GEOTECHNICAL TESTING REPORTS

We're here for you UNITED CONSULTING	N	Scale:	As Shown	Notes:	**Client:**	CH2M HILL
		Prepared:	AJR		**Site:**	HOWELL MILL SEWER OUTFALL
		Checked:	RIO			
		Project No.:	2016.5764.01		**Title:**	Borings Location Plan

FIG. 1

EXPLORATION PROCEDURES

Eight (8) SPT borings (designated HM-1 to HM-8) and two auger borings (HM-9 and HM-10) were performed at the approximate locations indicated on the attached Boring Location Plan (Figure 1). The SPT borings were performed in general accordance with ASTM D 1586. Soil samples obtained during testing were visually evaluated by the Project Engineer and classified according to the visual-manual procedure described in ASTM D 2488. A narrative of field operations is included in The Appendix.

The test locations were determined by our field engineer using a master plan provided by client and a Trimble GeoXH, rated as a sub-foot unit (horizontal accuracy) GPS Unit with a +/- 3 ft accuracy. These locations are shown on the attached Boring Location Plan (Figure 1) and should be considered approximate. The elevations shown on the test logs were obtained also using the GeoXH GPS Unit but should be considered very approximate. The provided elevation should not be relied upon during the design.

Boring and Rock Core Logs

GENERAL NOTES

The soil classifications noted on the Boring Logs are visual classifications unless otherwise noted. Minor constituents of a soil sample are termed as follows:

Trace	0 - 10%
Some	11 - 35%
Suffix "y" or "ey"	36 - 49%

LEGEND

Split Spoon Sample obtained during Standard Penetration Testing

Relatively Undisturbed Shelby Tube Sample

Groundwater Level at Time of Boring Completion

Groundwater Level at 24 hours (or as noted) after Termination of Boring

w	Natural Moisture Content	
LL	Liquid Limit	
PL	Plastic Limit	Atterberg Limits
PI	Plasticity Index	
PF	Percent Fines (Percent Passing #200 Sieve)	
γ_d	Dry Unit Weight (Pounds per Cubic Foot or PCF	
γ_m	Moist or In-Situ Unit Weight (PCF)	
γ_{sat}	Saturated Unit Weight (PCF)	

BORING LOG DATA AND NARRATIVE OF DRILLING OPERATIONS

The test borings were made by mechanically advancing helical hollow stem augers into the ground. Samples were covered at regular intervals in each of the borings following established procedures for performing the Standard Penetration Test in accordance with ASTM Specification D-1586. Soil samples were obtained with a standard 1.4" I.D. x 2.0" O.D. split barrel sampler. The sampler is first seated 6" to penetrate any loose cuttings and then driven an additional foot with the blows of a 140 pound hammer freely falling a distance of 30". The number of blows required to drive the sampler each six inches is recorded on the Boring Logs. The total number of blows required to drive the sampler the final foot is designated the "standard penetration resistance." This driving resistance, known as the "N" value, is a measure of the relative density of granular soils and is an indication of the consistency of cohesive deposits.

The Following table describes soil consistencies and relative densities based on standard-penetration resistance values (N) determined by the Standard Penetration Test.

	"N"	Consistency
	0-2	Very Soft
	3-4	Soft
	5-8	Firm
Clay and Silt	9-15	Stiff
	16-30	Very Stiff
	Over 31	Hard

	"N"	Relative Density
	0-4	Very Loose
	5-10	Loose
	11-19	Firm
Sand	20-29	Medium Dense
	30-49	Dense
	50+	Very Dense

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BORING LOG

Boring ID : HM-1

Sheet 1 of 1

CLIENT: **CH2M HILL**	SITE LOCATION: **Howell Mill Rd & Peachtree Battle Avenue NW**	
PROJECT NAME: **Howell Mill Sewer Outfall**	WATER LEVEL - IMMEDIATE: **Not Encountered**	
PROJECT NUMBER: **2016.5764.01**	DRILLING METHOD/TYPE: **SPT Hollow Stem Augers**	BORING DEPTH: **20 Feet**
LOGGED BY: **Andrew Raysin**	DATE DRILLED: **9/6/2016**	CORING DEPTH: **N/A**
Drilling Company/Drill Rig **Kilman Bros Inc / CME 550**	X COORDINATE/LAT (ft): **12289224.07**	Y COORDINATE/LONG (ft): **2424729.43**

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGY: LITHOLOGIC SYMBOL	LITHOLOGY: GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	SPT: ELEVATION (Ft)	SPT: RECOVERY (in. or %)	SPT: Blows/6"	SPT: N-VALUE (bpf)	NOTES
0			Silt-sandy, trace clay stiff; tan-red (Residual)(ML)	819				
				818	20	6-7-8-8	15	
				817				
				816	18	3-4-6-7	10	
			-firm; tan	815				Plastic Limit=Non Plastic; Liquid Limit = No Value; Plasticity Index=Non Plastic
5				814	18	2-2-3-3	5	
			-some clay; soft; tan-red	813				
				812	18	2-2-2-2	4	
			-firm	811				
				810	18	2-3-3-3	6	
10				809				
				808	20	3-3-3-3	6	
			-trace rock fragments; stiff	807				
				806	12	4-5-6-6	11	
			-firm	805				
15				804	16	3-4-3-5	7	
			Sand-some silt, trace clay and mica; loose; red-brown (SM)	803				
				802	14	4-4-4-4	8	
			-trace rock fragments	801				Slightly damp soil
				800	16	2-3-3-3	6	
20			BORING TERMINATED AT 20 FEET	799	16		6	No groundwater encountered at time of drilling
				798				

N-value (bpf) 0 5 10 15 20

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
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BORING LOG

Boring ID : HM-2

Sheet 1 of 1

CLIENT: **CH2M HILL**	SITE LOCATION: **Howell Mill Rd & Peachtree Battle Avenue NW**	
PROJECT NAME: **Howell Mill Sewer Outfall**	WATER LEVEL - IMMEDIATE: **Not Encountered**	
PROJECT NUMBER: **2016.5901.01**	DRILLING METHOD/TYPE: **SPT Hollow Stem Augers**	BORING DEPTH: **16 Feet**
LOGGED BY: **Andrew Raysin**	DATE DRILLED: **9/2/2016**	CORING DEPTH: **N/A**
Drilling Company/Drill Rig **Kilman Bros Inc / CME 550**	X COORDINATE/LAT (ft): **12289112.47**	Y COORDINATE/LONG (ft): **2424529.55**

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGY: LITHOLOGIC SYMBOL	LITHOLOGY: GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	SPT: ELEVATION (Ft)	SPT: RECOVERY (in. or %)	SPT: Blows/6"	SPT: N-VALUE (bpf)	NOTES
0			Clay-some silt and sand; stiff; red (Fill)(CL)	839				
			Silt-sandy, trace clay and mica; very stiff; tan-brown (Residual)(ML)	838	24	3-9-10-10	19	
			-trace rock fragments	837				
				836	20	6-7-10-17	17	
				835				
5				834	22	9-10-10-13	20	
			-stiff	833				
				832	20	4-4-6-7	10	
				831				Plastic Limit = Non Plastic; Liquid Limit = No Value; Plasticity Index = Non Plastic
			Sand-some silt, trace clay and rock fragments; medium dense; brown-tan (SM)	830	24	8-11-12-15	23	
10			-firm	829				
				828	24	5-7-7-8	14	
				827				
			Partially weathered rock sampled as sand-some rock fragments, trace silt, clay and mica; grey	826	7	12-15-50/3	100	
			Sand-trace clay, silt and rock fragments; medium dense; grey (SW)	825				
15				824	24	18-15-13-11	28	
			AUGER REFUSAL AT 16 FEET	823			28	No groundwater encountered at time of drilling
				822				

N-value (bpf): 0, 25, 50, 75, 100

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
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BORING LOG

Boring ID : HM-3

Sheet 1 of 1

CLIENT: **CH2M HILL**	SITE LOCATION: **Howell Mill Rd & Peachtree Battle Avenue NW**	
PROJECT NAME: **Howell Mill Sewer Outfall**	WATER LEVEL - IMMEDIATE: **Not Encountered**	
PROJECT NUMBER: **2016.5764.01**	DRILLING METHOD/TYPE: **SPT Hollow Stem Augers**	BORING DEPTH: **30 Feet**
LOGGED BY: **Andrew Raysin**	DATE DRILLED: **9/2/2016**	CORING DEPTH: **N/A**
Drilling Company/Drill Rig **Kilman Bros Inc / CME 550**	X COORDINATE/LAT (ft): **12289068.67**	Y COORDINATE/LONG (ft): **2424400.73**

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGY: LITHOLOGIC SYMBOL	LITHOLOGY: GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	SPT: ELEVATION (Ft)	SPT: RECOVERY (in. or %)	SPT: Blows/6"	SPT: N-VALUE (bpf)	NOTES
0			Silt-sandy, trace clay; very stiff; brown-tan (Residual)(ML)	828	20	4-7-9-15	16	
				826	18	8-13-16-18	29	
				824	20	12-12-10-10	22	
5				822	24	9-11-12-15	23	
			-stiff	820	20	5-6-7-7	13	
10				818	24	3-4-10-12	14	
			-very stiff	816	24	10-13-15-18	28	
				814	20	8-11-14-17	25	
15			-stiff	812	24	4-5-5-7	10	
				810	24	6-9-9-10	18	Plastic Limit = Non Plastic; Liquid Limit = No Value; Plasticity Index = Non Plastic
20			-very stiff; white-tan	808	24	7-8-8-9	16	
			-tan-brown	806	24	6-9-11-17	20	
			Clay-silty, some sand; very stiff; light tan (CL)	804	24	9-11-11-15	22	
25			-hard	802	24	10-15-19-22	34	
				800	24	13-16-19-25	30	
30			BORING TERMINATED AT 30 FEET	798	24		30	No groundwater encountered at time of drilling
				796				

N-value (bpf): 0, 10, 20, 30

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
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BORING LOG

Boring ID : HM-4

Sheet 1 of 1

CLIENT: **CH2M HILL**	SITE LOCATION: **Howell Mill Rd & Peachtree Battle Avenue NW**	
PROJECT NAME: **Howell Mill Sewer Outfall**	WATER LEVEL - IMMEDIATE: **25 Feet**	
PROJECT NUMBER: **2016.5764.01**	DRILLING METHOD/TYPE: **SPT Hollow Stem Augers**	BORING DEPTH: **30 Feet**
LOGGED BY: **Andrew Raysin**	DATE DRILLED: **9/2/2016**	CORING DEPTH: **N/A**
Drilling Company/Drill Rig **Kilman Bros Inc / CME 550**	X COORDINATE/LAT (ft): **12289043.87**	Y COORDINATE/LONG (ft): **2424195.54**

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGY: LITHOLOGIC SYMBOL	LITHOLOGY: GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	SPT: ELEVATION (Ft)	SPT: RECOVERY (in. or %)	SPT: Blows/6"	SPT: N-VALUE (bpf)	NOTES
0			Clay-some sand and silt; stiff; red (Fill)(CL)	820	24	3-5-7-7	12	
			Silt-some clay and sand, trace rock fragments; stiff; tan-orange (Residual)(ML)	818	24	4-5-6-7	11	
				816	24	6-7-8-9	15	
5				814	24	5-5-6-7	11	
				812	20	4-4-4-5	8	
			-firm	810	24	4-5-5-5	10	
10			-stiff	808	24	5-6-6-6	12	Damp soil
				806	24	6-7-9-11	16	
				804	24	6-8-8-7	16	
15			-very stiff	802	24	4-4-8-9	12	
				800	20	5-7-10-12	17	
			-sandy, trace clay; very stiff; white-tan	798	22	6-10-16-18	26	
20			-tan-brown	796	24	12-10-10-12	20	Plastic Limit = 25%; Liquid Limit = 40%; Plasticity Index = 15%
	▼		Clay-silty, some sand; very stiff; light tan (CL)					Groundwater encountered at 25 feet
25			-hard	794	20	8-8-10-11	18	
				792	24	6-9-11-17	20	
30			BORING TERMINATED AT 30 FEET	790	24		20	
				788				

N-value (bpf): 0 10 20

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
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BORING LOG

Boring ID : HM-5

Sheet 1 of 1

CLIENT: **CH2M HILL**	SITE LOCATION: **Howell Mill Rd & Peachtree Battle Avenue NW**	
PROJECT NAME: **Howell Mill Sewer Outfall**	WATER LEVEL - IMMEDIATE: **25 Feet**	
PROJECT NUMBER: **2016.5764.01**	DRILLING METHOD/TYPE: **SPT Hollow Stem Augers**	BORING DEPTH: **35 Feet**
LOGGED BY: **Andrew Raysin**	DATE DRILLED: **9/1/2016**	CORING DEPTH: **N/A**
Kilman Bros Inc. CME 550 **Kilman Bros Inc / CME 550**	X COORDINATE/LAT (ft): **12289010.25**	Y COORDINATE/LONG (ft): **2423975.13**

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGY: LITHOLOGIC SYMBOL	LITHOLOGY: GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	SPT: ELEVATION (Ft)	SPT: RECOVERY (in. or %)	SPT: Blows/6"	SPT: N-VALUE (bpf)	NOTES
0			Silt-sandy, trace clay; stiff; white-tan (Residual)(ML)	818	24	4-5-6-7	11	
				816	18	4-5-7-8	12	
			-firm; tan	814	20	3-4-4-6	8	
5				812	20	3-3-4-5	7	
			-stiff	810	22	3-5-5-6	10	
10			-firm	808	24	2-2-3-4	5	
				806	22	3-4-4-5	8	
				804	24	3-3-5-5	8	Damp soil
15				802	24	3-4-4-4	8	Plastic Index= 28%; Liquid Limit = 35; Plasticity Index = 7%
			-stiff	800	16	10-7-8-7	15	
20			-firm; light tan	798	24	3-4-4-4	8	
			-stiff	796	24	4-5-10-12	15	
				794				
25	▽		-very stiff	792	20	6-6-10-11	16	Groundwater encountered at 25 feet
			Partially weathered rock sampled as sand-trace silt and clay; very dense; white-brown		5	4-100	100/100	
			AUGER REFUSAL AT 27 FEET	790				
30				788				

N-value (bpf): 0, 25, 50, 75, 100

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
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HOWELL MILL SEWER OUTFALL

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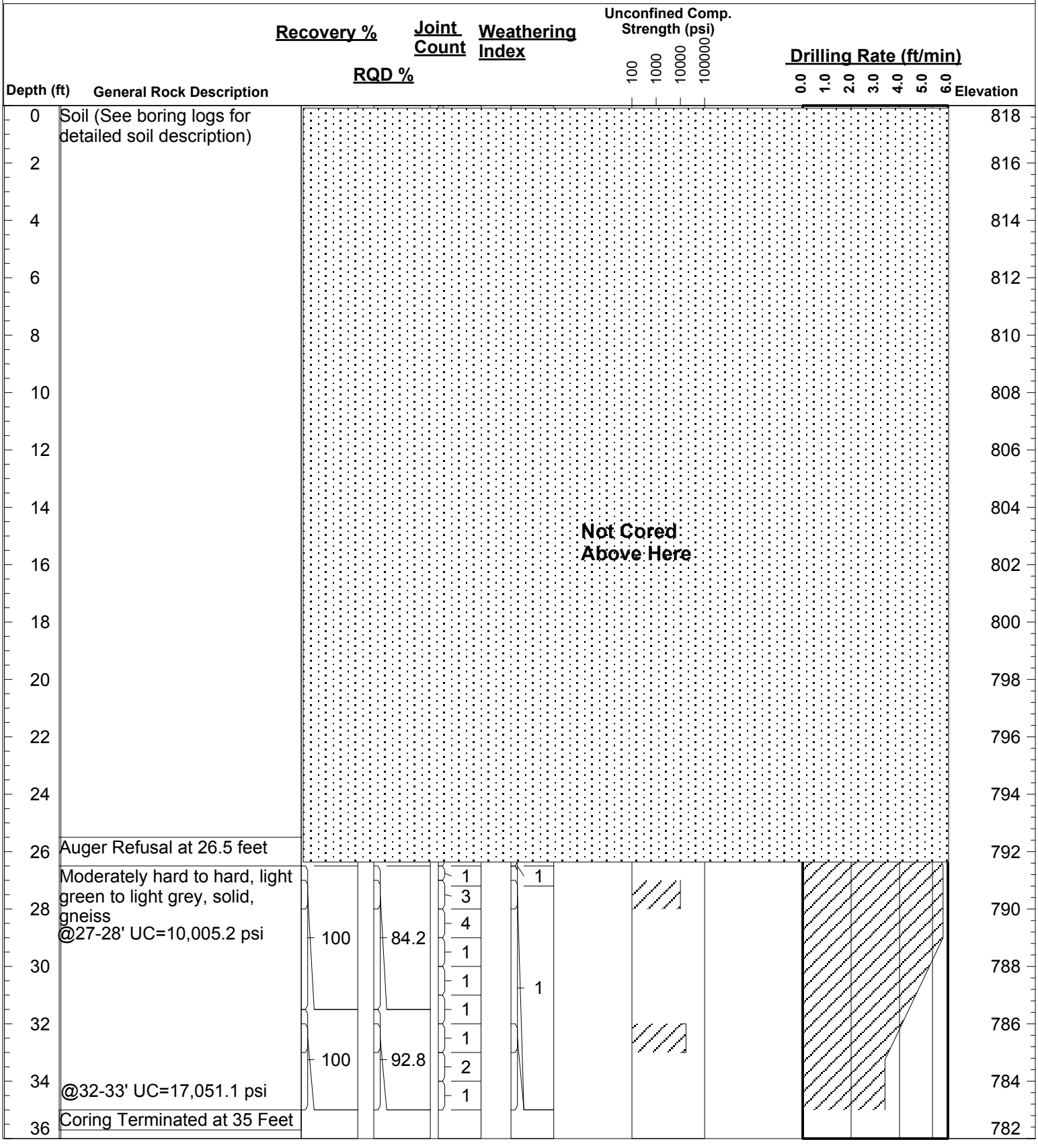
(in feet)	Depth	Elev.
Ground Level	0	818
Bottom of Casing	26.5	791.5
Invert level.	-	-
Bottom of Hole	35	791.5
Water Level	-	-

