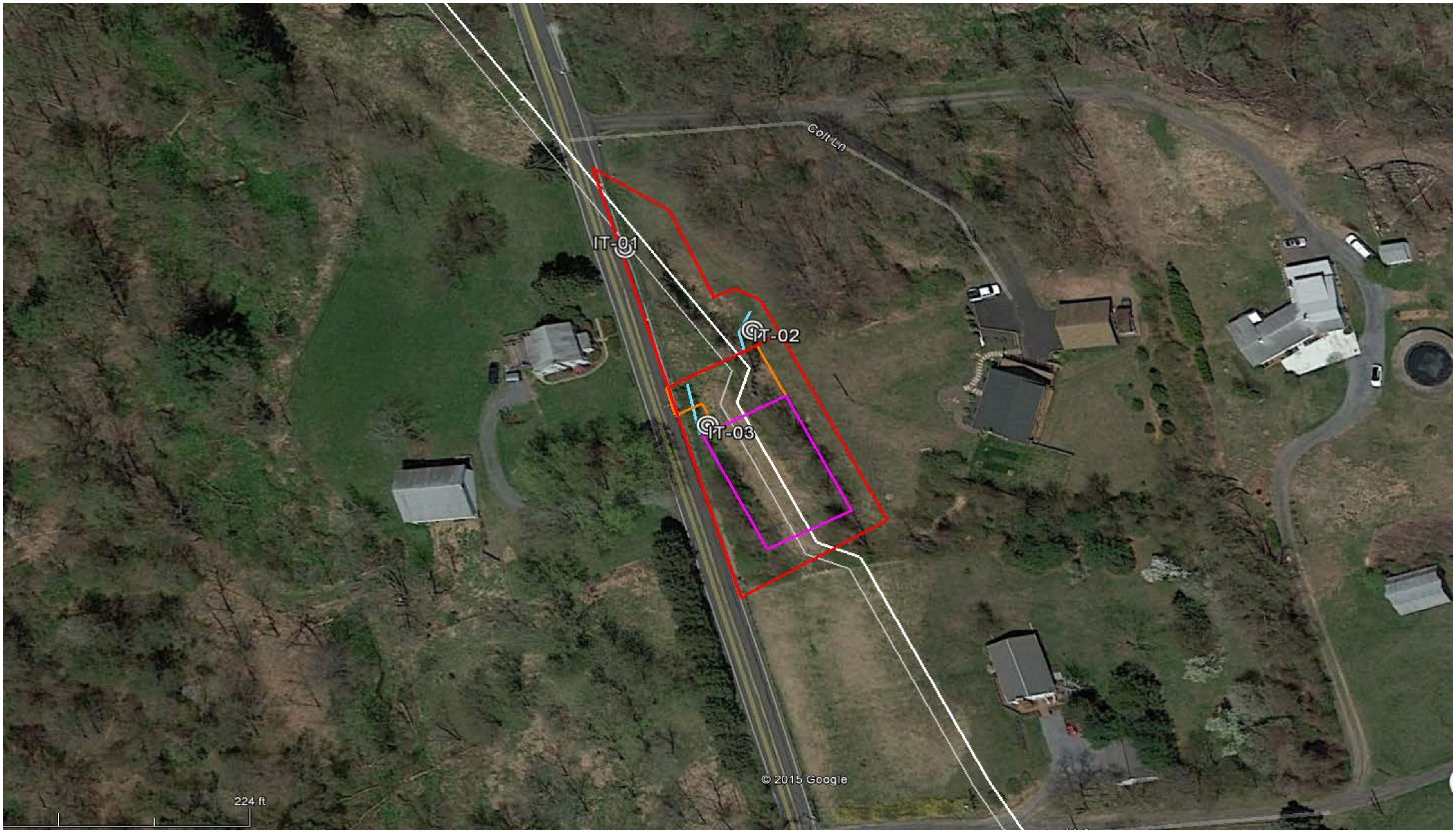
Attachment 1

Infiltration Test Locations



LEGEND:

Infiltration Test Locations (IT)

