# TRIP REPORT ARCONA ROAD VALVE SITE – INFILTRATION TESTING

#### 1.0 PURPOSE

This Trip Report presents the field data and results of double-ring soil infiltration tests conducted to support the design of a stormwater management system at the Arcona Road Valve site located in Lower Allen Township, Cumberland County, Pennsylvania, as part of the Pennsylvania Pipeline Project (PPP) for Sunoco Pipeline, LP. Two deep and two shallow tests (IT-A and IT-B) were performed at the site. The test locations are listed by coordinates (latitude and longitude) in Table 1 and shown on the attached figure.

#### 2.0 FIELD ACTIVITIES

The infiltration tests were conducted by Mark Mengel and Kevin Schwab of Tetra Tech, Inc., on October 04, 2016. The test locations were positioned in the field using a handheld, WAAS-enabled GPS unit. Table 1 provides the coordinates of the test locations. Both tests were located in a tall grassy area, between an existing valve site and an impoundment pond.

The infiltration tests were performed in accordance with the procedure specified in the 2006 Pennsylvania Stormwater Best Management Practices (BMP) Manual. The test locations were prepared with hand tools and a mini-excavator, and care was taken to minimize disturbance of the soil surface to be tested. Double-ring infiltrometers were used for testing and consisted of 10-inch diameter and 6-inch diameter sections of steel casing, each 10 inches in height. After digging to the target depth, the test surface was leveled, and loose soil and debris were removed. The rings were driven a minimum of 2 inches into the soil. The infiltration test depths are presented in Table 1.

Test locations were pre-soaked for 1 hour. The tests were then conducted with measurements at 10-minute or 30-minute intervals, based on the observed water level drops during the last half of the pre-soak period. Pre-soak and test information was recorded on infiltration test data sheets; copies of the test data sheets are attached to this report.

During the testing, the weather was sunny, approximately 65-70 degrees Fahrenheit, and no precipitation was observed during the time of testing. Additionally, less than 0.5 inches of precipitation was observed 24 hours prior to testing.

Test pits were excavated near each testing location to characterize the soil, determine the depth to bedrock, if encountered, and inspect for evidence of the seasonal high water table. The test pits were identified with the corresponding infiltration test name. The test pits were machine-excavated to 2 feet below the target infiltration test depth or refusal, whichever was encountered first. Descriptions of the soil were recorded on field logs, which were based on the form example in the BMP manual. Copies of the field soil logs are attached to this report.

#### 3.0 RESULTS

#### 3.1 <u>Soil Description</u>

Soils encountered generally consisted of a relatively deep (up to 12.2 inches) dark brown (7.5YR 3/2) topsoil/surface layer composed of a silt loam with small roots throughout. This surface layer was underlain by more developed illuvial layers which trended from a silt clay to a clay with depth. Soil in the illuvial layers found near the IT-B test location contained slightly more clay which resulted in a slightly less permeable layer than that found in IT-A. Roughly 2-5% of the soil consisted of small quartzite channers and colors of the subsurface consisted mainly of a strong brown (7.5YR 5/6-7.5YR 4/6). The total depth of the soil profile was terminated at roughly 5 ft bgs with no bedrock encountered.

Seasonal high water was not observed at the testing location, nor was any mottling observed.

According to United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey data, the soil type for the test location is mapped as follows:

 Edom Silt Loam - (EdB soil symbol) with 3-8 percent slopes; with medium runoff and well drained.