Station & Offset:	-	HM-5
Dates Drilled:	9/6/16	to 9/6/16
Angle & Bearing:	-	-
Method:	NQ coring (double tube)	
Version:	Oct-4-16	

HM-5



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BORING LOG

Boring ID : HM-6

Sheet 1 of 1

CLIENT: **CH2M HILL**	SITE LOCATION: **Howell Mill Rd & Peachtree Battle Avenue NW**	
PROJECT NAME: **Howell Mill Sewer Outfall**	WATER LEVEL - IMMEDIATE: **17 Feet**	
PROJECT NUMBER: **2016.5764.01**	DRILLING METHOD/TYPE: **SPT Hollow Stem Augers**	BORING DEPTH: **30 Feet**
LOGGED BY: **Andrew Raysin**	DATE DRILLED: **8/31/16**	CORING DEPTH: **N/A**
Drilling Company/ Drill Rig **Kilman Bros Inc / CME 550**	X COORDINATE/LAT (ft): **12289076.66**	Y COORDINATE/LONG (ft): **2423790.55**

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGY: LITHOLOGIC SYMBOL	LITHOLOGY: GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	SPT: ELEVATION (Ft)	SPT: RECOVERY (in. or %)	SPT: Blows/6"	SPT: N-VALUE (bpf)	NOTES
0			Silt-some sand, clay and gravel; stiff; tan-orange (Fill)(ML)	805				
				804	20	3-5-6-8	11	
				803				
			Silt-sandy, trace clay; stiff; tan (Residual)(ML)	802	24	7-7-8-8	15	
				801				
5			-very stiff	800	24	7-11-11-12	22	
				799				
			Partially weathered rock as sand-trace silt, clay and rock fragments; very dense; white	798	18	20-27-100	100	
			Silt-sandy, trace clay; stiff; white (ML)	797				
				796	16	10-5-5-6	10	
10				795				
			Partially weathered rock as sand-some rock fragments, trace silt and clay; white-brown	794	14	5 - 5-100	100	
				793				
			-grey	792	14	5-6-6-100	100	
				791				Plastic Limit = Non Plastic; Liquid Limit = No Value; Plasticity Index = Non Plastic
15				790	5	100-	100	
				789				
	▽		Sand-some silt and gravel, trace clay; firm; tan (SM)	788	24	3-8-10-10	18	Stabilized groundwater encountered at 17 feet
				787				
			Partially weathered rock as sand-some silt and rock fragments, trace clay; very dense; grey-brown	786	15	9 -15-100	100	
20				785			100	
			AUGER REFUSAL AT 20 FEET	784				

N-value (bpf) scale: 0, 25, 50, 75, 100

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
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HOWELL MILL SEWER OUTFALL

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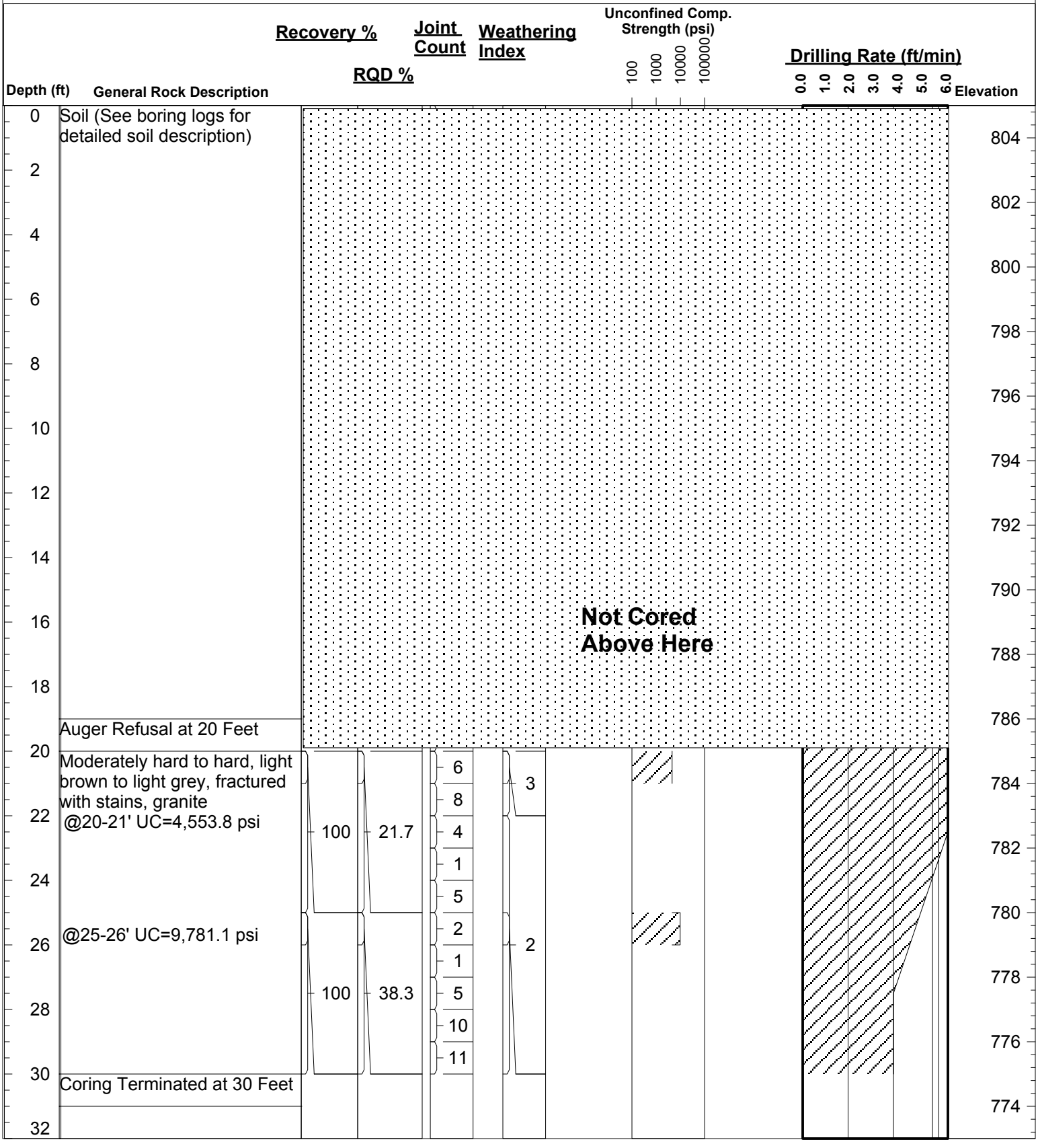
(in feet)	Depth	Elev.
Ground Level	0	805
Bottom of Casing	30	775
Invert level.	-	-
Bottom of Hole	30	775
Water Level	-	-

Station & Offset:	-	HM-6
Dates Drilled:	9/6/16	to 9/6/16
Angle & Bearing:	-	-
Method:	NQ coring (double tube)	
Version:	Oct-4-16	

HM-6



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BORING LOG

Boring ID : HM-7

Sheet 1 of 1

CLIENT: **CH2M HILL**	SITE LOCATION: **Howell Mill Rd & Peachtree Battle Avenue NW**	
PROJECT NAME: **Howell Mill Sewer Outfall**	WATER LEVEL - IMMEDIATE: **18 Feet**	
PROJECT NUMBER: **2016.5764.01**	DRILLING METHOD/TYPE: **SPT Hollow Stem Augers**	BORING DEPTH: **20 Feet**
LOGGED BY: **Andrew Raysin**	DATE DRILLED: **9/1/2016**	CORING DEPTH: **N/A**
Drilling Company/ Drill Rig **Kilman Bros Inc / CME 550**	X COORDINATE/LAT (ft): **12289192.94**	Y COORDINATE/LONG (ft): **2423554.82**

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGY: LITHOLOGIC SYMBOL	LITHOLOGY: GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	SPT: ELEVATION (Ft)	SPT: RECOVERY (in. or %)	SPT: Blows/6"	SPT: N-VALUE (bpf)	NOTES
0			Silt-sandy, trace clay; firm; white (Residual)(ML)	784	19	3-3-4-6	7	
			-tan	782	18	3-3-3-3	6	
			-trace root fragments; tan-brown	780	16	3-3-3-3	6	
5			-no roots; grey	778	20	3-3-4-4	7	
			-stiff	776	14	5-5-6-7	11	
10	▼		-trace rock fragments; very stiff	774	18	7-8-9-6	17	Stabilized groundwater measured at 10 feet
			-no rocks; firm; green-white	772	24	2-2-3-3	5	Plastic Limit=35%; Liquid Limit =43%; Plasticity Index=8%
			-tan-yellow	770	24	2-3-5-5	8	Damp soil
15			Sand-some silt and rock fragments, trace clay; loose tan (SM)	768	24	2-4-5-6	9	
				766	24	3-4-4-10	8	Groundwater encountered at 18 feet at time of drilling Saturated soil
20			BORING TERMINATED AT 20 FEET	764			8	
				762				

N-value (bpf): 0, 5, 10, 15

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
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BORING LOG

Boring ID : HM-8

Sheet 1 of 1

CLIENT: **CH2M HILL**	SITE LOCATION: **Howell Mill Rd & Peachtree Battle Avenue NW**	
PROJECT NAME: **Howell Mill Sewer Outfall**	WATER LEVEL - IMMEDIATE: **Not Encountered**	
PROJECT NUMBER: **2016.5764.01**	DRILLING METHOD/TYPE: **SPT Hollow Stem Augers**	BORING DEPTH: **15 Feet**
LOGGED BY: **Andrew Raysin**	DATE DRILLED: **8/31/2016**	CORING DEPTH: **N/A**
Drilling Company/ Drill Rig **Kilman Bros Inc / CME 550**	X COORDINATE/LAT (ft): **12288919.65**	Y COORDINATE/LONG (ft): **2423420.62**

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGY: LITHOLOGIC SYMBOL	LITHOLOGY: GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	SPT: ELEVATION (Ft)	SPT: RECOVERY (in. or %)	SPT: Blows/6"	SPT: N-VALUE (bpf)	NOTES
0			Asphalt/GAB	779	12		0	0 to 1 feet considered existing groundcover
			Silt-clayey, some sand; firm; tan-red (Fill)(ML)	778				
				777	20	3-4-4-6	8	
			Silt-some sand, clay and gravel; firm; tan-white-red (Residual)(ML)	776				
				775	24	3-3-4-6	7	Plastic Limit = 32%; Liquid Limit=47%; Plasticity Index=15%
5			-trace clay; tan-orange	774				
				773	20	3-3-4-5	7	
			-orange-brown	772				
				771	24	3-4-4-5	8	
			-stiff; white-red	770				
10				769	24	3-5-7-7	12	
			-firm; grey-brown	768				Damp soil
				767	24	3-3-4-4	7	
			-stiff	766				
				765	24	4-7-7-8	14	
15			BORING TERMINATED AT 15 FEET	764			14	No groundwater encountered at time of drilling
				763				
				762				

N-value (bpf) 0 5 10

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
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BORING LOG

Boring ID : HM-9

Sheet 1 of 1

CLIENT: **CH2M HILL**	SITE LOCATION: **Howell Mill Rd & Peachtree Battle Avenue NW**	
PROJECT NAME: **Howell Mill Sewer Outfall**	WATER LEVEL - IMMEDIATE: **Not Encountered**	
PROJECT NUMBER: **2016.5764.01**	DRILLING METHOD/TYPE: **SPT Hollow Stem Augers**	BORING DEPTH:
LOGGED BY: **Andrew Raysin**	DATE DRILLED: **9/6/2016**	CORING DEPTH: **N/A**
Drilling Company/ Drill Rig **Kilman Bros Inc / CME 550**	X COORDINATE/LAT (ft): **12289104.53**	Y COORDINATE/LONG (ft): **2424510.57**

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGY: LITHOLOGIC SYMBOL	LITHOLOGY: GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	SPT: ELEVATION (Ft)	SPT: RECOVERY (in. or %)	SPT: Blows/6"	SPT: N-VALUE (bpf)	SPT: N-value (bpf) 0 0.25 0.5 0.75 1	NOTES
0			Sand-silty (Residual)	826					Straight auger boring
5				824					
10				822					
15				820					
20				818					
25				816					
30			AUGER REFUSAL AT 30 FEET	814					No groundwater encountered at time of drilling
				812	N/A	N/A	N/A	N/A	
				810					
				808					
				806					
				804					
				802					
				800					
				798					
				796					
				794					

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
H:/Strater Boring Logs/

HOWELL MILL SEWER OUTFALL

UNITED CONSULTING GROUP, LTD.

(in feet)	Depth	Elev.
Ground Level	0	826
Bottom of Casing	30	35
Invert level.	-	-
Bottom of Hole	35	791
Water Level	-	-

Station & Offset:	-	HM-9
Dates Drilled:	9/6/16	to 9/6/16
Angle & Bearing:	-	-
Method:	NQ coring (double tube)	
Version:	Sept-27-16	

HM-9

Recovery %
RQD %
Joint Count
Weathering Index
Unconfined Comp. Strength (psi): 100, 1000, 10000, 100000
Drilling Rate (ft/min): 0.0, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0

Depth (ft)	General Rock Description	Recovery %	RQD %	Joint Count	Weathering Index	Elevation
0	Soil (See boring logs for detailed soil description)					826
2						824
4						822
6						820
8						818
10						816
12						814
14						812
16	Not Cored Above Here					810
18						808
20						806
22						804
24						802
26						800
28						798
30	Auger Refusal at 30 Feet					796
32	Moderately hard to hard, light green to light grey, solid, gneiss	100	60	2, 6, 4, 3, 3	2	794
34	@34-35' UC=7,969.1 psi					792
36	Coring Terminated at 35 Feet					790

UNITED CONSULTING

BORING LOG

Boring ID : HM-10

Sheet 1 of 1

CLIENT: **CH2M HILL**	SITE LOCATION: **Howell Mill Rd & Peachtree Battle Avenue NW**	
PROJECT NAME: **Howell Mill Sewer Outfall**	WATER LEVEL - IMMEDIATE: **Not Encountered**	
PROJECT NUMBER: **2016.5764.01**	DRILLING METHOD/TYPE: **SPT Hollow Stem Augers**	BORING DEPTH: **21 Feet**
LOGGED BY: **Andrew Raysin**	DATE DRILLED: **9/6/2016**	CORING DEPTH: **N/A**
Drilling Company/ Drill Rig **Kilman Bros Inc / CME 550**	X COORDINATE/LAT (ft): **12289123.65**	Y COORDINATE/LONG (ft): **2424552.82**

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGY: LITHOLOGIC SYMBOL	LITHOLOGY: GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	SPT: ELEVATION (Ft)	SPT: RECOVERY (in. or %)	SPT: Blows/6"	SPT: N-VALUE (bpf)	SPT: N-value (bpf) 0 0.25 0.5 0.75 1	NOTES
0			Sand-silty (Residual)	820					Straight auger boring
5				818					
				816					
				814					
				812					
10						N/A			
				810					
				808					
15				806	N/A		N/A	N/A	
				804					
				802					
20			Partially weathered rock						
			AUGER REFUSAL AT 21 FEET	800					No groundwater encountered at time of drilling

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
H:/Strater Boring Logs/

Piezometer Installation Logs

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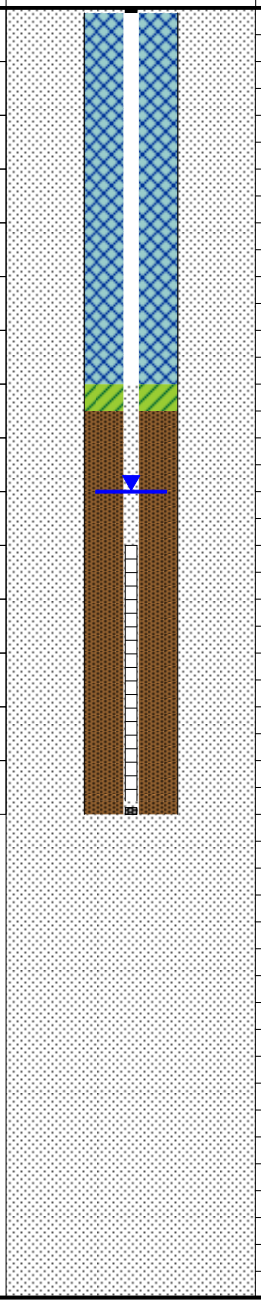
TEMPORARY WELL LOG

PROPOSED ID: **HM-4** WELL ID: **HM-4**

CLIENT: **CH2M HILL**	DRILLING CONTRACTOR: **Kilman Bros Inc**	GROUND SURFACE ELEV.: **820**
PROJECT: **Howell Mill Sewer Outfall**	DRILLING EQUIPMENT: **CME-550**	TOC ELEVATION: **-**
PROJECT NUMBER: **2016.5764.01**	DRILLING METHOD: **Hollow Stem Auger**	DEPTH TO WATER: **17**
LOGGED BY: **Andrew Raysin**	SAMPLING METHOD: **2-foot continuous split spoon sampler**	LOCATION: **Atlanta, Georgia**