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INFILTRATION TEST LOCATIONS
WYOMISSING VALVE SITE
BERKS COUNTY, CUMRU TOWNSHIP, PA
SUNOCO PENNSYLVANIA PIPELINE PROJECT

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Attachment 2

Soil Boring Logs

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INFILTRATION TESTING SOIL LOG

Project: Sunoco PPP - Wyomissing Valve Site

Project No.: 103IP3406

Boring/Pit No.: IT-01

Tested by: Tetra Tech/Hynes

Equipment Used: Infiltration Testing Equipment/Hand Auger

Weather: Sunny

Geology:

Land Use: N/A

Horizon	Upper Boundary	Lower Boundary	Soil Textural Class	Description	Soil Color	Color Patterns	Pores, Roots, Rock Structure	Depth to Bedrock	Depth to Water	Comments
	0''	6"	topsoil	topsoil	brown	Solid				
	6"	36"	CL	sandy clay, trace fine gravel	brown	solid		Not Encountered	Not Encountered	%<200: 63.1

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INFILTRATION TESTING SOIL LOG

Project: Sunoco PPP - Wyomissing Valve Site
Project No.: 103IP3406
Boring/Pit No.: IT-02
Tested by: Tetra Tech/Hynes

Equipment Used: Infiltration Testing Equipment/Hand Auger
Weather: Sunny
Geology:
Land Use: N/A

Horizon	Upper Boundary	Lower Boundary	Soil Textural Class	Description	Soil Color	Color Patterns	Pores, Roots, Rock Structure	Depth to Bedrock	Depth to Water	Comments
	0''	6"	topsoil	topsoil	brown	Solid				
	6"	36"	SM	fine to medium sand, a little silt, trace F-C gravel	reddish brown	solid		Not Encountered	Not Encountered	%<200: 14.9

INFILTRATION TESTING SOIL LOG

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Project: Sunoco PPP - Wyomissing Valve Site
Project No.: 103IP3406
Boring/Pit No.: IT-03
Tested by: Tetra Tech/Hynes

Equipment Used: Infiltration Testing Equipment/Hand Auger
Weather: Sunny
Geology:
Land Use: N/A

Horizon	Upper Boundary	Lower Boundary	Soil Textural Class	Description	Soil Color	Color Patterns	Pores, Roots, Rock Structure	Depth to Bedrock	Depth to Water	Comments
	0''	6"	topsoil	topsoil	brown	Solid				
	6"	36"	SM	fine to medium sand, some silt, trace F-C gravel	brown	solid		Not Encountered	Not Encountered	%<200: 21.3

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Attachment 3

Laboratory Testing Summary

GEOTECHNICAL LABORATORY TESTING SUMMARY
SUNOCO PENNSYLVANIA PIPELINE PROJECT
WYOMISSING VALVE SITE

Valve Site	Soil Boring No.	Sample No.	Water Content, % (ASTM D2216)	Percent Silts/Clays, % (ASTM D1140)	Atterburg Limits (ASTM D4318) Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	USCS Classif. (ASTM D2487)
Wyomissing	IT-01	IT-01	18.1	63.1	42	22	20	CL
	IT-02	IT-02	13.2	14.9	NL	NP	NV	SM
	IT-03	IT-03	15.1	21.3	NL	NP	NV	SM