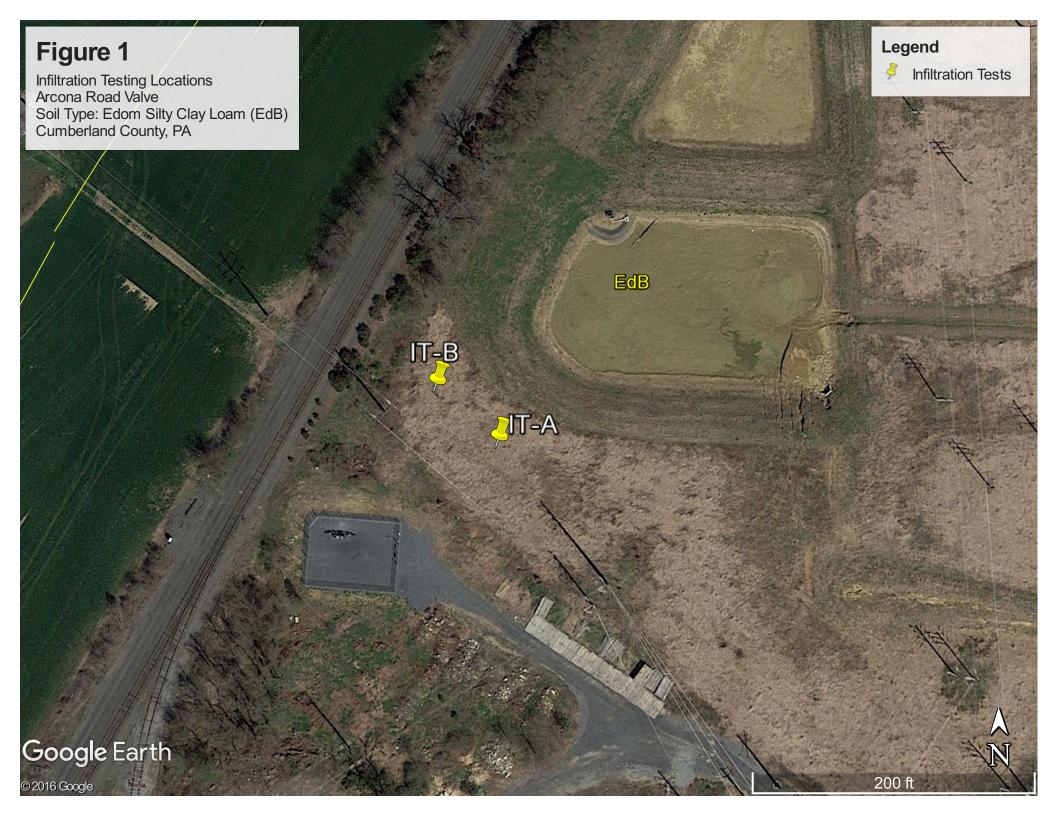
#### 3.2 <u>Infiltration Tests Results</u>

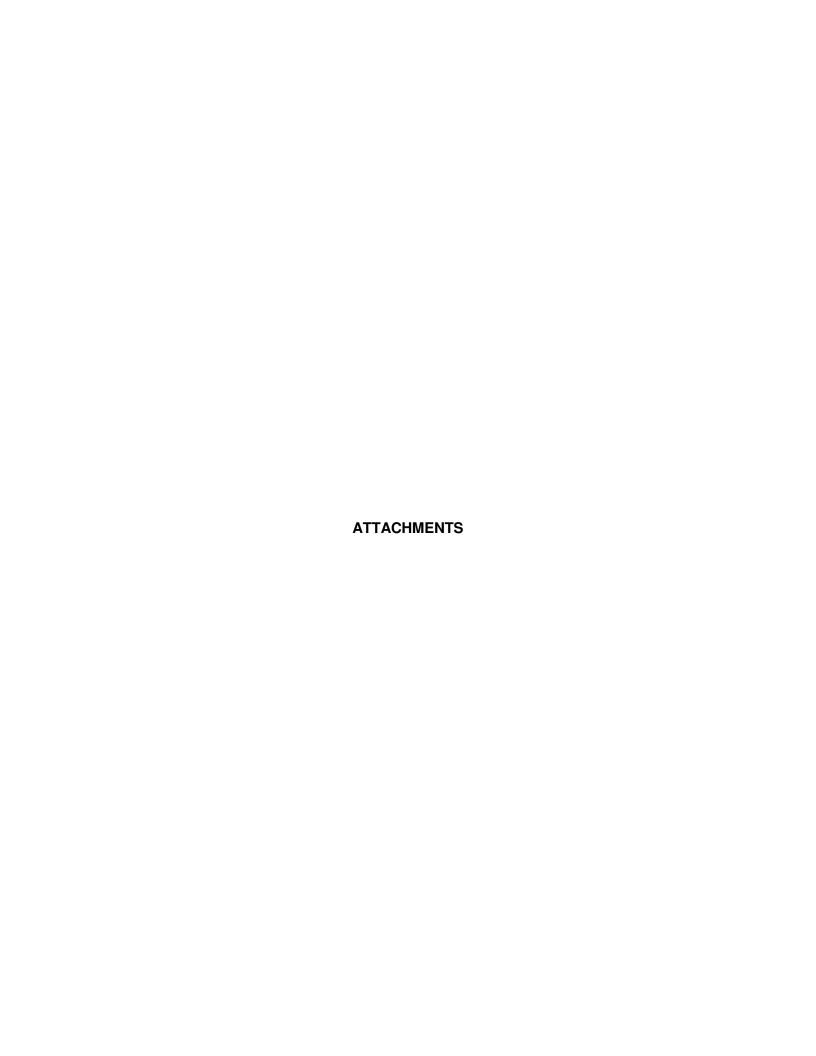
Table 1 summarizes the infiltration rates (inches per hour) calculated from the test data. Infiltration rates presented in Table 1 were calculated from the average water level drop of the last four stabilized readings measured in the inner ring.