Depth (feet)	USCS	Description	% REC	# Blows	OVM
0	CL	Clay, some sand and silt; red (Fill)	24	3-5-7-7	-
2		Silt-some to trace sand and clay; brown-grey-tan (Residual)	24	4-5-6-7	-
4			24	6-7-8-9	-
6			24	5-5-6-7	-
8			20	4-4-4-5	-
10			24	4-5-5-5	-
12			24	5-6-6-6	-
14			24	6-7-9-11	-
16	ML		24	6-8-8-7	-
18			24	4-4-8-9	-
20			20	5-7-10-12	-
22			22	6-10-16-18	-
24			24	12-10-10-12	-
26			20	8-8-10-11	-
28			24	6-9-11-17	-
30		Boring Terminated			
32					
34					
36					
38					
40					
42					
44					
46					
48					

Sketch



Well Construction Details

- Riser Height from Ground Surface: -
- Annular Fill: -
- Annular Sealant: Bentonite
- Filter: Sand
- PVC Well Diameter: 2 Inch
- Bore Hole Diameter: 6.00 Inches
- Top of Screen: 20
- Screen Length: 10 Feet
- Screen Slot Size: 0.010 Inch
- Bottom of Screen: 30 Feet
- Bottom of Well: 30 Feet
- Total Depth: 30
- Completion: Flush Mount
- Easting: 2424195.54
- Northing: 12289043.87
- Date Completed: 9/2/2016
- Date Started: 9/2/2016

24-Hour Groundwater Level:	18.35
Groundwater Level After Development:	17.55
Groundwater Level At Time of Drilling:	25

NOTES:

Graphic Fill = Bentonite/Cement Grout

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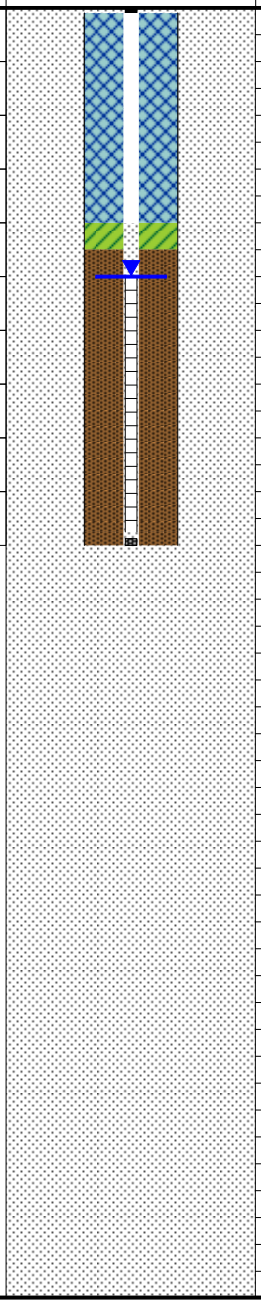
TEMPORARY WELL LOG

PROPOSED ID: **HM-7** WELL ID: **HM-7**

CLIENT: **CH2M HILL**	DRILLING CONTRACTOR: **Kilman Bros Inc**	GROUND SURFACE ELEV.: **784**
PROJECT: **Howell Mill Sewer Outfall**	DRILLING EQUIPMENT: **CME-550**	TOC ELEVATION: **-**
PROJECT NUMBER: **2016.5764.01**	DRILLING METHOD: **Hollow Stem Auger**	DEPTH TO WATER: **10**
LOGGED BY: **Andrew Raysin**	SAMPLING METHOD: **2-foot continuous split spoon sampler**	LOCATION: **Atlanta, Georgia**

Depth (feet)	USCS	Description	% REC	# Blows	OVM
0	SM	Sand,trace to silty, trace clay; white-tan (Residual)	19	3-3-4-6	-
2			18	3-3-3-3	-
4			16	3-3-3-3	-
6			20	3-3-4-4	-
8			14	5-5-6-7	-
10			18	7-8-9-6	-
12			24	2-2-3-3	-
14			24	2-3-5-5	-
16	ML	Silt, some sand, trace clay; brown	24	2-4-5-6	-
18			24	3-4-4-10	-
20		Boring Terminated			
22					
24					
26					
28					
30					
32					
34					
36					
38					
40					
42					
44					
46					
48					

Sketch



Well Construction Details

- Riser Height from Ground Surface: -
- Annular Fill: -
- Annular Sealant: Bentonite
- Filter: Sand
- PVC Well Diameter: 2 Inch
- Bore Hole Diameter: 6.00 Inches
- Top of Screen: 10
- Screen Length: 10 Feet
- Screen Slot Size: 0.010 Inch
- Bottom of Screen: 20 Feet
- Bottom of Well: 20 Feet
- Total Depth: 20
- Completion: Flush Mount
- Easting: 2423554.82
- Northing: 12289192.94
- Date Completed: 9/2/2016
- Date Started: 9/1/2016

24-Hour Groundwater Level:	11.25
Groundwater Level After Development:	10.7
Groundwater Level At Time of Drilling:	18.5

NOTES:

Graphic Fill = Bentonite/Cement Grout

Rock Core Photos

Rock Core from HM-5 (26.5’ – 35.0’)
Run 1: REC= 100% RQD = 84.2%
Run 2: REC= 100% RQD = 92.8%

Rock Core from HM-6 (20.0’ – 30.0’)
Run 1: REC=100% RQD =21.7%
Run 2: REC=100% RQD =38.3%

UNITED CONSULTING

Rock Core from HM-9 (30.0’ – 35.0’)
Run 1 : REC=100% RQD=60%

United Consulting – Lab Test Results

HOWELL MILL SEWER OUTFALL
SUMMARY OF SOIL DATA

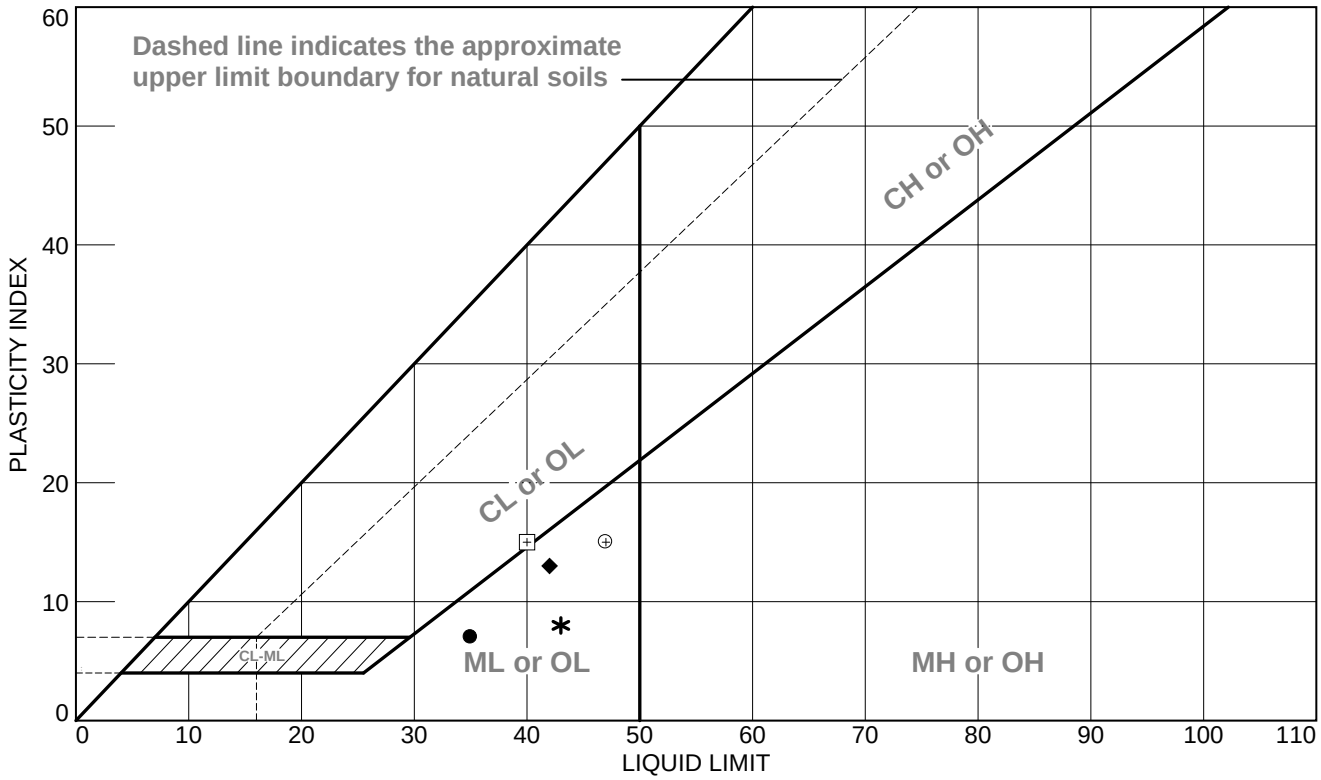
Sample Identification		Sample Type	Sample Depth	Soil Classi-fication	As R'cd Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Organic Contant %	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
Borehole Number	Sample ID					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %			Moisture %	Dry (lb/cuft)		
HM-1	3	BAG	4-6	ML	8.6	NV	NP	NP	-	99.7	50.6	9.5	-	-	-	-	-	-	-	-
HM-2	5	BAG	8-10	SM	11.9	NV	NP	NP	-	97.0	31.9	5.2	-	-	-	-	-	-	-	-
HM-3	6	BAG	10-12	(ML)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P, R
HM-3	9	BAG	18-20	ML	17.5	29	42	13	-	99.5	55.1	6.6	-	-	-	-	-	-	-	-
HM-4	12	BAG	24-26	CL	24.1	25	40	15	-	99.5	62.1	5.0	-	-	-	-	-	-	-	-
HM-5	8	BAG	16-18	ML	31.8	28	35	7	-	98.6	55.4	4.0	-	-	-	-	-	-	-	-
HM-6	7	BAG	14-16	SM	9.6	NV	NP	NP	-	94.9	36.6	3.7	-	-	-	-	-	-	-	-
HM-7	5	BAG	8-10	(ML)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P, R
HM-7	6	BAG	12-14	ML	35.1	35	43	8	-	99.8	58.4	5.6	-	-	-	-	-	-	-	-
HM-8	3	BAG	4-6	ML	25.7	32	47	15	-	89.9	59.2	31.6	-	-	-	-	-	-	-	-

ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST

O = ORGANIC CONTENT
P = pH
R = SOIL RESISTIVITY
Vc = VOLUME/SHRINKAGE CHANGE

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●		HM-5	16.0-18.0 ft	31.8	28	35	7	ML
■		HM-6	14.0-16.0 ft	9.6	NP	NV	NP	SM
▲		HM-2	8.0-10.0 ft	11.9	NP	NV	NP	SM
◆		HM-3	18.0-20.0 ft	17.5	29	42	13	ML
▼		HM-1	4.0-6.0 ft	8.6	NP	NV	NP	ML
✱		HM-7	12.0-14.0 ft	35.1	35	43	8	ML
⊕		HM-8	4.0-6.0 ft	25.7	32	47	15	ML
⊞		HM-4	24.0-26.0 ft	24.1	25	40	15	CL

United Consulting

Norcross, Georgia

Client: CH2M HILL
Project: HOWELL MILL RD OUTFALL SEWER

Project No.: 2016.5764.01 **Figure**

Corrosivity Series

ASTM G51, G57 / AASHTO T289, T288 / UC SOP L6, L40

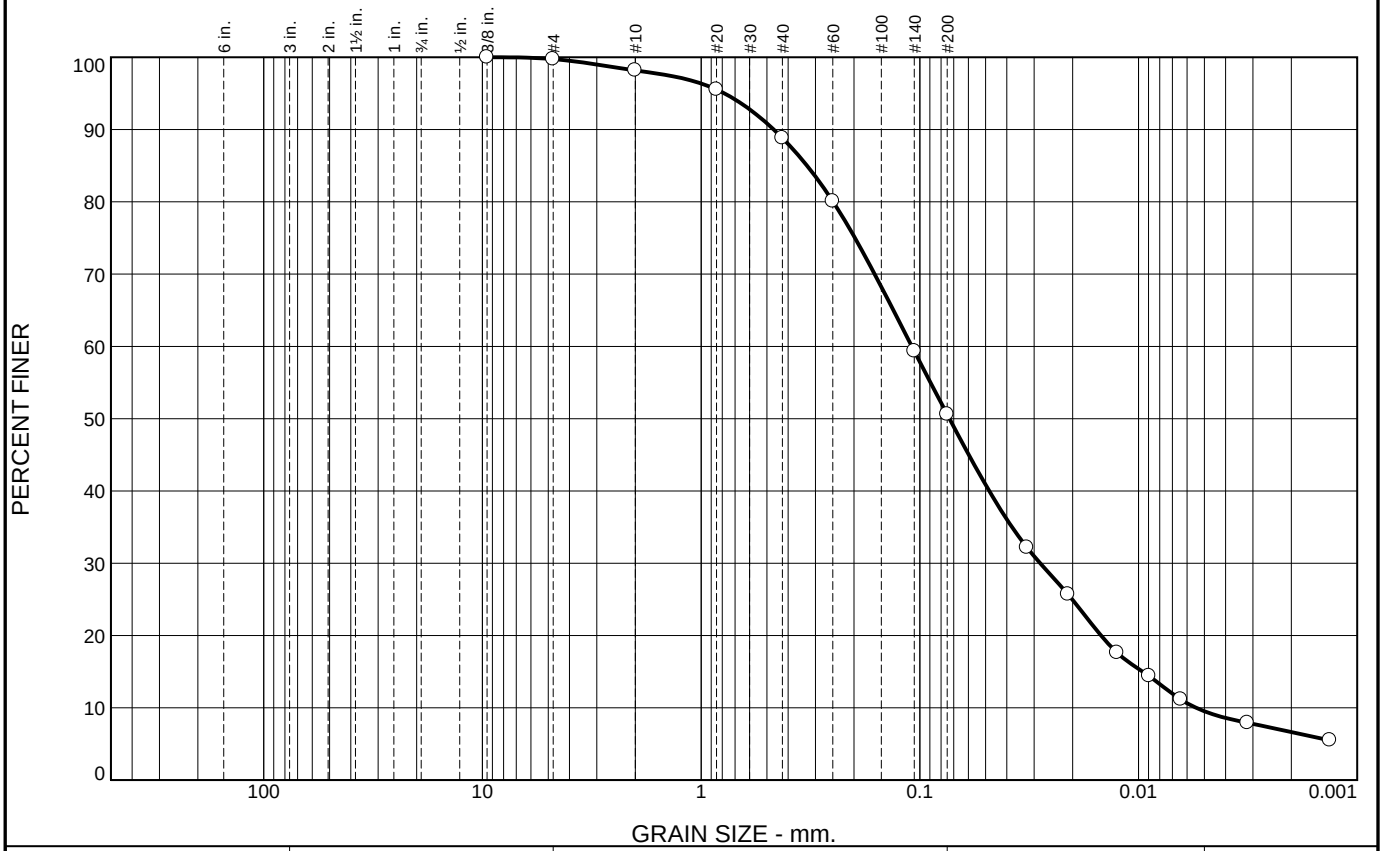
PROJECT: HOWELL MILL RD OUTFALL SEWER

PROJECT No.: 2016.5764.01

TESTING DATE: 10/3/2016

Sample ID	Soil pH s.u.	Soil Resistivity (Ω-cm)
1. HM-3@10.0-12.0'	4.55	72,000
2. HM-7@8.0-10.0'	4.22	15,000
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.3	49.1	41.1	9.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
#4	99.7		
#10	98.2		
#20	95.5		
#40	88.8		
#60	80.1		
#140	59.3		
#200	50.6		

* (no specification provided)

Material Description

Silt-sandy, trace clay and gravel, tan

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.4656 D_{85}= 0.3279 D_{60}= 0.1087
D_{50}= 0.0732 D_{30}= 0.0282 D_{15}= 0.0096
D_{10}= 0.0055 C_u= 19.95 C_c= 1.34

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Sample Number: HM-1 **Depth:** 4.0-6.0 ft