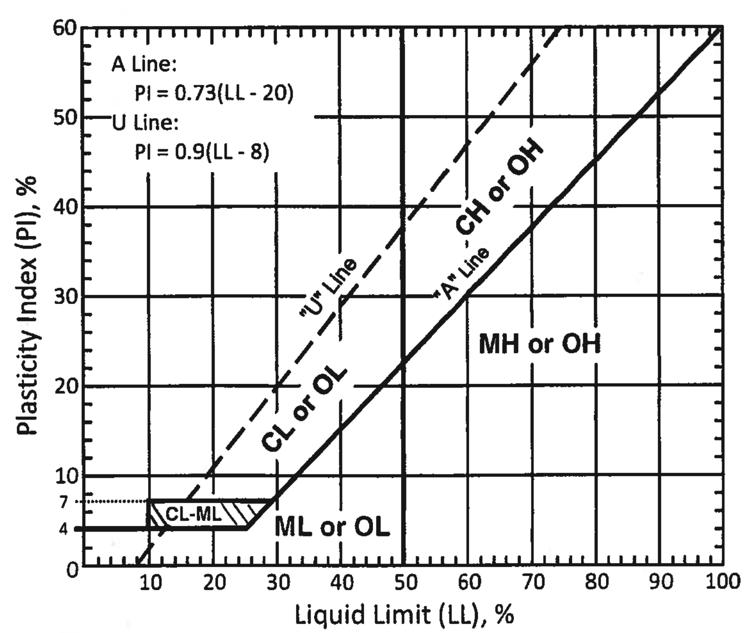
Notes:
1) Sample depths based on feet below grade at time of exploration.

UNIFIED SOIL CLASSIFICATION SYSTEM [Casagrande (1948)]

Major Divisions			Group Symbols	Typical Descriptions	Laboratory Classifications		
Coarse Grained Soils (More than half of material is larger than No. 200 sieve)	Gravels More than half of coarse fraction is larger than No. 4 sieve size	Clean gravel (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine Percentage of sand and gravel from grain size curve. Depending on Percentage of fines (fraction smaller than No. 200 sieve), coarse-grained soils are classified as follows: Less than 5 percent — GW, GP, SW, SP; More than 12 percent — GM, GC, SM, SC; 5 to 12 percent — Borderline cases requiring dual symbols[1]	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4: $C_c = \frac{(D_{30})2}{D_{10} \times D_{60}}$ between 1 and 3	
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines		Not meeting C_u or C_c requirements for GW	
		Gravel with fines (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures		Atterberg limits below A Line or I_p less than 4	Limits plotting in hatched zone with I_p between 4 and 7 are borderline cases requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures		Atterberg limits above A line with I_p greater than 7	
	Sands (More than half of coarse fraction is smaller than No. 4 Sieve)	Clean sands (Little or no fines)	SW	Well graded sands, gravely sands, little or no fines		$C_u = \frac{D_{60}}{D_{10}}$ greater than 6 $C_c = \frac{(D_{30})2}{D_{10} \times D_{60}}$ between 1 and 3	
			SP	Poorly graded sands, gravelly sands, little or no fines		Not meeting C_u or C_c requirements for SW	
		Sands with fines (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures		Atterberg limits below A Line or I_p less than 4	Limits Plotting in hatched zone with I_p between 4 and 7 are borderline cases requirlng use of dual symbols
			SC	Clayey sands, sand-clay mixtures		Atterberg limits above A line with I_p greater than 7	

Major Divisions		Group Symbols	Typical Descriptions
Fine–grained soils (More than half of material is smaller than No. 200 sieve)	Silts and clays (Liquid limit less than 50)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays , sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays (Liquid limit greater than 50)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silts
	Highly organic soils	Pt	Peat and other highly organic soils

For soils plotting nearly on A line use dual symbols i.e ., I_p = 29.5, w_L=60 gives CH-MH. When w_L is near 50 use CL-CH or ML-MH. Take near as ± 2 percent.



(1) Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC. well-graded gravel-sand mixture with clay binder.

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Attachment 4

Falling Head Singe Ring Infiltration Test and Double Ring Constant Head Test Procedures

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Falling Head Singe Ring
Infiltration Test Procedure

☐	15 gallons of clean water per test	☐	Hand Auger 4-inch bucket (with extensions)
☐	4 inch diameter thin wall PVC pipe	☐	Driving Block
☐	SledgeHammer	☐	5 gallon buckets Water
☐	3- inch hand auger bucket	☐	level indicator Gator/ATV
☐	Shovels Flat/Round	☐	level indicator Gator/ATV (as necessary)

Procedure

A. Unless directed otherwise, advance one soil boring at each test location. The boring should extend to groundwater. Accurately measure depth to groundwater and depth of each soil change. Pay close attention to soils for mottling. Contact office to determine test depth. Note: This step can be omitted if test borings were advanced during a previous site visit.