The pre-soak test results for IT-B (deep) indicated a low infiltration rate, requiring a 30 minute test cycle; whereas, the pre-soak test results for IT-A (surface and deep) and IT-B (surface) indicated high infiltration rates, requiring 10 minute test cycles.

Table 1
Summary of Infiltration Test Results
Arcona Road Valve
Lower Allen Township, Cumberland County, PA
Sunoco PPP

Test Location	Locati	ion Data	Test Depth (inches)	Infiltration Test Result
(IT-)	LATITUDE LONGITUDE		] ' ` ` ` ´	(inches/hour)
IT-A (shallow)	40.192904°	- 076.9469980°	2	7.90
IT-A (deep)			36	5.25
IT-B (shallow)	40.1929837°	- 076.9471253°	2	12.40
IT-B (deep)			36	0.20







TŁ	TETRA	TECH
----	-------	------

### Soil Log

Tested By: KAS Kevin Schnab	Project: Ascona Rd Sunaco Project No.: 1/2 1/2 595
Test Pit: 17- A Eastern Date: 10/4/16	Equipment Used:
Geology: Soil Type:	Land Use: Flot field near Weather: portly claud
	overhead power/we

#### **Additional Comments**

Horizon	Upper Boundary	Lower Boundary	Soil Textural Class	Type, Size, Coarse Fragments, etc.	Soil Color	Color Patterns	Pores, Roots, Rock Structure	Depth to Bedrock	Depth to Water	Comments
A	0"	12"	silt loan	Finegranular	7.5/R 3/2	even	small roofs			
В	12"	22"	silt clay	fine - med weak sub-angular sub-rounded	7.5YR 5/6	1	2-5% small quartiste channers	(		
Ba	22*	43 4"	sit clay	fine-med	7.5 XR ×4					
Вз	43 4"	<i>5</i> 9"	Clay	med mod-str ongular blocky	ong 1.512 %		4			
			(	,						

Horizon:	USDA Definition	Soil Textural Class	Boundary	Notes:
0	Organic debris	Use ternary diagram from	Use depth and classification	less clay than IT-B(deep) until
А	Dark colored, mixed mineral organic matter	US Department of Agriculture Soil Conservation Service	Classification as Follows:	B3 horizon, then clay content increases
В	Maximum accumulation of silicate clay minerals	-	Clear	
С	Weathered parent material	]	Gradual	]
R	Layer of consolidated rock beneath the soil		Diffuse	

<u>Table based on:</u> Sample soil log located on page 12 of the Pennsylvania Stormwater Best Management Practices Manual <u>USDA Definitions located from:</u> http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/edu/?cid=nrcs142p2\_054308