Date: 9/12/16

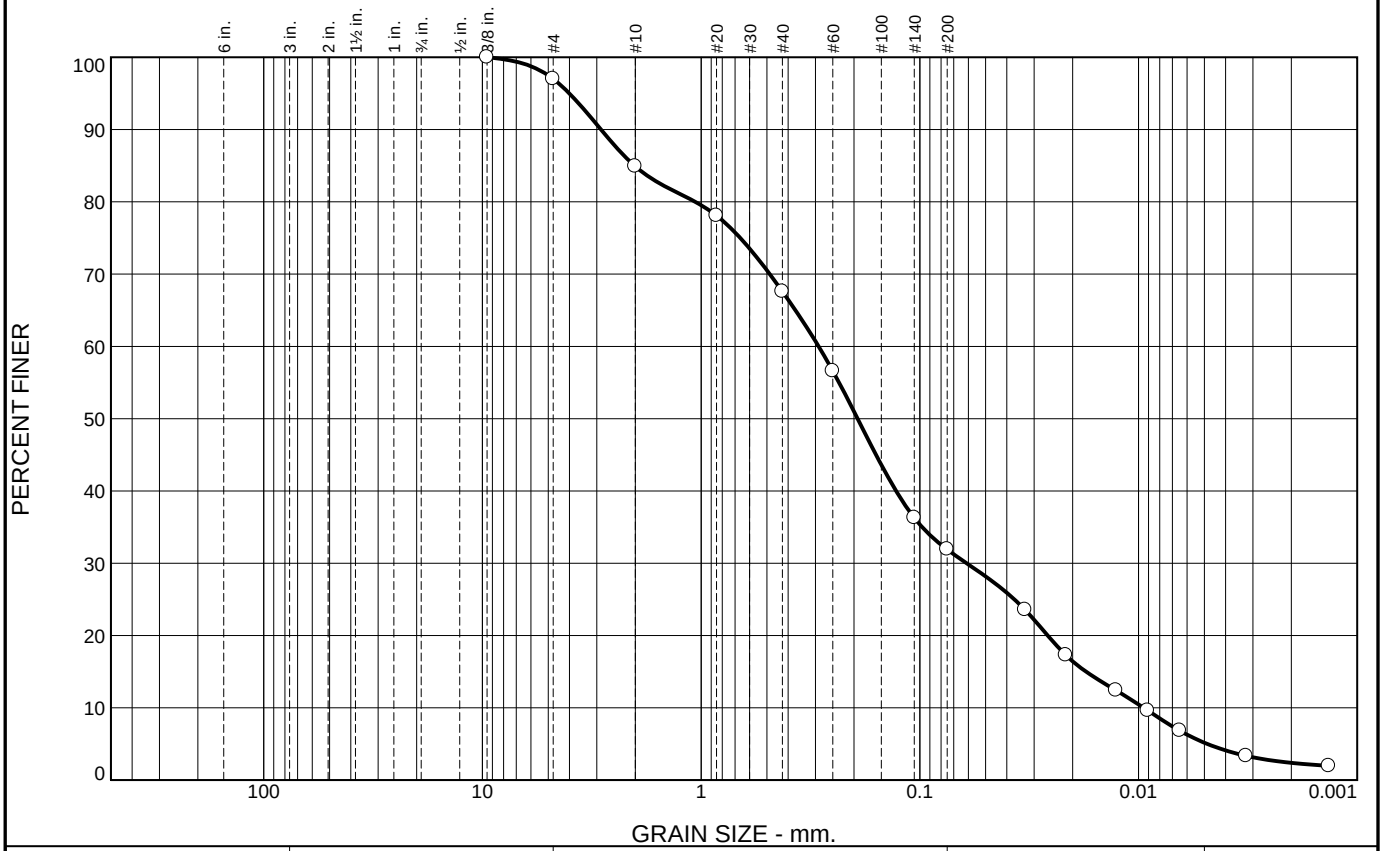
United Consulting

Norcross, Georgia

Client: CH2M HILL
Project: HOWELL MILL RD OUTFALL SEWER

Project No: 2016.5764.01 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	3.0	65.1	26.7	5.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
#4	97.0		
#10	84.9		
#20	78.1		
#40	67.6		
#60	56.6		
#140	36.3		
#200	31.9		

* (no specification provided)

Material Description

Sand, some silt, trace clay and gravel, dark tan

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 2.8715 D_{85}= 2.0181 D_{60}= 0.2902
D_{50}= 0.1925 D_{30}= 0.0611 D_{15}= 0.0174
D_{10}= 0.0095 C_u= 30.67 C_c= 1.36

Classification

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

Remarks

Sample Number: HM-2 **Depth:** 8.0-10.0 ft

Date: 9/12/16

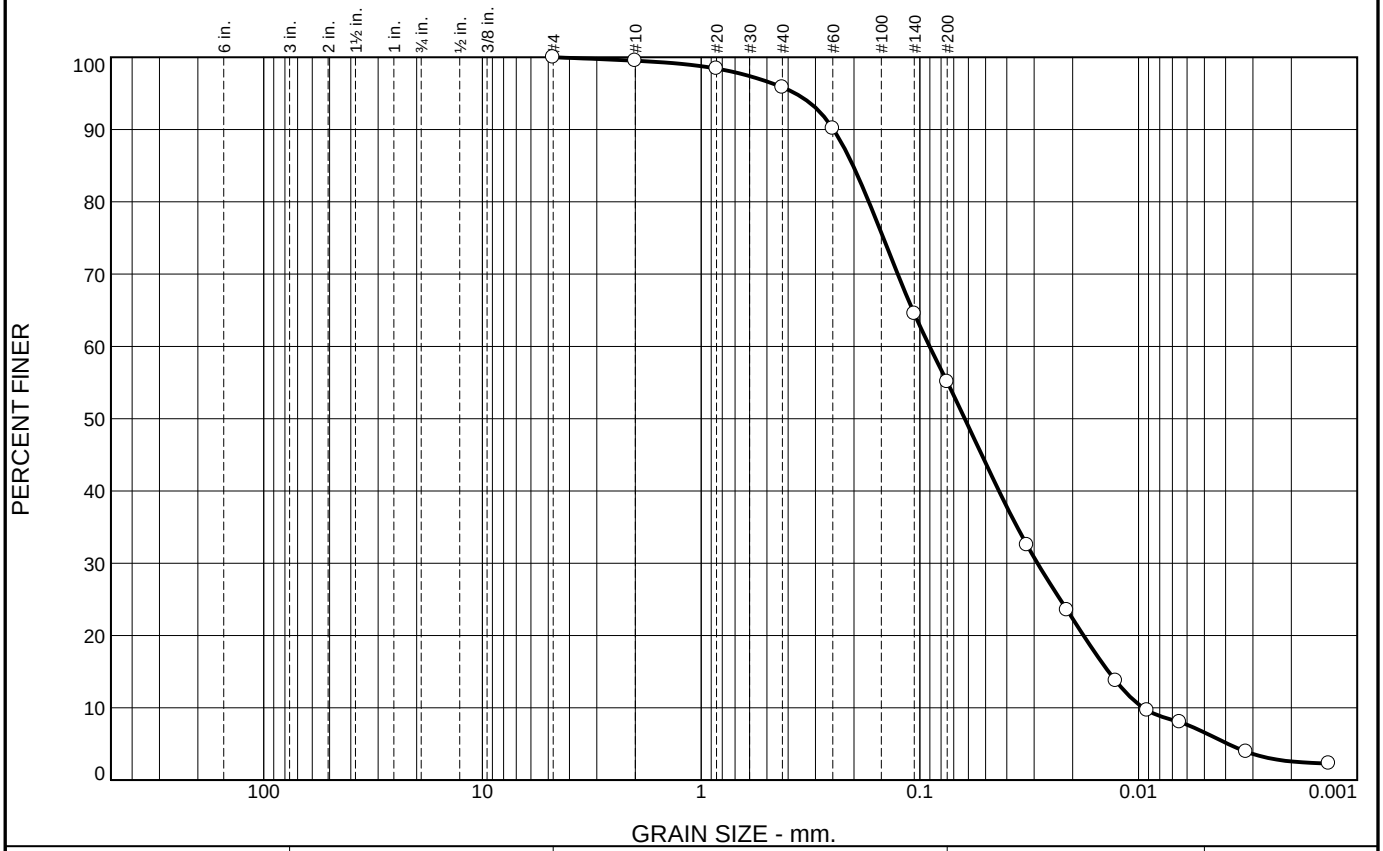
United Consulting

Norcross, Georgia

Client: CH2M HILL
Project: HOWELL MILL RD OUTFALL SEWER

Project No: 2016.5764.01 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.0	44.9	48.5	6.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.5		
#20	98.4		
#40	95.8		
#60	90.2		
#140	64.5		
#200	55.1		

* (no specification provided)

Material Description

Silt-sandy, trace clay, light tan

Atterberg Limits

PL= 29 LL= 42 PI= 13

Coefficients

D_{90}= 0.2481 D_{85}= 0.2020 D_{60}= 0.0902
D_{50}= 0.0623 D_{30}= 0.0290 D_{15}= 0.0137
D_{10}= 0.0095 C_u= 9.49 C_c= 0.98

Classification

USCS= ML AASHTO= A-7-6(5)

Remarks

Sample Number: HM-3 **Depth:** 18.0-20.0 ft

Date: 9/12/16

United Consulting

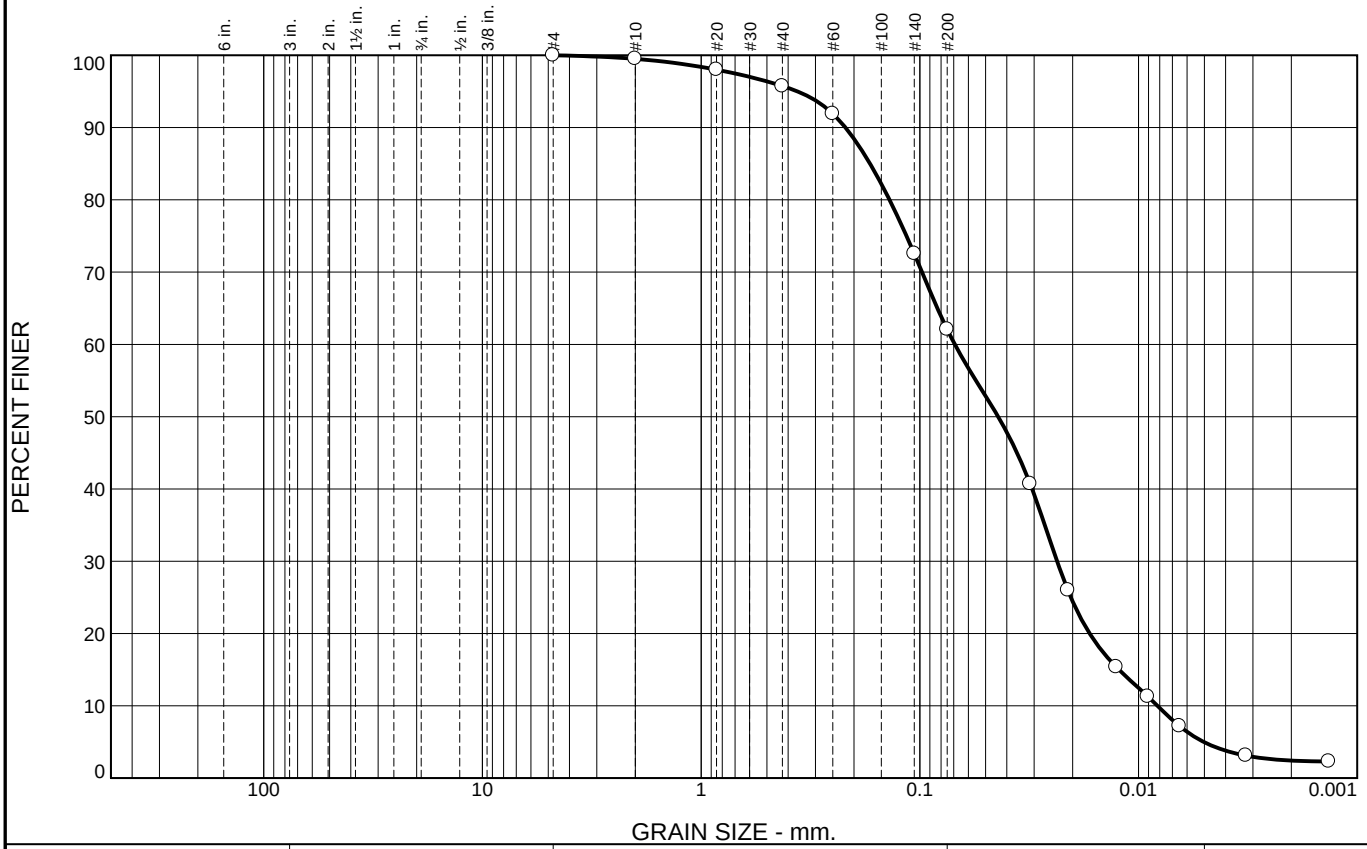
Norcross, Georgia

Client: CH2M HILL

Project: HOWELL MILL RD OUTFALL SEWER

Project No: 2016.5764.01 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.0	37.9	57.1	5.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.5		
#20	98.0		
#40	95.7		
#60	91.9		
#140	72.5		
#200	62.1		

* (no specification provided)

Material Description

Clay-silty, some sand, trace clay, light tan

Atterberg Limits

PL= 25 LL= 40 PI= 15

Coefficients

D_{90}= 0.2189 D_{85}= 0.1689 D_{60}= 0.0692
D_{50}= 0.0438 D_{30}= 0.0236 D_{15}= 0.0123
D_{10}= 0.0082 C_u= 8.45 C_c= 0.98

Classification

USCS= CL AASHTO= A-6(8)

Remarks

Sample Number: HM-4 **Depth:** 24.0-26.0 ft

Date: 9/12/16

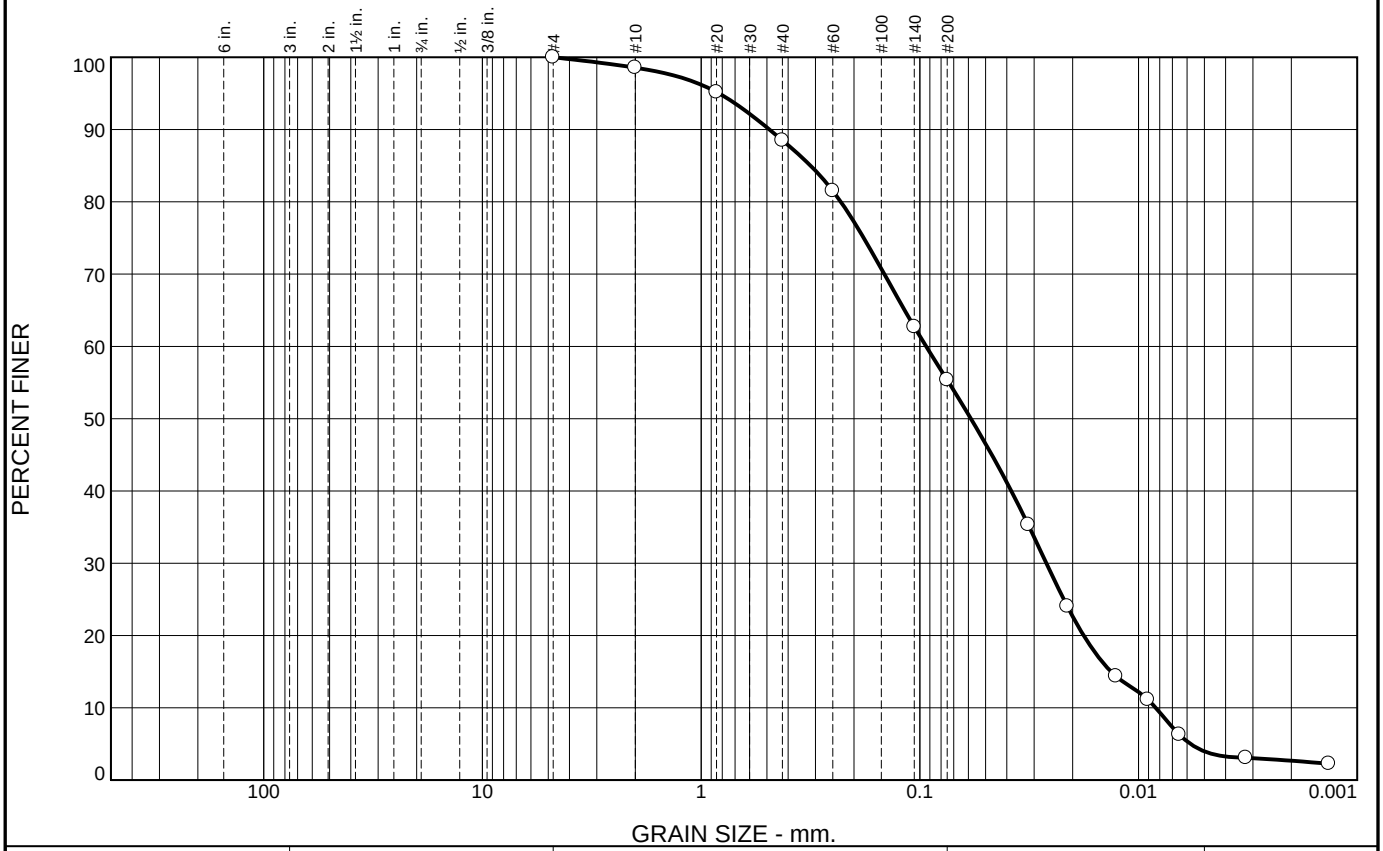
United Consulting

Norcross, Georgia

Client: CH2M HILL
Project: HOWELL MILL RD OUTFALL SEWER

Project No: 2016.5764.01 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.0	44.6	51.4	4.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	98.6		
#20	95.2		
#40	88.5		
#60	81.5		
#140	62.7		
#200	55.4		

* (no specification provided)

Material Description

Silt-sandy, trace clay, light tan

Atterberg Limits

PL= 28 LL= 35 PI= 7

Coefficients

D_{90}= 0.4871 D_{85}= 0.3158 D_{60}= 0.0935
D_{50}= 0.0584 D_{30}= 0.0264 D_{15}= 0.0134
D_{10}= 0.0083 C_u= 11.22 C_c= 0.89

Classification

USCS= ML AASHTO= A-4(2)