B. Advance a 4-inch diameter soil boring to the specified test depth. Check boring log to ensure that soil at bottom of excavation is soil type to be tested.

C. Cut thin wall PVC to length (approximately 1 to 2' longer than desired test depth).

D. Push/drive PVC to bottom of soil boring.

E. Using 3-inch auger, clean out bottom of test hole to remove any soils that caved in during PVC placement. Drive PVC casing an additional 2 inches to ensure that bottom of test hole does not extend beyond the bottom of the PVC pipe.

F. Collect initial test information using water level indicator

   1. Determine the total depth to the bottom of the hole from top of pipe and record.
   2. Determine riser height above ground and .record.
   3. Subtract 2 feet from total depth (See F.1.) and record.

G. Start Test\

   1. Set up water level indicator at depth determined in F.3.
   2. Fill tube with water until water level indicator alarms. To minimize soil scouring, slowly pour water down the inside of the casing wall.
   3. Record exact depth to water with level indicator

H. Run Test:

   1. Pre-soak (1 hour or less).
      a. Record depth to water every 15 minutes for first hour (pre-soak).
      b. At the end of first hour refill pipe with water to level determined Step F.3.

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Falling Head Singe Ring
Infiltration Test Procedure

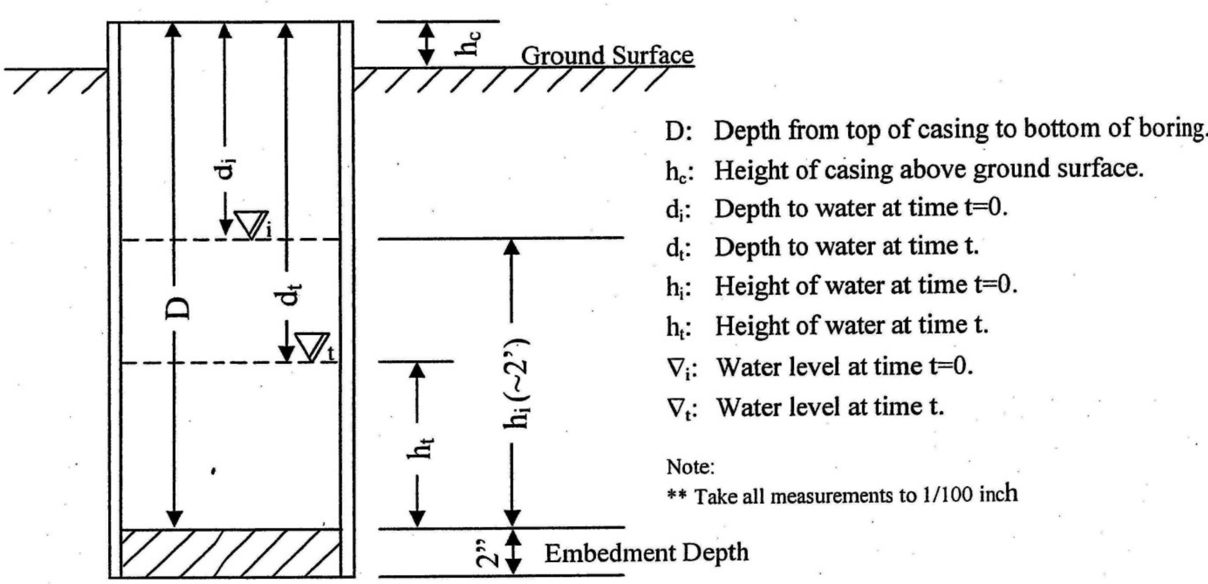
2. Infiltration testing (four, one Hour tests)
    a. Tests starts after completing Step H.1.b
    b. Record depth of water every 15 minutes (or more frequently) for one hour or until water drains from pipe.
    c. Refill pipe with water to level determined in Step F.3
    d. Repeat Step H.2.b. and c. three additional times (four test runs)
    e. Testing concludes after pre-soak and four test runs are completed

I. Calculations

Infiltration rate is calculated as inches per hour.