Page of	
---------	--

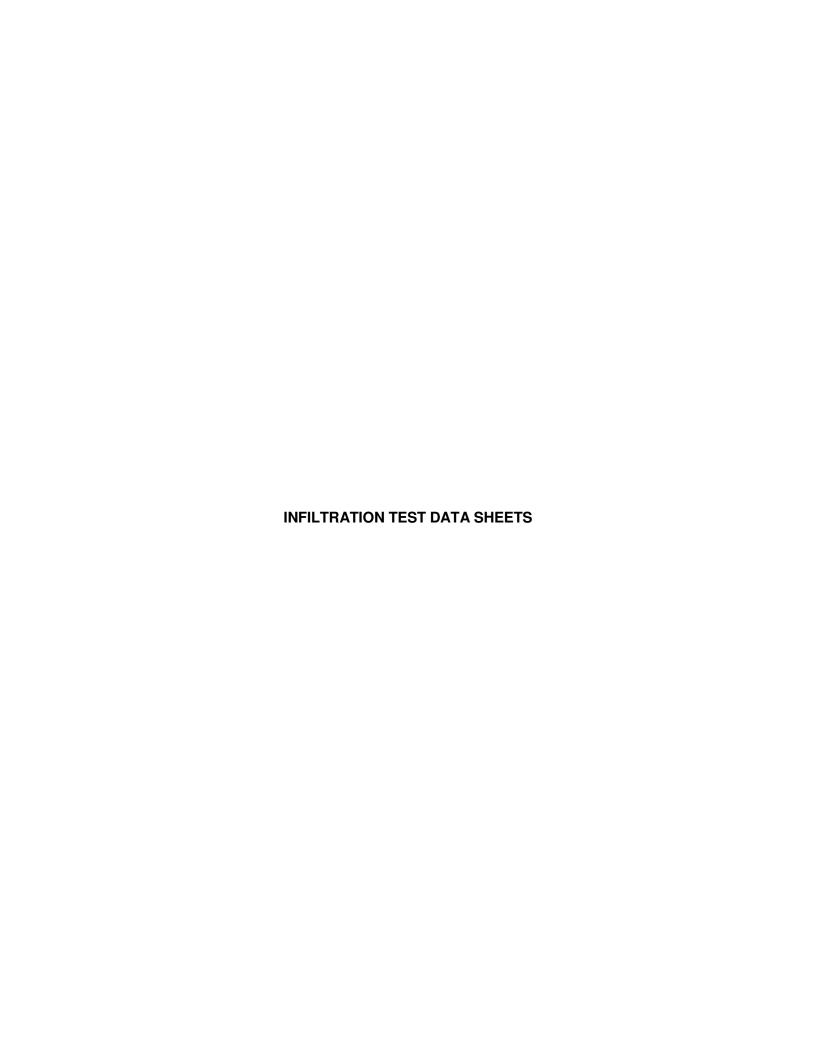
TŁ	TETRA	TECH
----	-------	------

### Soil Log

Tested By:	KAS Kevin Schnab		Project: A	rcona Rd.	Sunoas PPF	Project No.:	112 SC 0545
Test Pit:	IT-B Date:	10/4/16	Elevation:			Equipment Used:	
Geology:	Soil Type:			at field moor	ocovalue	Weather:	partly cloudy
Additional Co	ommante		Power	LINE A JOSE	aco and are		

Horizon	Upper Boundary	Lower Boundary	Soil Textural Class	Type, Size, Coarse Fragments, etc.	Soil Color	Color Patterns	Pores, Roots, Rock Structure	Depth to Bedrock	Depth to Water	Comments
A	0"	10%	Class Silt	fine grandar	25783	وبعر	small roots			
В	10 1/2"	26"	silt clay	Went sub angul	1.5/0 <sup>5</sup> /6	1	2-5% small quarts	ike		
В2	26°	60/9"	clay	med strains	7.578/6		SAA			
				•						

Horizon:	USDA Definition	Soil Textural Class	Boundary	Notes:
0	Organic debris	Use ternary diagram from	Use depth and classification	
A	Dark colored, mixed mineral organic matter	US Department of Agriculture Soil Conservation Service	Classification as Follows: Abrupt	
В	Maximum accumulation of silicate clay minerals		Clear	
С	Weathered parent material		Gradual	
R	Layer of consolidated rock beneath the soil		Diffuse	





	_							
PROJECT NAM	ie: Arcon	e o PPP A DD.	TEST AREA ID:	4.7.	Shalor A Co	Arcona St 16.T	Rd	
PROJECT NUM		05958	PERSONNEL:	KAS	Kevin			
TEST METHOI	D: Double Ring Infile Single Ring Infile	trometer Percolation	1	Location	n Coordinat	es or Descri	ption:	
DIAME	RING INSIDE TER/HEIGHT: RING INSIDE	6/10			10.192 <mark>8</mark> 76.9469			
	TER/HEIGHT:	10/10	<u> </u>			•		
PERCOLATIO	N HOLE DIAMETE	ER:	(If performing a	n open ho	le perc test)			
	10/4/16	Rainfall er ring/hole to measur	within lost	24 hr	s < 0.5	inches):	~ W	
MEASURING F		) Indicator Mark	_	EPTH OF		<b>a</b>	ક"	
TIME	ELAPSED TIME SINCE START OF TEST (minutes)	WATER LEVEL DROP, INNER RING OR PERCOLATION HOLE (inches)	VOLUME OF WAT ADDED AT EAC CYCLE, INNER RI (liters)	H		REMAR	<b>KS</b>	
PRESOAK DA	TA							
0935	0		4.26					
1005	30	3 13/16	1.4 L					
1035	60	3 17/16	1.5%					
TEST DATA		I						
1035	0							
1015	10	16/16	,81					
1055	20	16/16	·81					
1105	30	1 4/16	.656			·		
1115	40	/ 9/6			END	of te	51	
						_	<del></del>	
								·
					<del></del>			