Remarks

Sample Number: HM-5 **Depth:** 16.0-18.0 ft

Date: 9/12/16

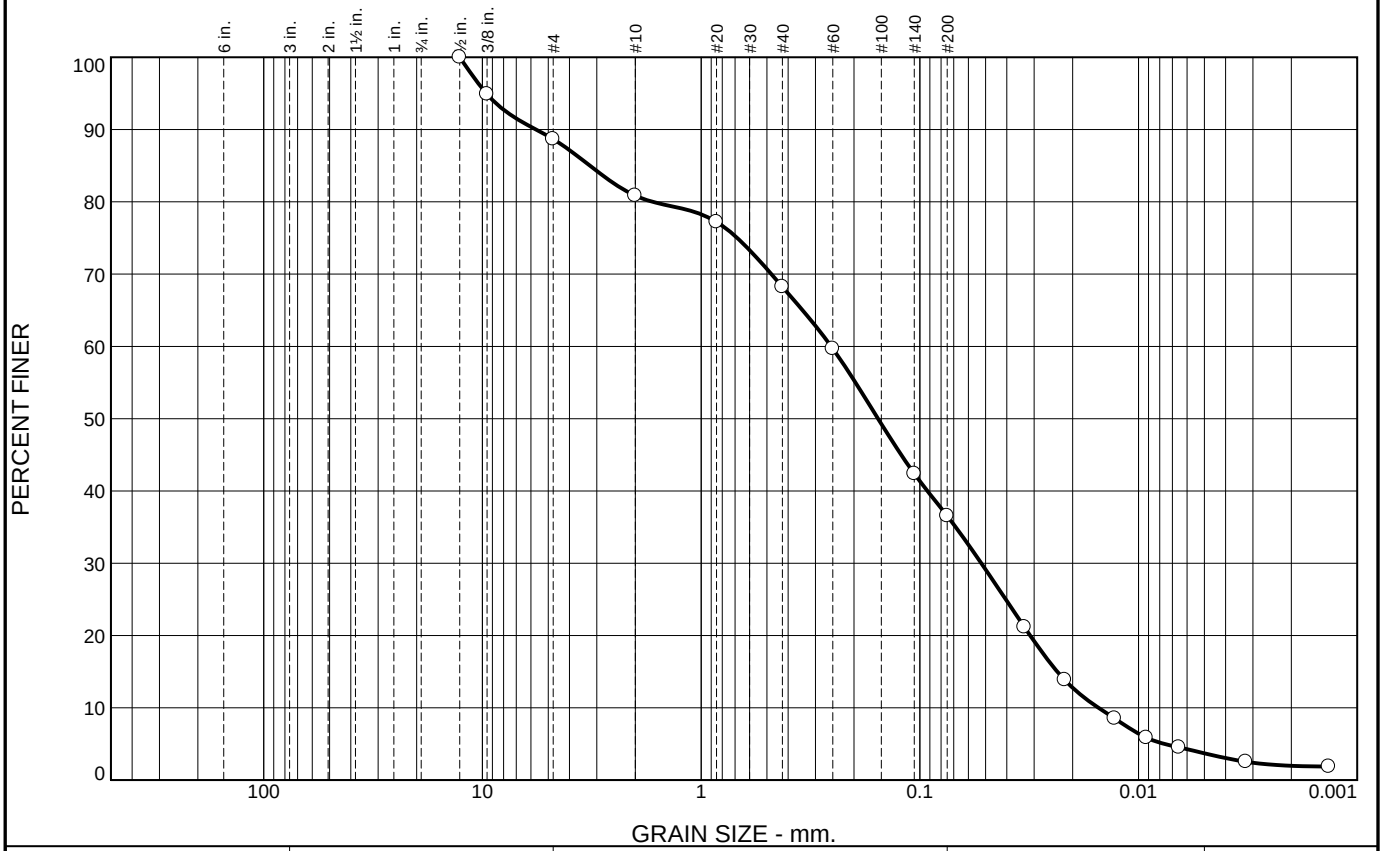
United Consulting

Norcross, Georgia

Client: CH2M HILL
Project: HOWELL MILL RD OUTFALL SEWER

Project No: 2016.5764.01 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	11.3	52.1	32.9	3.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5	100.0		
0.375	94.9		
#4	88.7		
#10	80.9		
#20	77.2		
#40	68.2		
#60	59.7		
#140	42.4		
#200	36.6		

* (no specification provided)

Material Description

Sand, some silt and gravel, trace clay, tan

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 5.6822 D_{85}= 3.2251 D_{60}= 0.2543
D_{50}= 0.1553 D_{30}= 0.0523 D_{15}= 0.0235
D_{10}= 0.0152 C_u= 16.69 C_c= 0.71

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Sample Number: HM-6 **Depth:** 14.0-16.0 ft

Date: 9/12/16

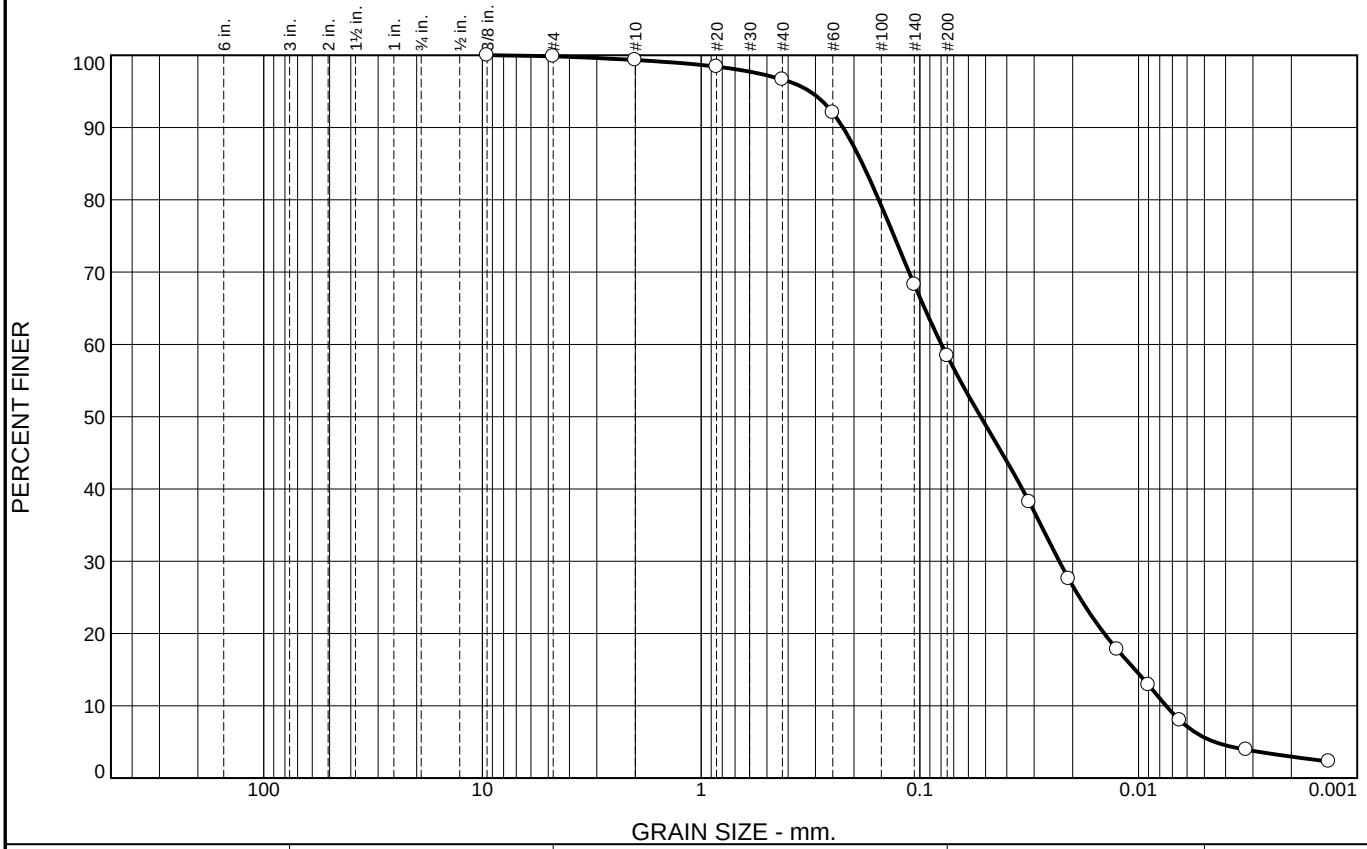
United Consulting

Norcross, Georgia

Client: CH2M HILL
Project: HOWELL MILL RD OUTFALL SEWER

Project No: 2016.5764.01 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.2	41.4	52.8	5.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
#4	99.8		
#10	99.3		
#20	98.4		
#40	96.6		
#60	92.1		
#140	68.3		
#200	58.4		

* (no specification provided)

Material Description

Silt-sandy, trace clay and gravel, tan

Atterberg Limits

PL= 35 LL= 43 PI= 8

Coefficients

D_{90}= 0.2244 D_{85}= 0.1830 D_{60}= 0.0796
D_{50}= 0.0527 D_{30}= 0.0230 D_{15}= 0.0104
D_{10}= 0.0075 C_u= 10.65 C_c= 0.89

Classification

USCS= ML AASHTO= A-5(4)

Remarks

Sample Number: HM-7 **Depth:** 12.0-14.0 ft

Date: 91/12/16

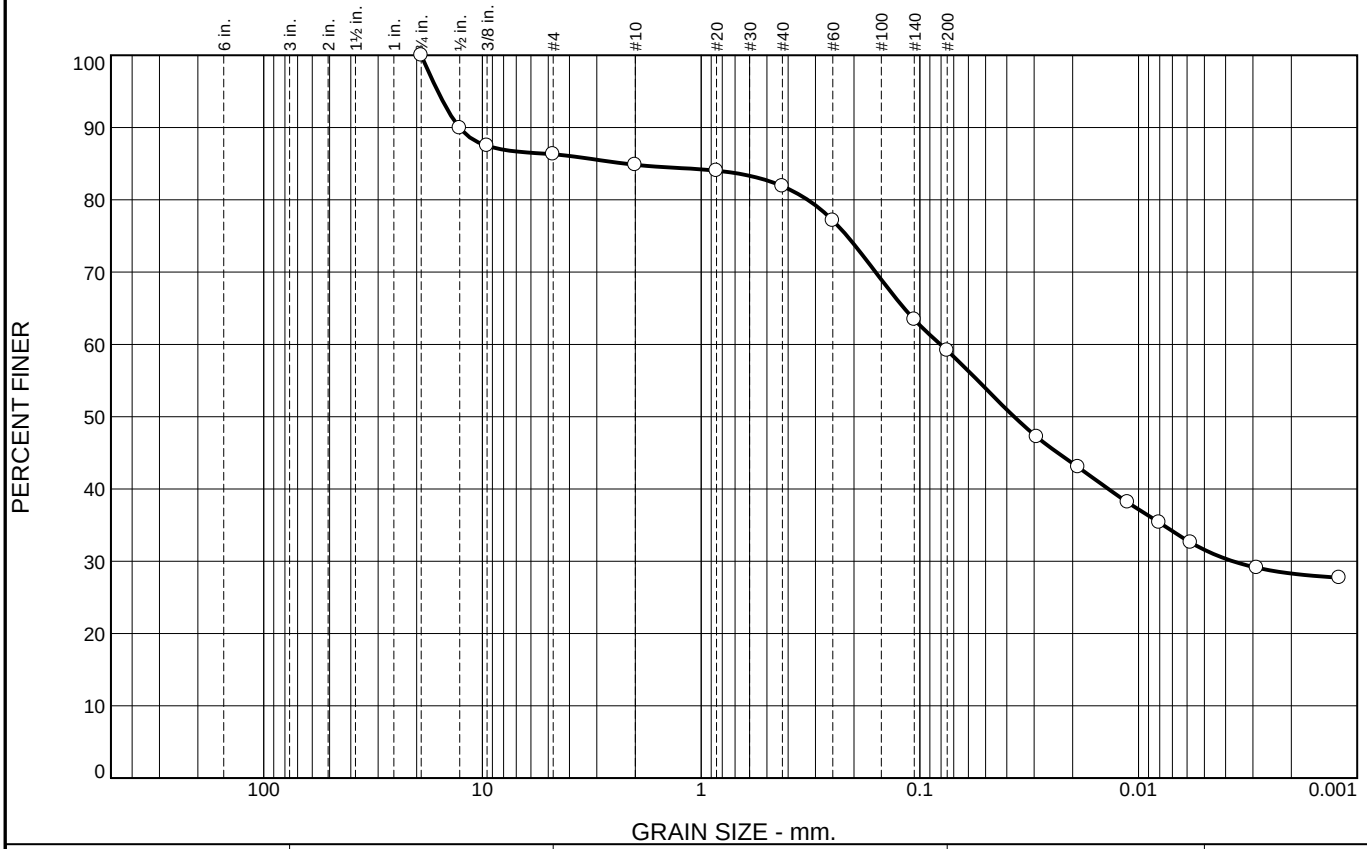
United Consulting

Norcross, Georgia

Client: CH2M HILL
Project: HOWELL MILL RD OUTFALL SEWER

Project No: 2016.5764.01 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	13.7	27.1	27.6	31.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75	100.0		
0.5	89.9		
0.375	87.5		
#4	86.3		
#10	84.8		
#20	84.0		
#40	81.9		
#60	77.1		
#140	63.4		
#200	59.2		

* (no specification provided)

Material Description

Silt, some clay, sand and gravel, yellow tan

Atterberg Limits

PL= 32 LL= 47 PI= 15

Coefficients

D_{90}= 12.7527 D_{85}= 2.2208 D_{60}= 0.0805
D_{50}= 0.0371 D_{30}= 0.0037 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-7-5(8)

Remarks

Sample Number: HM-8 **Depth:** 4.0-6.0 ft

Date: 9/12/16

United Consulting

Norcross, Georgia

Client: CH2M HILL
Project: HOWELL MILL RD OUTFALL SEWER

Project No: 2016.5764.01 **Figure**

UNCONFINED COMPRESSION TEST OF ROCK

ASTM D2938 / AASHTO T226 / UC SOP L9

PROJECT: **HOWELL MILL RD OUTFALL SEWER**

PROJECT No.: **2016.5764.01**

SAMPLE No.: HM-5@27-28

TESTING DATE: **9/15/2016**

TESTED BY: **MS**

SPECIMEN CONDITIONS / TEST RESULTS		
1. DIAMETER	1.87	in.
2. HEIGHT	4.01	in.
3. MAXIMUM LOAD	27,420	lb.
4. CROSS SECTIONAL AREA	2.74	in^2
5. CORRECTION FACTOR	1.00	
6. UNCONFINED COMPRESSIVE STRENGTH	**10,005.2**	psi

UNCONFINED COMPRESSION TEST OF ROCK

ASTM D2938 / AASHTO T226 / UC SOP L9

PROJECT: **HOWELL MILL RD OUTFALL SEWER**

PROJECT No.: **2016.5764.01**

SAMPLE No.: HM-5@32-33

TESTING DATE: **9/15/2016**

TESTED BY: **DM**

SPECIMEN CONDITIONS / TEST RESULTS		
1. DIAMETER	1.87	in.
2. HEIGHT	4.17	in.
3. MAXIMUM LOAD	46,680	lb.
4. CROSS SECTIONAL AREA	2.74	in^2
5. CORRECTION FACTOR	1.00	
6. UNCONFINED COMPRESSIVE STRENGTH	**17,051.1**	psi

UNCONFINED COMPRESSION TEST OF ROCK

ASTM D2938 / AASHTO T226 / UC SOP L9

PROJECT: **HOWELL MILL RD OUTFALL SEWER**

PROJECT No.: **2016.5764.01**

SAMPLE No.: HM-6@20-21

TESTING DATE: **9/15/2016**

TESTED BY: **MS**

SPECIMEN CONDITIONS / TEST RESULTS		
1. DIAMETER	1.87	in.
2. HEIGHT	3.89	in.
3. MAXIMUM LOAD	12,440	lb.
4. CROSS SECTIONAL AREA	2.73	in^2
5. CORRECTION FACTOR	1.00	
6. UNCONFINED COMPRESSIVE STRENGTH	**4,553.8**	psi

UNCONFINED COMPRESSION TEST OF ROCK

ASTM D2938 / AASHTO T226 / UC SOP L9

PROJECT: **HOWELL MILL RD OUTFALL SEWER**

PROJECT No.: **2016.5764.01**

SAMPLE No.: HM-6@25-26

TESTING DATE **9/15/2016**

TESTED BY: **DM**

SPECIMEN CONDITIONS / TEST RESULTS		
1. DIAMETER	1.87	in.
2. HEIGHT	3.46	in.
3. MAXIMUM LOAD	26,720	lb.
4. CROSS SECTIONAL AREA	2.73	in^2
5. CORRECTION FACTOR	1.00	
6. UNCONFINED COMPRESSIVE STRENGTH	**9,781.1**	psi

FTS – Lab Test Results

Analytical Report

A6I0073

Project

Howell Mill Sewer Outfall

Project Number

2016.5764.01

September 19, 2016
United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

6017 Financial Dr.
Norcross, GA 30071

Phone #:770-449-8800
Website: www.ftsanalytical.com

September 19, 2016

Aaron Epstein
United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

RE: Howell Mill Sewer Outfall

We are reporting the results of the analyses performed on the samples recieved on 9/12/2016 under the project name referenced above and identified as the lab Work Order A6I0073. All results being reported under this Report apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontracted lab, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. The uncertainty of measurement associated with the results of analysis reported is available upon request. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reporting using all other available quality control methods.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by FTS Analytical Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise agreed upon. The samples received, and described as recorded in Work Order A6I0073 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise agreed upon. We reserve the right to return to you any unused samples, extracts, or solutions if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding standard practices, controlled/regulated substances, etc.)

We thank you for selecting FTS Analytical to serve your analytical needs. If you have any questions concerning this report, please do not hesitate to contact us at any time. We will be happy to help.