Determine the water level drop recorded during each one hour test (note that the water level indicator is marked in tenths of a foot. A conversion to inches is required). Multiply the water level drop recorded in tenths of a foot by 1.2 to get water level drop in inches.

All data should be recorded on pre-made forms.



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Falling Head Singe Ring
Infiltration Test Procedure

Date: ____________________ Test Location: ____________________

Depth from top of Casing to Bottom of Boring (D): ____________________

Height of Casing above Ground Surface (h_c): ____________________

Tester/ Technician Performing Test: ____________________

Time (t)	Time Elapsed	Depth to Water (d_t) Measured from top of casing to water to nearest 1/100 foot	Change

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Constant Head
Double Ring Infiltration Test

Tools and Supplies:

- ☐ 125 gallons of clean water per test
- ☐ Two infiltrometers per test
- ☐ One 12” ring per test
- ☐ One 24” ring per test
- ☐ Splash Guard
- ☐ Shovels Flat/Round
- ☐ Hand Rake
- ☐ Sledge Hammer
- ☐ Driving Block and Cap
- ☐ Purge Pump and tubing
- ☐ Battery
- ☐ Backhoe (for tests greater than 2 feet)
- ☐ Gator/ATV (as necessary
- ☐ Hand Auger (with extensions)
- ☐ Thermometer
- ☐ Supply bucket (1/2 inch PVC, tubing, funnel extra valves…..)

Procedure:

A. Unless directed otherwise, advance one soil boring at each test location. The boring should extend to groundwater. Accurately measure depth to groundwater and depth of each soil change. Pay close attention to soils for mottling. Contact office to determine test depth. Note this step can be omitted if test borings were advanced during a previous site visit.

B. Excavate test pit to specified test depth. Test pit should be sloped or benched in accordance with OSHA standards. (For safety two people will be onsite for tests deeper than 4 feet).

C. Use Flat point shovel to grade bottom of test pit. Bottom of excavation should be flat but not compacted. Check boring log to ensure that soil at bottom of excavation is soil type to be tested. (Collect and bag sample of soil at the bottom of the excavation) Include soil description and classification on worksheet.

D. Set up infiltrometer:

1. Set 24” ring at bottom of excavation.
2. Using driving block drive (ring) 3 to 4 inches into the ground (Record penetration depth).
3. Set 12” ring at bottom of excavation centered in 24” ring.
4. Using driving block drive (ring) 2 to 3 inches into the ground (Leave 12” ring approximately 1 inch higher than 24” ring.) (Record penetration depth)
5. Lightly tamp disturbed soil along inside and outside edges of rings. Do not compact soil at the bottom of the hole.
6. Use hand rake to scarify soils within the test rings.
7. Install drop tubes on infiltrometers.
8. Measure distance from bottom of drop tube to soil. Should be 5 to 6 inches. Record on attached form. Should be ± ¼ inch between two rings

Constant Head
Double Ring Infiltration Test

9. Set stand and infiltrometer on each ring.
    a. Make sure infiltrometers are oriented so that bottom valve is easy to reach.
    b. Measure distance from bottom of drop tube to soil. Should be 5 to 6 inches. Record as Hc on attached form.

E. Fill infiltrometer and ring.
1. Use pump, battery to transfer water to test set up as necessary.
2. Be sure bottom valves are closed and all top valves are open.
3. Fill infiltrometers through top valve to 0 L mark.
4. Place splash guard within rings to prevent soil scouring.
5. Fill rings until water reaches the bottom of the drop tube.
6. Water level should be ± ¼ inch between two rings.
7. Remove splash guard.

F. Start Test
1. Close all upper valves.
2. Open bottom valves.
3. Record water level (in milliliters) in sight windows on attached form. Observe water from vantage point that is approximately level with the water in the sight glass. Please note that markings on PVC casing are for reference only. Do not use these marks when observing water level.
4. Record time on attached form.