DD O TOTAL A	SUN OCO	• -	TECT ADEA ID	-	Deep	Arcona Ro	
PROJECT NAM PROJECT NUM			TEST AREA ID: PERSONNEL:		r-A Kevin	schwab	
				#M 2	PUEVIN	S CANOLO	
TEST METHOD	<ul> <li>Oouble Ring Infilt</li> <li>Single Ring Infilt</li> </ul>	rometer Percolation	1				
INNER	RING INSIDE	4				nates or Description	on:
i e	TER/HEIGHT:	6/10		_	40.92	6964 <b>9</b>	
	RING INSIDE FER/HEIGHT:	10/10			3.0,	-/-/	
	N HOLE DIAMETE		— (If performing a		hala mara ta		
			_ ` -	_	-	•	
DATE(s):	10/4/16	- Rainfall	within last	24 /	irs L	a, 5	
Distance from the	ne bottom of the inne	r ring/note to measuri	ing point (minimun -	n water	column of	6-8 inches):	8*
MEASURING P	OINT: (Ring Rin)	Indicator Mark	] DE	EPTH O	F TEST:_	36"	· · · · · · · · · · · · · · · · · · ·
		WATER LEVEL	VOLUME OF WAT	Top			en j
TIME	ELAPSED TIME SINCE START OF	DROP, INNER RING	ADDED AT EAC	H		REMARKS	and the second s
	TEST (minutes)	OR PERCOLATION HOLE (inches)	CYCLE, INNER RI (liters)	NG			
PRESOAK DAT	ΓA						
0930	<b>Q</b>		4.26				
1000	30	3 4/4	1.5L				
1030	60	2 3/16	1.2 6				
		-					
TEST DATA							
/030	•		en nisterio joriji 1948			**************************************	11881 - P2003888-1
1090		14/16	•4 L				
<u> </u>	/0	14/16				<del></del>	
1050	20	141.	• 4 L	-			
1100	30	14/16	.47				
1110	40	11/16	<u>-</u>		END	OF YEST	
			<del></del>				
						<del></del>	<del></del>
						<del></del>	



				1	
SUN OC		loco ppp		Arcona Ro	
PROJECT NAME:  PROJECT NUMBER:  #2.01			TEST AREA ID: PERSONNEL:	IT-B Western IT Shallow	
PROJECT NUI	MBER: <u>//2.4.C</u>	05958	PERSONNEL: _	Kevin Schwab	
TEST METHO	D: Double Ring Infil Single Ring Infilt	trometer Percolation	1	Location Coordinates or Description:	
INNER RING INSIDE				40.1929837	
DIAMETER/HEIGHT:		_	-0769471253		
DIAMETER/HEIGHT: OUTER RING INSIDE DIAMETER/HEIGHT:				-0/6/17/1A23	
	ON HOLE DIAMETE	•	(If performing ar	n open hole perc test)	
DATE(s): 10/4/6 Rainfall within last 24 hrs <0.5"  Distance from the bottom of the inner ring/hole to measuring point (minimum water column of 6-8 inches):					
			'	•	
MEASURING	POINT: (Ring Rim	➤ Indicator Mark	DE	PTH OF TEST:	
TIME	ELAPSED TIME SINCE START OF TEST (minutes)	WATER LEVEL DROP, INNER RING OR PERCOLATION HOLE (inches)	VOLUME OF WATE ADDED AT EACH CYCLE, INNER RIN (liters)	I DEMARKS	
PRESOAK DA	ATA				
1005	0		4.22	1015 down 4" added 2.11 1038 do	
1035	30	1 % 6	0.9L	1050 down 4" oddod 2.1 L	
1105	60	3 %/6	1.85L		
TEST DATA					
1105	0				
1115	18	3/16	1.104		
1125	90	21/6	1.10L		
1135	30	216	1.10 L		
1145	40	214	. 55%	END OF TEST	
· ·					
<del></del>					
	<u> </u>				
i	1	1		1	



INNER DIAM OUTE DIAM PERCOLATIO	ME: ARCO MES MBER: //31C DO DOUBLE Ring Infilt Single Ring Infilt R RING INSIDE ETER/HEIGHT: R RING INSIDE ETER/HEIGHT: ON HOLE DIAMETE	trometer Percolation rometer  G/ro  10/10  R: NA	(If performing a	Ascena Retent TT Deep Western TT Deep Wastern
MEASURING	POINT: King Rin	Indicator Mark	DI	EPTH OF TEST: 36"
TIME	ELAPSED TIME SINCE START OF TEST (minutes)	WATER LEVEL DROP, INNER RING OR PERCOLATION HOLE (inches)	VOLUME OF WAT ADDED AT EAC CYCLE, INNER RI (liters)	H REMARKS
PRESOAK DA			لـ۵	
1000	30	13/16	4.2L .45L	
1100	60	5/16	1204	
TEST DATA	30 60	2/1L 2/1L	•/5 L	
1330	90 120	1/16	•1 4	END OF TEST