Sincerely,

J. Derek Rounsley
Project Manager

United Consulting -Norcross	Project: Howell Mill Sewer Outfall	
625 Holcomb Bridge Road	Project Number: 2016.5764.01	**Reported:**
Norcross, GA 30071	Project Manager: Aaron Epstein	09/19/2016 15:17

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
A6I0073-01	HM-3	Solid	12-Sep-2016 00:00	12-Sep-2016 12:15
A6I0073-02	HM-7	Solid	12-Sep-2016 00:00	12-Sep-2016 12:15

United Consulting -Norcross	Project: Howell Mill Sewer Outfall	
625 Holcomb Bridge Road	Project Number: 2016.5764.01	**Reported:**
Norcross, GA 30071	Project Manager: Aaron Epstein	09/19/2016 15:17

Hits Summary

(Not Including Subcontracted Analysis)

Sample: HM-3

Lab ID: A6I0073-01

Analyte	Result	RL	Units	Dil	Date Analyzed	Qual	CAS #	Method
pH	**4.55**	0.0100	SU	1	9/13/16 11:20			EPA 9040/1311
% Solids	**86.4**	0.100	%	1	9/13/16 7:15			SM 2540G
Percent Moisture	**13.6**	0.100	%	1	9/13/16 7:15			SM 2540G

Sample: HM-7

Lab ID: A6I0073-02

Analyte	Result	RL	Units	Dil	Date Analyzed	Qual	CAS #	Method
pH	**4.56**	0.0100	SU	1	9/13/16 11:20			EPA 9040/1311
% Solids	**83.3**	0.100	%	1	9/13/16 7:15			SM 2540G
Percent Moisture	**14.7**	0.100	%	1	9/13/16 7:15			SM 2540G

United Consulting -Norcross	Project: Howell Mill Sewer Outfall	
625 Holcomb Bridge Road	Project Number: 2016.5764.01	**Reported:**
Norcross, GA 30071	Project Manager: Aaron Epstein	09/19/2016 15:17

Sample Results

Client Sample ID: HM-3
Lab Sample ID: A6I0073-01 (Solid)

Sampled:
9/12/16 0:00

Analyte	Result	RL	Units	Dil	Date Prepared	Date Analyzed	Qual	CAS #
Anions by Method 9056								
Chloride	ND	116	mg/Kg dry	10	9/16/16 9:33	9/16/16 21:49	U	16887-00-6
Sulfate	ND	116	mg/Kg dry	10	9/16/16 9:33	9/16/16 21:49	U	14808-79-8
Percent Moisture by Method 2540G								
% Solids	**86.4**	0.100	%	1	9/12/16 7:30	9/13/16 7:15		
Percent Moisture	**13.6**	0.100	%	1	9/12/16 7:30	9/13/16 7:15		
pH S by Method 9045D								
pH	**4.55**	0.0100	SU	1	9/13/16 10:30	9/13/16 11:20		

United Consulting -Norcross	Project: Howell Mill Sewer Outfall	
625 Holcomb Bridge Road	Project Number: 2016.5764.01	**Reported:**
Norcross, GA 30071	Project Manager: Aaron Epstein	09/19/2016 15:17

Sample Results
(Continued)

Client Sample ID: HM-7
Lab Sample ID: A6I0073-02 (Solid)

Sampled:
9/12/16 0:00

Analyte	Result	RL	Units	Dil	Date Prepared	Date Analyzed	Qual	CAS #
Anions by Method 9056								
Chloride	ND	120	mg/Kg dry	10	9/16/16 9:33	9/16/16 22:08	U	16887-00-6
Sulfate	ND	120	mg/Kg dry	10	9/16/16 9:33	9/16/16 22:08	U	14808-79-8
Percent Moisture by Method 2540G								
% Solids	**83.3**	0.100	%	1	9/12/16 7:30	9/13/16 7:15		
Percent Moisture	**14.7**	0.100	%	1	9/12/16 7:30	9/13/16 7:15		
pH S by Method 9045D								
pH	**4.56**	0.0100	SU	1	9/13/16 10:30	9/13/16 11:20		

United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/19/2016 15:17

Quality Control

Anions by Method 9056

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0393										
Blank (B6I0393-BLK1)					Prepared & Analyzed: 9/16/2016					
Chloride	ND	U	20.0	mg/Kg wet						
Sulfate	ND	U	20.0	mg/Kg wet						
LCS (B6I0393-BS1)					Prepared & Analyzed: 9/16/2016					
Chloride	200		20.0	mg/Kg wet	200		100	80-120		
Sulfate	189		20.0	mg/Kg wet	200		94	90-110		
LCS Dup (B6I0393-BSD1)					Prepared & Analyzed: 9/16/2016					
Chloride	199		20.0	mg/Kg wet	200		99	80-120	0.7	15
Sulfate	200		20.0	mg/Kg wet	200		100	90-110	6	20
Duplicate (B6I0393-DUP1)		**Source: L6I0094-03**			Prepared & Analyzed: 9/16/2016					
Chloride	ND	U	24.1	mg/Kg dry		ND				15
Sulfate	35.7		24.1	mg/Kg dry		35.5			0.8	15
Matrix Spike (B6I0393-MS1)		**Source: L6I0094-03**			Prepared & Analyzed: 9/16/2016					
Chloride	250		24.1	mg/Kg dry	241	ND	104	75-125		
Sulfate	298		24.1	mg/Kg dry	241	35.5	109	75-125		
Matrix Spike Dup (B6I0393-MSD1)		**Source: L6I0094-03**			Prepared & Analyzed: 9/16/2016					
Chloride	242		24.1	mg/Kg dry	241	ND	101	75-125	3	20
Sulfate	293		24.1	mg/Kg dry	241	35.5	107	75-125	1	20

United Consulting -Norcross	Project: Howell Mill Sewer Outfall	
625 Holcomb Bridge Road	Project Number: 2016.5764.01	**Reported:**
Norcross, GA 30071	Project Manager: Aaron Epstein	09/19/2016 15:17

Quality Control
(Continued)

Percent Moisture by Method 2540G

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0236										
Duplicate (B6I0236-DUP1)		**Source: A6I0064-01**			Prepared: 9/12/2016 Analyzed: 9/13/2016					
% Solids	93.3		0.100	%		93.4			0.1	20
Percent Moisture	6.71		0.100	%		6.62			1	20

United Consulting -Norcross	Project: Howell Mill Sewer Outfall	
625 Holcomb Bridge Road	Project Number: 2016.5764.01	**Reported:**
Norcross, GA 30071	Project Manager: Aaron Epstein	09/19/2016 15:17

Quality Control
(Continued)

pH S by Method 9045D

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0253										
Duplicate (B6I0253-DUP1)		**Source: A6I0073-01**			Prepared & Analyzed: 9/13/2016					
pH	4.52		0.0100	SU		4.55			0.7	20

United Consulting -Norcross	Project: Howell Mill Sewer Outfall	
625 Holcomb Bridge Road	Project Number: 2016.5764.01	**Reported:**
Norcross, GA 30071	Project Manager: Aaron Epstein	09/19/2016 15:17

List of Certifications

Number	Description	Code	Facility	Expires
04176	LA CERTIFICATE	LANELAC	FTSA	06/30/2016
483	NC CERTIFICATE	ANC	FTSA	12/31/2016
85	KENTUKY CERTIFICATE	KENTUKY	FTSA	
98015	SC CERTIFICATE	ASC	FTSA	06/30/2017
E84098	FL NELAC CERTIFICATE	LFLNELAC	FTSL	06/30/2017
E87429	FL NELAC CERTIFICATE	AFLNELAC	FTSA	06/30/2017
LI0-135	DoD CERTIFICATE	DOD	FTSA	06/30/2016
P330-07-00105	USDA CERTIFICATE	USDA	FTSA	

Notes and Definitions

Item	Definition
Dry	Sample results reported on a dry weight basis.
U or ND	Analyte NOT DETECTED at or above the reporting limit.
A	Suspected adol-condensation product
B	Analyte detected in the method blank
C	Confirmed by GC/MS analysis
E	Concentration exceeds calibration range
K	Hold Time exceeded
J	Estimated Value
N	Tentatively Identified Compound
P	>25% difference between primary and secondary columns
S	Quantitation based on single-point calibration
X	QC Failure see Case Narrative

RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was matrix spiked or duplicated.

SAMPLE CHAIN-OF-CUSTODY RECORD

A6I0073

UNITED CONSULTING
625 Holcomb Bridge
NORCROSS, GEORGIA 30071
(770) 209-0029 FAX (770) 582-2895
www.unitedconsulting.com

PROJECT NAME:						ANALYSES (indicate target list)								
Howell Mill Sewer Outfall				Project # 2016.5764.01		Sulfate EPA 9056	Chloride	PH	Resistivity					
TAT or DUE DATE: STA	CONTACT: Mahvand Saleki msaleki@unitedconsulting.com	PROJECT MANAGER: Rafael Ospina (404)583-2670												
	PHONE#: 770-582-2846	RECEIVING LAB: FTS			PO#: 91505									
SAMPLE NUMBER	SAMPLE DESCRIPTION	Date Shipped	Sample Matrix	Preserva-tive	# / Size of Cont.									
HM-3	Soil @8.0-10.0'	9/12/2016	s	Ice	1 x 8oz	x	x	x	x					
HM-7	Soil @6.0-8.0'	9/12/2016	s	Ice	1 x 8oz	x	x	x	x					

SAMPLES RELINQUISHED BY:	DATE/ TIME	SAMPLES ACCEPTED BY:	DATE/ TIME	COMMENTS:
	9-12-16 12:15		9/12/16 12:25	1.4°C

Analytical Report

A6I0073

Project

Howell Mill Sewer Outfall

Project Number

2016.5764.01

September 30, 2016
United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

6017 Financial Dr.
Norcross, GA 30071

Phone #:770-449-8800
Website: www.ftsanalytical.com

September 30, 2016

Aaron Epstein
United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

RE: Howell Mill Sewer Outfall

We are reporting the results of the analyses performed on the samples recieved on 9/12/2016 under the project name referenced above and identified as the lab Work Order A6I0073. All results being reported under this Report apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontracted lab, or the complete subcontracted report attached to this report.

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The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by FTS Analytical Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise agreed upon. The samples received, and described as recorded in Work Order A6I0073 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise agreed upon. We reserve the right to return to you any unused samples, extracts, or solutions if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding standard practices, controlled/regulated substances, etc.)

We thank you for selecting FTS Analytical to serve your analytical needs. If you have any questions concerning this report, please do not hesitate to contact us at any time. We will be happy to help.

Sincerely,

J. Derek Rounsley
Project Manager

United Consulting -Norcross	Project: Howell Mill Sewer Outfall	
625 Holcomb Bridge Road	Project Number: 2016.5764.01	**Reported:**
Norcross, GA 30071	Project Manager: Aaron Epstein	09/30/2016 13:55

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
A6I0073-01	HM-3	Solid	12-Sep-2016 00:00	12-Sep-2016 12:15
A6I0073-02	HM-7	Solid	12-Sep-2016 00:00	12-Sep-2016 12:15

United Consulting -Norcross	Project: Howell Mill Sewer Outfall	
625 Holcomb Bridge Road	Project Number: 2016.5764.01	**Reported:**
Norcross, GA 30071	Project Manager: Aaron Epstein	09/30/2016 13:55

Hits Summary

(Not Including Subcontracted Analysis)

Sample: HM-3

Lab ID: A6I0073-01

Analyte	Result	RL	Units	Dil	Date Analyzed	Qual	CAS #	Method
pH	**4.55**	0.0100	SU	1	9/13/16 11:20			EPA 9040/1311
Resistivity	**64100**		mg/L	1	9/22/16 9:57			SM 2540C
% Solids	**86.4**	0.100	%	1	9/13/16 7:15			SM 2540G
Percent Moisture	**13.6**	0.100	%	1	9/13/16 7:15			SM 2540G

Sample: HM-7

Lab ID: A6I0073-02

Analyte	Result	RL	Units	Dil	Date Analyzed	Qual	CAS #	Method
pH	**4.56**	0.0100	SU	1	9/13/16 11:20			EPA 9040/1311
Resistivity	**39500**		mg/L	1	9/22/16 9:57			SM 2540C
% Solids	**83.3**	0.100	%	1	9/13/16 7:15			SM 2540G
Percent Moisture	**14.7**	0.100	%	1	9/13/16 7:15			SM 2540G

United Consulting -Norcross	Project: Howell Mill Sewer Outfall	
625 Holcomb Bridge Road	Project Number: 2016.5764.01	**Reported:**
Norcross, GA 30071	Project Manager: Aaron Epstein	09/30/2016 13:55

Sample Results

Client Sample ID: HM-3
Lab Sample ID: A6I0073-01 (Solid)

Sampled:
9/12/16 0:00

Analyte	Result	RL	Units	Dil	Date Prepared	Date Analyzed	Qual	CAS #
Anions by Method 9056								
Chloride	ND	116	mg/Kg dry	10	9/16/16 9:33	9/16/16 21:49	U	16887-00-6
Sulfate	ND	116	mg/Kg dry	10	9/16/16 9:33	9/16/16 21:49	U	14808-79-8
Percent Moisture by Method 2540G								
% Solids	**86.4**	0.100	%	1	9/12/16 7:30	9/13/16 7:15		
Percent Moisture	**13.6**	0.100	%	1	9/12/16 7:30	9/13/16 7:15		
pH S by Method 9045D								
pH	**4.55**	0.0100	SU	1	9/13/16 10:30	9/13/16 11:20		
TDS by Method 2540C								
Resistivity	**64100**		mg/L	1	9/22/16 9:57	9/22/16 9:57		

United Consulting -Norcross	Project: Howell Mill Sewer Outfall	
625 Holcomb Bridge Road	Project Number: 2016.5764.01	**Reported:**
Norcross, GA 30071	Project Manager: Aaron Epstein	09/30/2016 13:55

Sample Results
(Continued)

Client Sample ID: HM-7
Lab Sample ID: A6I0073-02 (Solid)

Sampled:
9/12/16 0:00

Analyte	Result	RL	Units	Dil	Date Prepared	Date Analyzed	Qual	CAS #
Anions by Method 9056								
Chloride	ND	120	mg/Kg dry	10	9/16/16 9:33	9/16/16 22:08	U	16887-00-6
Sulfate	ND	120	mg/Kg dry	10	9/16/16 9:33	9/16/16 22:08	U	14808-79-8
Percent Moisture by Method 2540G								
% Solids	**83.3**	0.100	%	1	9/12/16 7:30	9/13/16 7:15		
Percent Moisture	**14.7**	0.100	%	1	9/12/16 7:30	9/13/16 7:15		
pH S by Method 9045D								
pH	**4.56**	0.0100	SU	1	9/13/16 10:30	9/13/16 11:20		
TDS by Method 2540C								
Resistivity	**39500**		mg/L	1	9/22/16 9:57	9/22/16 9:57		

United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/30/2016 13:55

Quality Control

Anions by Method 9056

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0393										
Blank (B6I0393-BLK1)					Prepared & Analyzed: 9/16/2016					
Chloride	ND	U	20.0	mg/Kg wet						
Sulfate	ND	U	20.0	mg/Kg wet						
LCS (B6I0393-BS1)					Prepared & Analyzed: 9/16/2016					
Chloride	200		20.0	mg/Kg wet	200		100	80-120		
Sulfate	189		20.0	mg/Kg wet	200		94	90-110		
LCS Dup (B6I0393-BSD1)					Prepared & Analyzed: 9/16/2016					
Chloride	199		20.0	mg/Kg wet	200		99	80-120	0.7	15
Sulfate	200		20.0	mg/Kg wet	200		100	90-110	6	20
Duplicate (B6I0393-DUP1)		**Source: L6I0094-03**			Prepared & Analyzed: 9/16/2016					
Chloride	ND	U	24.1	mg/Kg dry		ND				15
Sulfate	35.7		24.1	mg/Kg dry		35.5			0.8	15
Matrix Spike (B6I0393-MS1)		**Source: L6I0094-03**			Prepared & Analyzed: 9/16/2016					
Chloride	250		24.1	mg/Kg dry	241	ND	104	75-125		
Sulfate	298		24.1	mg/Kg dry	241	35.5	109	75-125		
Matrix Spike Dup (B6I0393-MSD1)		**Source: L6I0094-03**			Prepared & Analyzed: 9/16/2016					
Chloride	242		24.1	mg/Kg dry	241	ND	101	75-125	3	20
Sulfate	293		24.1	mg/Kg dry	241	35.5	107	75-125	1	20

United Consulting -Norcross	Project: Howell Mill Sewer Outfall	
625 Holcomb Bridge Road	Project Number: 2016.5764.01	**Reported:**
Norcross, GA 30071	Project Manager: Aaron Epstein	09/30/2016 13:55

Quality Control
(Continued)

TDS by Method 2540C

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0497										
Duplicate (B6I0497-DUP1)		**Source: A6I0073-01**			Prepared & Analyzed: 9/22/2016					
Resistivity	64100			mg/L		64100			0	20

United Consulting -Norcross	Project: Howell Mill Sewer Outfall	
625 Holcomb Bridge Road	Project Number: 2016.5764.01	**Reported:**
Norcross, GA 30071	Project Manager: Aaron Epstein	09/30/2016 13:55

Quality Control
(Continued)

Percent Moisture by Method 2540G

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0236										
Duplicate (B6I0236-DUP1)		**Source: A6I0064-01**			Prepared: 9/12/2016 Analyzed: 9/13/2016					
% Solids	93.3		0.100	%		93.4			0.1	20
Percent Moisture	6.71		0.100	%		6.62			1	20

United Consulting -Norcross	Project: Howell Mill Sewer Outfall	
625 Holcomb Bridge Road	Project Number: 2016.5764.01	**Reported:**
Norcross, GA 30071	Project Manager: Aaron Epstein	09/30/2016 13:55

Quality Control
(Continued)

pH S by Method 9045D

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B6I0253										
Duplicate (B6I0253-DUP1)		**Source: A6I0073-01**			Prepared & Analyzed: 9/13/2016					
pH	4.52		0.0100	SU		4.55			0.7	20

United Consulting -Norcross	Project: Howell Mill Sewer Outfall	
625 Holcomb Bridge Road	Project Number: 2016.5764.01	**Reported:**
Norcross, GA 30071	Project Manager: Aaron Epstein	09/30/2016 13:55

List of Certifications

Number	Description	Code	Facility	Expires
04176	LA CERTIFICATE	LANELAC	FTSA	06/30/2016
483	NC CERTIFICATE	ANC	FTSA	12/31/2016
85	KENTUKY CERTIFICATE	KENTUKY	FTSA	
98015	SC CERTIFICATE	ASC	FTSA	06/30/2017
E84098	FL NELAC CERTIFICATE	LFLNELAC	FTSL	06/30/2017
E87429	FL NELAC CERTIFICATE	AFLNELAC	FTSA	06/30/2017
LI0-135	DoD CERTIFICATE	DOD	FTSA	06/30/2016
P330-07-00105	USDA CERTIFICATE	USDA	FTSA	

Notes and Definitions

Item	Definition
Dry	Sample results reported on a dry weight basis.
U or ND	Analyte NOT DETECTED at or above the reporting limit.
A	Suspected adol-condensation product
B	Analyte detected in the method blank
C	Confirmed by GC/MS analysis
E	Concentration exceeds calibration range
K	Hold Time exceeded
J	Estimated Value
N	Tentatively Identified Compound
P	>25% difference between primary and secondary columns
S	Quantitation based on single-point calibration
X	QC Failure see Case Narrative

RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was matrix spiked or duplicated.