G. Monitor Test
1. Record water level in sight window and time on attached form.
2. Readings should be taken every 15 minutes for the 1st hour, 30 minutes for the second hour and every hour there after.
3. Do not allow water to drop below sight window at any time during testing.
4. Test duration is a minimum of 5 hours.
5. Refill test set up as necessary (When the water level reaches a point which will not allow another reading without running out.)
    a. Close bottom valves.
    b. Open top valves.
    c. Fill infiltrometers through top valve to 0 L mark.
    d. Record time and water level before and after filling.
    e. Close top two valves.
    f. Open bottom valve.
6. Test can be terminated when two successive permeability rates do not vary by more than 10%.

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Constant Head
Double Ring Infiltration Test

H. Calculations

Inner Ring: $V_{IR} = \Delta V_{IR} / (A_{IR} * \Delta T)$

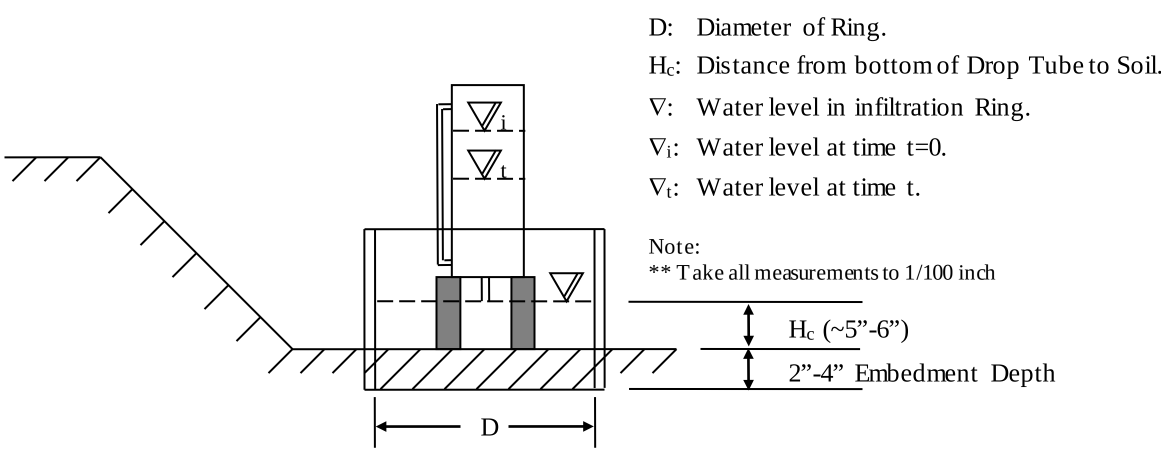
Annular Space: $V_A = \Delta V_A / (A_A * \Delta T)$

V= infiltration velocity (cm/h)

ΔV = volume of liquid used during time interval (cm^3)

ΔT= time interval in h

A= internal area of ring or annular space (cm^2)



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Attachment 5

Infiltration Testing Tables

Tt Double Ring Infiltration Test

Location:	IT-01		Project Name:	PPP - Wyomissing Valve Site		Date:	September 17, 2015	
Inner Ring Diameter:	12	inch	Soil Temperature:	77	degrees	Outer Ring Penetration:	2.50	inches
Inner Ring Area:	729.7	cm^2	Water Temperature:	64	degrees	Inner Ring Penetration:	1.50	inches
Outer Ring Diameter:	24	inch	Inner Ring Liquid Depth:	3.75	inches	Test Depth:	0.5	feet
Annular Space Area:	2189	cm^2	Annular Space Liquid Depth:	4.25	inches	Technician:	JR	