SAMPLE CHAIN-OF-CUSTODY RECORD

A6I0073

UNITED CONSULTING
625 Holcomb Bridge
NORCROSS, GEORGIA 30071
(770) 209-0029 FAX (770) 582-2895
www.unitedconsulting.com

PROJECT NAME:						ANALYSES (indicate target list)								
Howell Mill Sewer Outfall				Project # 2016.5764.01		Sulfate EPA 9056	Chloride	PH	Resistivity					
TAT or DUE DATE: STA	CONTACT: Mahvand Saleki msaleki@unitedconsulting.com	PROJECT MANAGER: Rafael Ospina (404)583-2670												
	PHONE#: 770-582-2846	RECEIVING LAB: FTS			PO#: 91505									
SAMPLE NUMBER	SAMPLE DESCRIPTION	Date Shipped	Sample Matrix	Preserva-tive	# / Size of Cont.									
HM-3	Soil @8.0-10.0'	9/12/2016	s	Ice	1 x 8oz	x	x	x	x					
HM-7	Soil @6.0-8.0'	9/12/2016	s	Ice	1 x 8oz	x	x	x	x					

SAMPLES RELINQUISHED BY:	DATE/ TIME	SAMPLES ACCEPTED BY:	DATE/ TIME	COMMENTS:
	9-12-16 12:15		9/12/16 12:15	1.4°C

APPENDIX F

GeoTesting – Lab Test Results

GeoTesting EXPRESS

Technologies to manage risk for infrastructure

Boston
Atlanta
Chicago
Los Angeles
New York

www.geotesting.com

Transmittal

TO:

Mahvand Saleki

United Consulting Group

625 Holcomb Bridge Road

Norcross, GA 30071

DATE: 9/21/2016	GTX NO: 305340
RE: Howell Mill Sewer Outfall	

COPIES	DATE	DESCRIPTION
	9/21/2016	**September 2016 Laboratory Test Report**

REMARKS:

SIGNED:

Jonathan Campbell, Assistant Laboratory Manager

CC:

APPROVED BY:

Mark Dobday, P.G., Laboratory Manager

GeoTesting EXPRESS

Technologies to manage risk for infrastructure

Boston
Atlanta
Chicago
Los Angeles
New York
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September 21, 2016

Mahvand Saleki
United Consulting Group
625 Holcomb Bridge Road
Norcross, GA 30071

RE: Howell Mill Sewer Outfall, Atlanta, GA (GTX-305340)

Dear Mahvand Saleki:

Enclosed are the test results you requested for the above referenced project. GeoTesting Express, Inc. (GTX) received three samples from you on 9/19/2016. These samples were labeled as follows:

Boring Number	Sample Number	Depth
1	HM-5	27-28 ft
2	HM-6	25-26 ft
3	HM-9	34-35 ft

GTX performed the following tests on these samples:

3 ASTM D7625 -CERCHAR Abrasivity Index (CAI)

A copy of your test request is attached.

The results presented in this report apply only to the items tested. This report shall not be reproduced except in full, without written approval from GeoTesting Express. The remainder of these samples will be retained for a period of sixty (60) days and will then be discarded unless otherwise notified by you. Please call me if you have any questions or require additional information. Thank you for allowing GeoTesting Express the opportunity of providing you with testing services. We look forward to working with you again in the future.

Respectfully yours,

Jonathan Campbell
Assistant Laboratory Manager

GeoTesting EXPRESS

Technologies to manage risk for infrastructure

Boston
Atlanta
Chicago
Los Angeles
New York

www.geotesting.com

Geotechnical Test Report **9/21/2016**

GTX-305340
Howell Mill Sewer Outfall
Atlanta, GA

Client Project No.: 2016-5764-01

Prepared for:

United Consulting Group

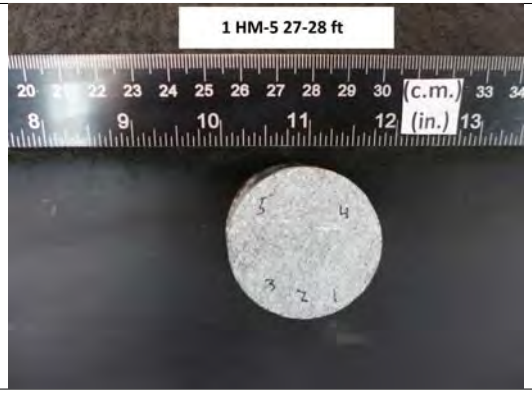
Client:	United Consulting Group				
Project:	Howell Mill Sewer Outfall				
Location:	Atlanta GA			Project No:	GTX-305340
Boring ID:	1	Sample Type:	cylinder	Tested By:	daa
Sample ID:	HM-5	Test Date:	09/19/16	Checked By:	jsc
Depth :	27-28 ft	Test Id:	391329		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
1	HM-5	27-28 ft	1	3.5	3.8	3.65	
			2	3.4	3.7	3.55	
			3	3.9	3.8	3.85	
			4	3.3	3.2	3.25	
			5	4.2	3.8	4.00	
			Average CAIs			3.66	
			Average CAI *			4.10	
					CERCHAR Abrasiveness Index Classification	**Extreme abrasiveness**	

Notes

Test Surface: Saw Cut
Moisture Condition: As Received
Apparatus Type: Original CERCHAR
Stylus Hardness: Rockwell Hardess 54/56 HRC
Stylus Displacement Relative to Rock Fabric:
Styli 1-3: Normal; Styli 4-5: Parallel
* CAI = (0.99 * CAIs) + 0.48
CAIs = CERCHAR index for smooth (saw cut) surface
CAI = CERCHAR index for natural surface
Comments:



Client:	United Consulting Group				
Project:	Howell Mill Sewer Outfall				
Location:	Atlanta, GA			Project No:	GTX-305340
Boring ID:	2	Sample Type:	cylinder	Tested By:	daa
Sample ID:	HM-6	Test Date:	09/19/16	Checked By:	jsc
Depth :	25-26 ft	Test Id:	391330		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
2	HM-6	25-26 ft	1	3.8	3.4	3.60	
			2	4.3	4.8	4.55	
			3	3.0	3.5	3.25	
			4	4.1	3.7	3.90	
			5	3.3	3.8	3.55	
			Average CAIs			3.77	
			Average CAI *			4.21	
				CERCHAR Abrasiveness Index Classification		**Extreme abrasiveness**	

Notes

Test Surface: Saw Cut
Moisture Condition: As Received
Apparatus Type: Original CERCHAR
Stylus Hardness: Rockwell Hardess 54/56 HRC
Stylus Displacement Relative to Rock Fabric:
Styli 1-3: Normal; Styli 4-5: Parallel
* CAI = (0.99 * CAIs) + 0.48
CAIs = CERCHAR index for smooth (saw cut) surface
CAI = CERCHAR index for natural surface
Comments:

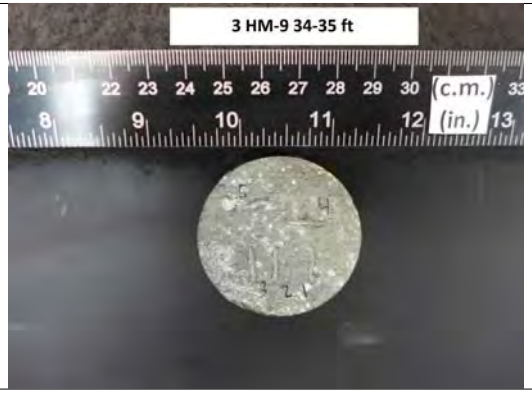
Client:	United Consulting Group				
Project:	Howell Mill Sewer Outfall				
Location:	Atlanta, GA			Project No:	GTX-305340
Boring ID:	3	Sample Type:	cylinder	Tested By:	daa
Sample ID:	HM-9	Test Date:	09/19/16	Checked By:	jsc
Depth :	34-35 ft	Test Id:	391331		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
3	HM-9	34-35 ft	1	0.4	0.6	0.50	
			2	0.8	0.5	0.65	
			3	1.5	1.2	1.35	
			4	0.4	0.3	0.35	
			5	1.2	1.4	1.30	
			Average CAIs			0.83	
			Average CAI *			1.30	
				CERCHAR Abrasiveness Index Classification		**Medium abrasiveness**	

Notes

Test Surface: Saw Cut
Moisture Condition: As Received
Apparatus Type: Original CERCHAR
Stylus Hardness: Rockwell Hardess 54/56 HRC
Stylus Displacement Relative to Rock Fabric:
Styli 1-3: Normal; Styli 4-5: Parallel
* CAI = (0.99 * CAIs) + 0.48
CAIs = CERCHAR index for smooth (saw cut) surface
CAI = CERCHAR index for natural surface
Comments:



GeoTesting EXPRESS

ROCK CHAIN OF CUSTODY & TEST REQUEST

GeoTesting Express, Inc.
125 Nagog Park
Acton, MA 01720
800 434 1062 Toll Free
978 635 0266 Fax

2358 Perimeter Park Drive, Suite 320
Atlanta, GA 30341
770 645 6575 Tel
770 645 6570 Fax

www.geotesting.com

CLIENT		INVOICE (complete if different from Client)	
Company: United Consulting		Company:	
Address: 625 Holcomb Br. Rd.		Address:	
City, State, Zip: Norcross, GA 30071		City, State, Zip:	
Contact: Mahvand Saleki	Phone: 770)582-2843	Contact:	Phone:
E-mail: msaleki@unitedconsulting.com	Cell:	E-mail:	Cell:

PROJECT		
Project Name: Howell Mill sewer outfall	Client Project #: 2016-5764-01	Purchase Order#:
Project Location: Howell Mill Rd, Tucker	GTX Sales Order #:	Requested Turnaround: 1 week
On-site Contact: Rafael Ospina - Team Leader 404) 583-2670	E-mail:	Phone:

ROCK

Core Run #	Sample ID	Depth	CERCHAR Abrasivity (ASTM D 7625) * 55HRC/40HRC	Direct Shear (ASTM D5607)*	Direct Tensile Strength (ASTM D 2936)	Elastic Moduli in Triaxial Compression (ASTM D 7012B)	Elastic Moduli in Unlaxial Compression (ASTM D 7012D)	Unit Weight (ISRM)	Petrographic Analysis (ISRM)	Point Load Index (ASTM D 5731)* Diametral, Axial, Lump/Block	Punch Penetration (Handewith)	Slake Durability (ASTM D 4644)	Splitting (Brazilian) Tensile Strength (ASTM D 3967)	Schmidt Hammer (ASTM D 5873)	Total Hardness (Schmidt Hammer and Taber Abrasion)	Triaxial Compression (ASTM D 7012A)	Unconfined Compression (ASTM D 7012C)	Other:	Other:
1	HM-5	27-28 ft	X																
2	HM-6	25-26 ft	X																
3	HM-9	34-35 ft	X																

*Specify Test Conditions (Undisturbed or Remolded, Density and Moisture, Test Normal Loads, Test Confining Stresses, etc.):

AUTHORIZE BY SIGNING AND DATING:

SIGNATURE: _____ PRINT NAME: _____ DATE: _____

For GTX Use Only
Incoming Sample Inspection Performed ☐
Adverse conditions: _____

Relinquished By: R Baker	DATE:	Received By:	DATE: 9/15/16
	TIME:		TIME: 10:32
Relinquished By:	DATE:	Received By:	DATE:
	TIME:		TIME:

GeoTesting EXPRESS

WARRANTY and LIABILITY

GeoTesting Express (GTX) warrants that all tests it performs are run in general accordance with the specified test procedures and accepted industry practice. GTX will correct or repeat any test that does not comply with this warranty. GTX has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

GTX may report engineering parameters that require us to interpret the test data. Such parameters are determined using accepted engineering procedures. However, GTX does not warrant that these parameters accurately reflect the true engineering properties of the *in situ* material. Responsibility for interpretation and use of the test data and these parameters for engineering and/or construction purposes rests solely with the user and not with GTX or any of its employees.

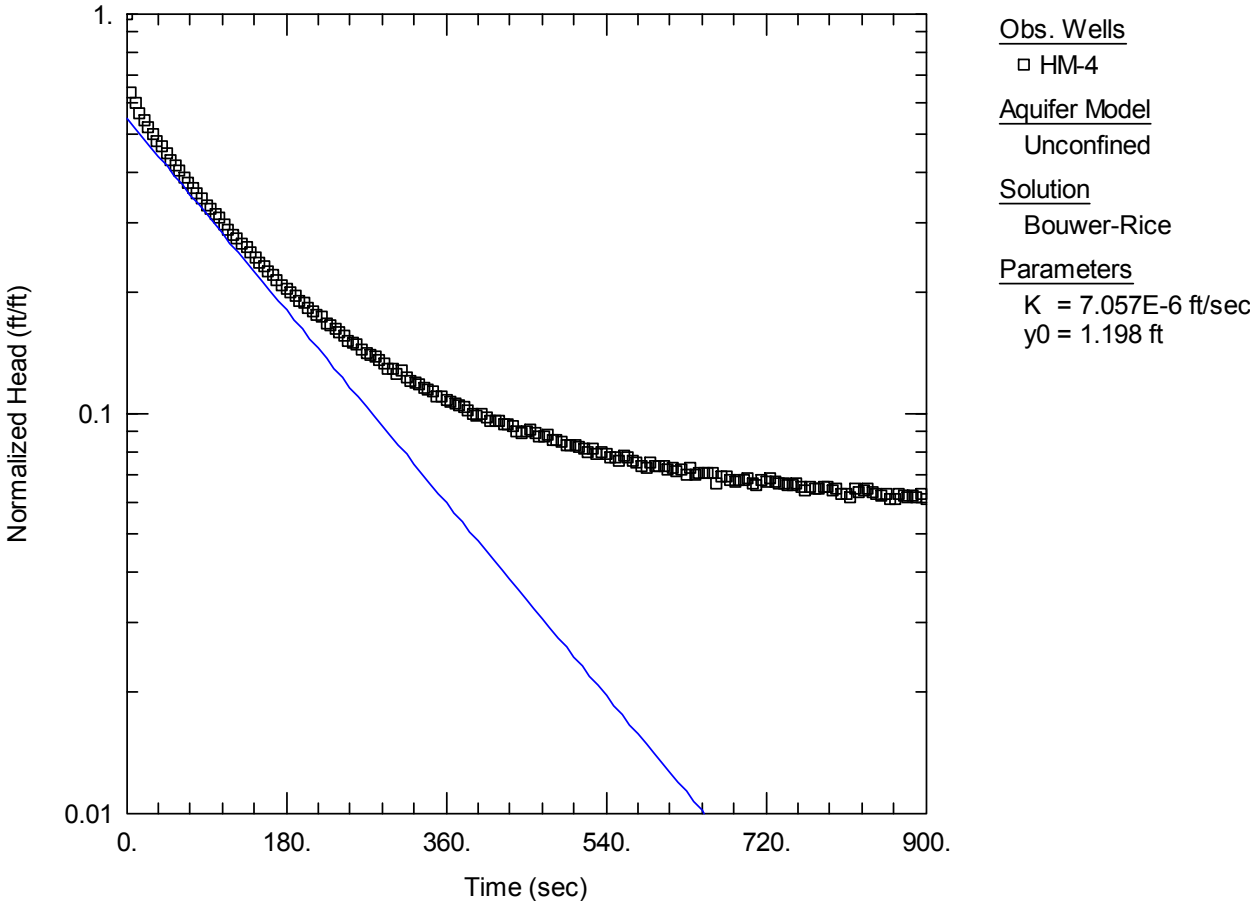
GTX's liability will be limited to correcting or repeating a test which fails our warranty. GTX's liability for damages to the Purchaser of testing services for any cause whatsoever shall be limited to the amount GTX received for the testing services. GTX will not be liable for any damages, or for any lost benefits or other consequential damages resulting from the use of these test results, even if GTX has been advised of the possibility of such damages. GTX will not be responsible for any liability of the Purchaser to any third party.