Trial	Start/End	Date	Time	delta-Time	Elapsed Time	Flow Readings				Incremental Infiltration		Notes
						Inner Ring		Annular Space		Inner Ring	Outer Ring	
				(min)	(min)	Reading (ml)	Flow (ml)	Reading (ml)	Flow (ml)	(in/hr)	(in/hr)	
1	S	9/17/15	9:00	15	15	0	250	0	1,250	0.00	0.00	
	E	9/17/15	9:15			250		1,250				
2	S	9/17/15	9:15	15	30	250	500	1,250	8,500	1.0791	6.1151	
	E	9/17/15	9:30			750		9,750				
3	S	9/17/15	9:30	15	45	750	1,000	9,750	5,250	2.1583	3.7770	
	E	9/17/15	9:45			1,750		15,000				
4	S	9/17/15	9:45	15	60	1,750	1,000	0	4,750	2.1583	3.4173	Refilled to zero
	E	9/17/15	10:00			2,750		4,750				
5	S	9/17/15	10:00	15	75	2,750	500	4,750	2,750	1.0791	1.9784	
	E	9/17/15	10:15			3,250		7,500				
6	S	9/17/15	10:15	15	90	3,250	750	7,500	5,000	1.6187	3.5971	
	E	9/17/15	10:30			4,000		12,500				
7	S	9/17/15	10:30	15	105	4,000	1,000	12,500	4,500	2.1583	3.2374	
	E	9/17/15	10:45			5,000		17,000				
8	S	9/17/15	10:45	15	120	5,000	750	17,000	2,250	1.6187	1.6187	
	E	9/17/15	11:00			5,750		19,250				
9	S	9/17/15	11:00	15	135	5,750	500	0	5,750	1.0791	4.1367	Refilled to zero
	E	9/17/15	11:15			6,250		5,750				
10	S	9/17/15	11:15	15	150	6,250	750	5,750	2,750	1.6187	1.9784	
	E	9/17/15	11:30			7,000		8,500				
11	S	9/17/15	11:30	15	165	7,000	500	8,500	4,000	1.0791	2.8777	
	E	9/17/15	11:45			7,500		12,500				
12	S	9/17/15	11:45	15	180	7,500	500	12,500	1,750	1.0791	1.2590	
	E	9/17/15	12:00			8,000		14,250				
13	S	9/17/15	12:00	15	195	8,000	250	14,250	1,750	0.5396	1.2590	
	E	9/17/15	12:15			8,250		16,000				
14	S	9/17/15	12:15	15	210	8,250	750	16,000	2,750	1.6187	1.9784	
	E	9/17/15	12:30			9,000		18,750				
15	S	9/17/15	12:30	15	225	9,000	500	0	3,000	1.0791	2.1583	Refilled to zero
	E	9/17/15	12:45			9,500		3,000				
16	S	9/17/15	12:45	16	241	9,500	500	3,000	2,250	1.0117	1.5175	
	E	9/17/15	13:00			10,000		5,250				
17	S	9/17/15	13:00	15	256	10,000	500	5,250	4,000	1.0791	2.8777	
	E	9/17/15	13:15			10,500		9,250				
18	S	9/17/15	13:15	15	271	10,500	1,000	9,250	6,500	2.1583	4.6763	
	E	9/17/15	13:30			11,500		15,750				
19	S	9/17/15	13:30	15	286	11,500	750	15,750	2,500	1.6187	1.7986	
	E	9/17/15	13:45			12,250		18,250				
20	S	9/17/15	13:45	15	301	12,250	250	0	3,250	0.5396	2.3381	Refilled to zero
	E	9/17/15	14:00			12,500		3,250				

Note: mL is equal to cm^3.

Average Hourly infiltration rate (inches per hour) = 1.4122

INFILTRATION TEST DATA SHEET

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JOB NAME: PPP - Wyomissing Valve Site

PROJECT NUMBER: 103IP3406 **TEST LOCATION:** IT-02

TEST DATE: September 17, 2015 **TEST DEPTH:** 0.54 ft

	TIME	DEPTH TO WATER BELOW GROUND SURFACE	HYDRAULIC HEAD	Δ HYDRAULIC HEAD	PERMEABILITY (K_m)		COMMENTS
Test Hour 1	9:15	-0.73 ft	1.27 ft				
	9:30	-0.12 ft	0.66 ft	0.61 ft			
	9:45	0.13 ft	0.41 ft	0.25 ft			Refilled to 1.36 feet AGS
	10:00	-1.07 ft	1.61 ft	0.29 ft			
	10:15	-0.85 ft	1.39 ft	0.22 ft	1.37 ft/hr	16.44 in/hr	
Test Hour 2	10:30	-0.48 ft	1.02 ft	0.37 ft			
	10:45	-0.16 ft	0.70 ft	0.32 ft			
	11:00	0.14 ft	0.40 ft	0.30 ft			Refilled to 1.19 feet AGS
	11:15	-0.81 ft	1.35 ft	0.38 ft	1.37 ft/hr	16.44 in/hr	
Test Hour 3	11:30	-0.57 ft	1.11 ft	0.24 ft			
	11:45	-0.35 ft	0.89 ft	0.22 ft			
	12:00	-0.17 ft	0.71 ft	0.18 ft			
	12:15	-0.04 ft	0.58 ft	0.13 ft	0.77 ft/hr	9.24 in/hr	
Test Hour 4	12:30	0.09 ft	0.45 ft	0.13 ft			
	12:45	0.15 ft	0.39 ft	0.06 ft			
	13:00	0.20 ft	0.34 ft	0.05 ft			Refilled to 1.35 feet AGB
	13:15	-0.98 ft	1.52 ft	0.39 ft	0.63 ft/hr	7.56 in/hr	
Test Hour 5	13:30	-0.58 ft	1.12 ft	0.40 ft			
	13:45	-0.44 ft	0.98 ft	0.14 ft			
	14:00	-0.23 ft	0.77 ft	0.21 ft			
	14:15	-0.02 ft	0.56 ft	0.21 ft	0.96 ft/hr	11.52 in/hr	

There are generally two acceptable methods to calculate steady state infiltration rates:

1. Time Weighted Average: 11.19 in/hr
2. Final Test Hour Reading: 11.52 in/hr

INFILTRATION TEST DATA SHEET

JOB NAME: PPP - Wyomissing Valve Site

PROJECT NUMBER: 103IP3406 **TEST LOCATION:** IT-03

TEST DATE: September 17, 2015 **TEST DEPTH:** 0.81 ft

	TIME	DEPTH TO WATER BELOW GROUND SURFACE	HYDRAULIC HEAD	Δ HYDRAULIC HEAD	PERMEABILITY (K_m)		COMMENTS
Test Hour 1	9:15	-1.14 ft	1.95 ft				
	9:30	-0.63 ft	1.44 ft	0.51 ft			
	9:45	-0.17 ft	0.98 ft	0.46 ft			
	10:00	0.04 ft	0.77 ft	0.21 ft			
	10:15	0.36 ft	0.45 ft	0.32 ft	1.50 ft/hr	18.00 in/hr	
Test Hour 2	10:30	0.53 ft	0.28 ft	0.17 ft			
	10:45	0.62 ft	0.19 ft	0.09 ft			
	11:00	0.73 ft	0.08 ft	0.11 ft			Refilled to 1.13 feet AGS
	11:15	-0.90 ft	1.71 ft	0.23 ft	0.60 ft/hr	7.20 in/hr	
Test Hour 3	11:30	-0.69 ft	1.50 ft	0.21 ft			
	11:45	-0.51 ft	1.32 ft	0.18 ft			
	12:00	-0.32 ft	1.13 ft	0.19 ft			
	12:15	-0.20 ft	1.01 ft	0.12 ft	0.70 ft/hr	8.40 in/hr	
Test Hour 4	12:30	-0.02 ft	0.83 ft	0.18 ft			
	12:45	0.02 ft	0.79 ft	0.04 ft			
	13:00	0.05 ft	0.76 ft	0.03 ft			Refilled to 1.14 feet AGS
	13:15	-0.83 ft	1.64 ft	0.31 ft	0.56 ft/hr	6.72 in/hr	
Test Hour 5	13:30	-0.56 ft	1.37 ft	0.27 ft			
	13:45	-0.47 ft	1.28 ft	0.09 ft			
	14:00	-0.26 ft	1.07 ft	0.21 ft			
	14:15	-0.09 ft	0.90 ft	0.17 ft	0.74 ft/hr	8.88 in/hr	

There are generally two acceptable methods to calculate steady state infiltration rates:

1. Time Weighted Average: 7.80 in/hr
2. Final Test Hour Reading: 8.88 in/hr