Commonly Used Symbols

A	pore pressure parameter for $\Delta\sigma_1 - \Delta\sigma_3$
B	pore pressure parameter for $\Delta\sigma_3$
CAI	CERCHAR Abrasiveness Index
CIU	isotropically consolidated undrained triaxial shear test
CR	compression ratio for one dimensional consolidation
CSR	cyclic stress ratio
C_c	coefficient of curvature, $(D_{30})^2 / (D_{10} \times D_{60})$
C_u	coefficient of uniformity, D_{60}/D_{10}
C_c	compression index for one dimensional consolidation
C_α	coefficient of secondary compression
c_v	coefficient of consolidation
c	cohesion intercept for total stresses
c'	cohesion intercept for effective stresses
D	diameter of specimen
D	damping ratio
D_{10}	diameter at which 10% of soil is finer
D_{15}	diameter at which 15% of soil is finer
D_{30}	diameter at which 30% of soil is finer
D_{50}	diameter at which 50% of soil is finer
D_{60}	diameter at which 60% of soil is finer
D_{85}	diameter at which 85% of soil is finer
d_{50}	displacement for 50% consolidation
d_{90}	displacement for 90% consolidation
d_{100}	displacement for 100% consolidation
E	Young's modulus
e	void ratio
e_c	void ratio after consolidation
e_o	initial void ratio
G	shear modulus
G_s	specific gravity of soil particles
H	height of specimen
H_R	Rebound Hardness number
i	gradient
I_S	Uncorrected point load strength
$I_{S(50)}$	Size corrected point load strength index
H_A	Modified Taber Abrasion
H_T	Total hardness
K_o	lateral stress ratio for one dimensional strain
k	permeability
LI	Liquidity Index
m_v	coefficient of volume change
n	porosity
PI	plasticity index
P_c	preconsolidation pressure
p	$(\sigma_1 + \sigma_3) / 2$, $(\sigma_v + \sigma_h) / 2$
p'	$(\sigma'_1 + \sigma'_3) / 2$, $(\sigma'_v + \sigma'_h) / 2$
p'_c	p' at consolidation
Q	quantity of flow
q	$(\sigma_1 - \sigma_3) / 2$
q_f	q at failure
q_o, q_i	initial q
q_c	q at consolidation
S_r	Post cyclic undrained shear strength
T	temperature
t	time
U, UC	unconfined compression test
UU, Q	unconsolidated undrained triaxial test
u_a	pore gas pressure
u_e	excess pore water pressure
u, u_w	pore water pressure
V	total volume
V_g	volume of gas
V_s	volume of solids
V_s	shear wave velocity
V_v	volume of voids
V_w	volume of water
V_o	initial volume
v	velocity
W	total weight
W_s	weight of solids
W_w	weight of water
w	water content
w_c	water content at consolidation
w_f	final water content
w_l	liquid limit
w_n	natural water content
w_p	plastic limit
w_s	shrinkage limit
w_o, w_i	initial water content
α	slope of q_f versus p_f
α'	slope of q_f versus p_f'
γ_t	total unit weight
γ_d	dry unit weight
γ_s	unit weight of solids
γ_w	unit weight of water
ε	strain
ε_{vol}	volume strain
ε_h, ε_v	horizontal strain, vertical strain
μ	Poisson's ratio, also viscosity
σ	normal stress
σ'	effective normal stress
σ_c, σ'_c	consolidation stress in isotropic stress system
σ_h, σ'_h	horizontal normal stress
σ_v, σ'_v	vertical normal stress
σ'_{vc}	Effective vertical consolidation stress
σ_1	major principal stress
σ_2	intermediate principal stress
σ_3	minor principal stress
τ	shear stress
φ	friction angle based on total stresses
φ'	friction angle based on effective stresses
φ'_r	residual friction angle
φ_{ult}	φ for ultimate strength

Slug Test Results

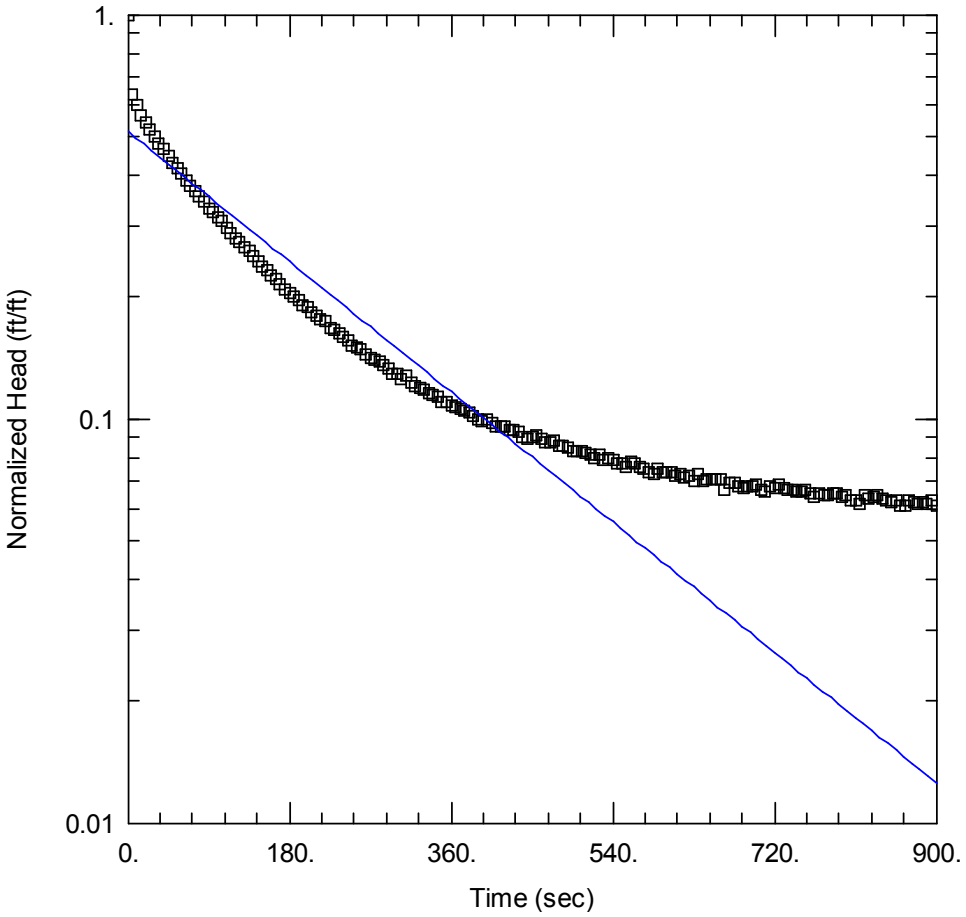
HM-4 RUN 1 SOLUTIONS



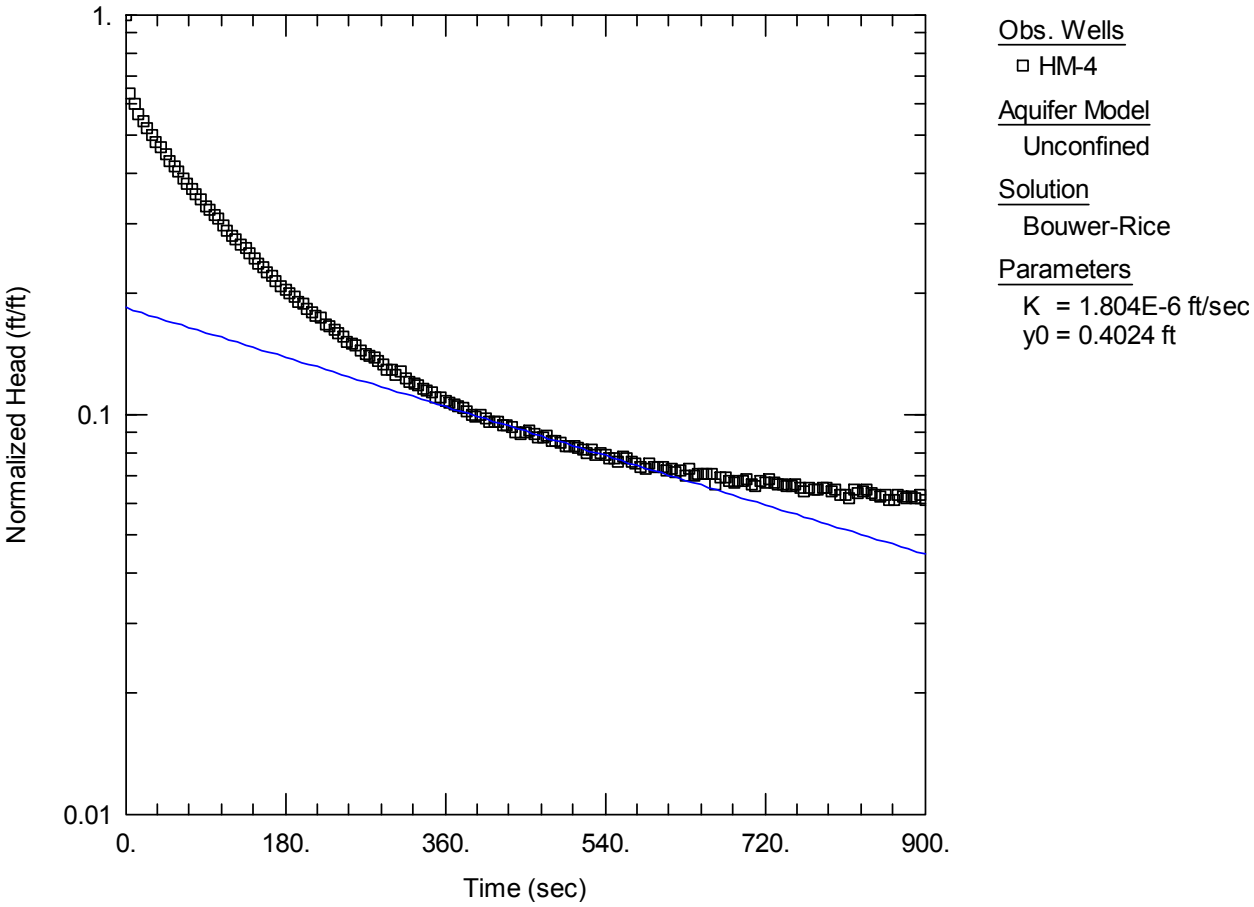
- HM-4 Slug In Run 1 – **High** Solution

UNITED CONSULTING

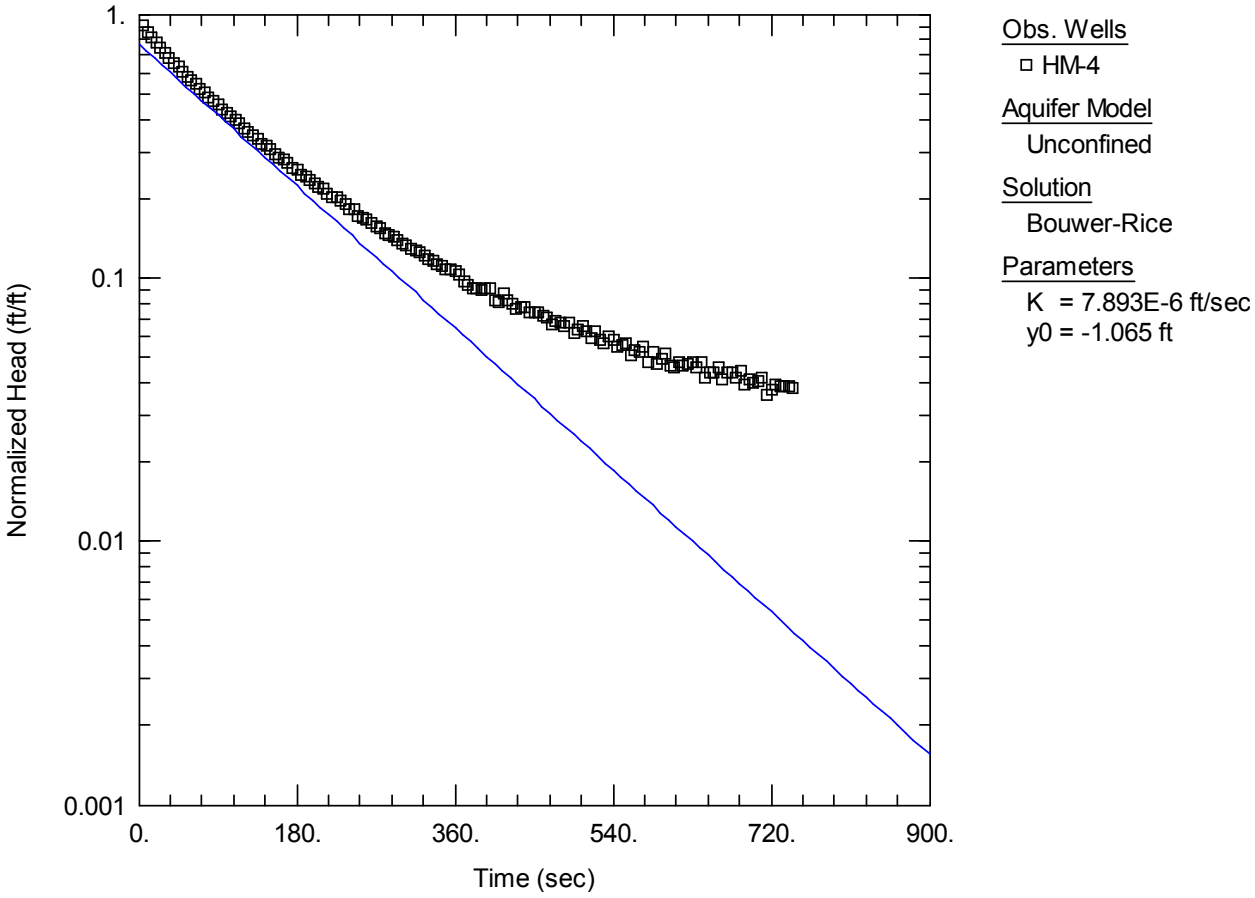
Data Processed and Output by: AQTESOLV®v.4.50.002



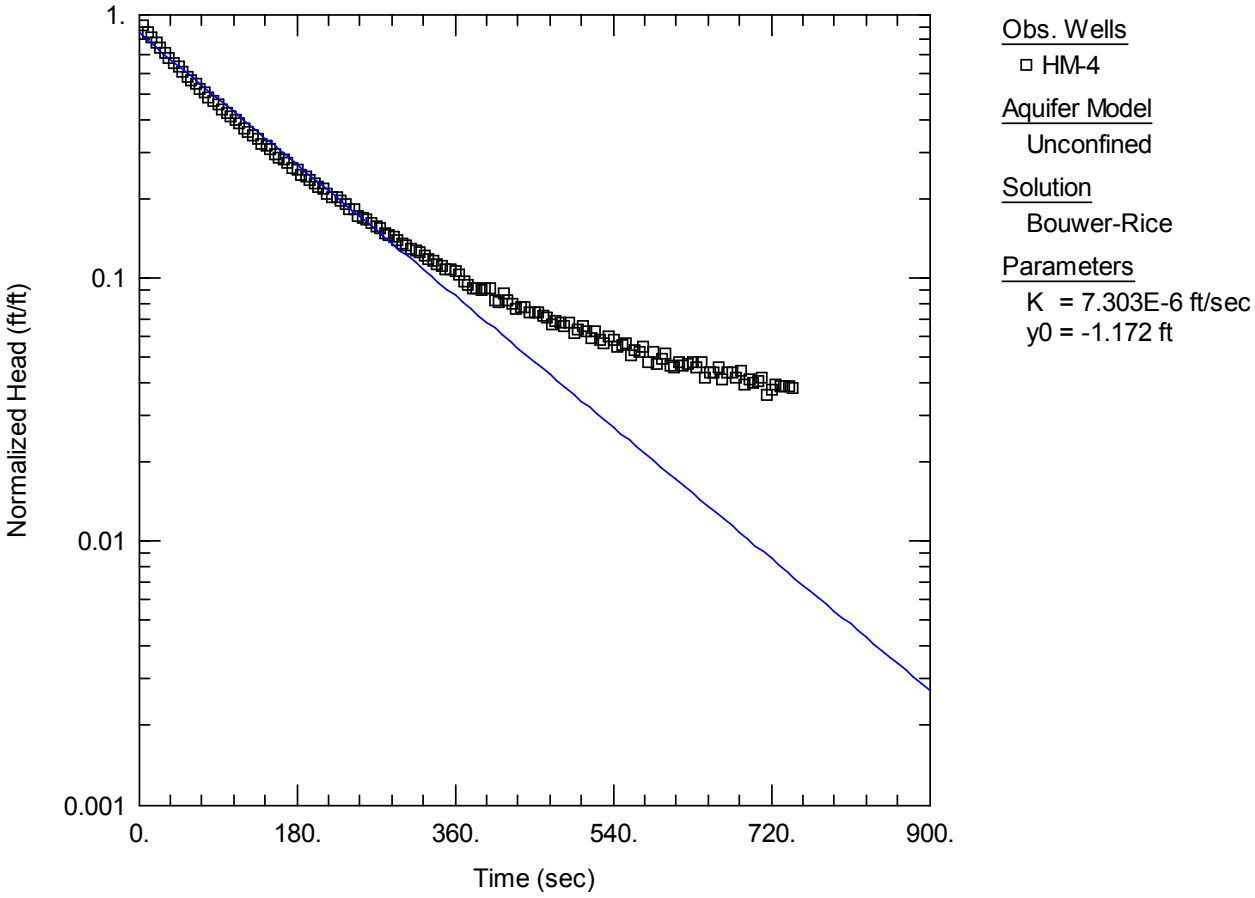
- HM-4 Slug In Run 1 – **Automatic** Solution



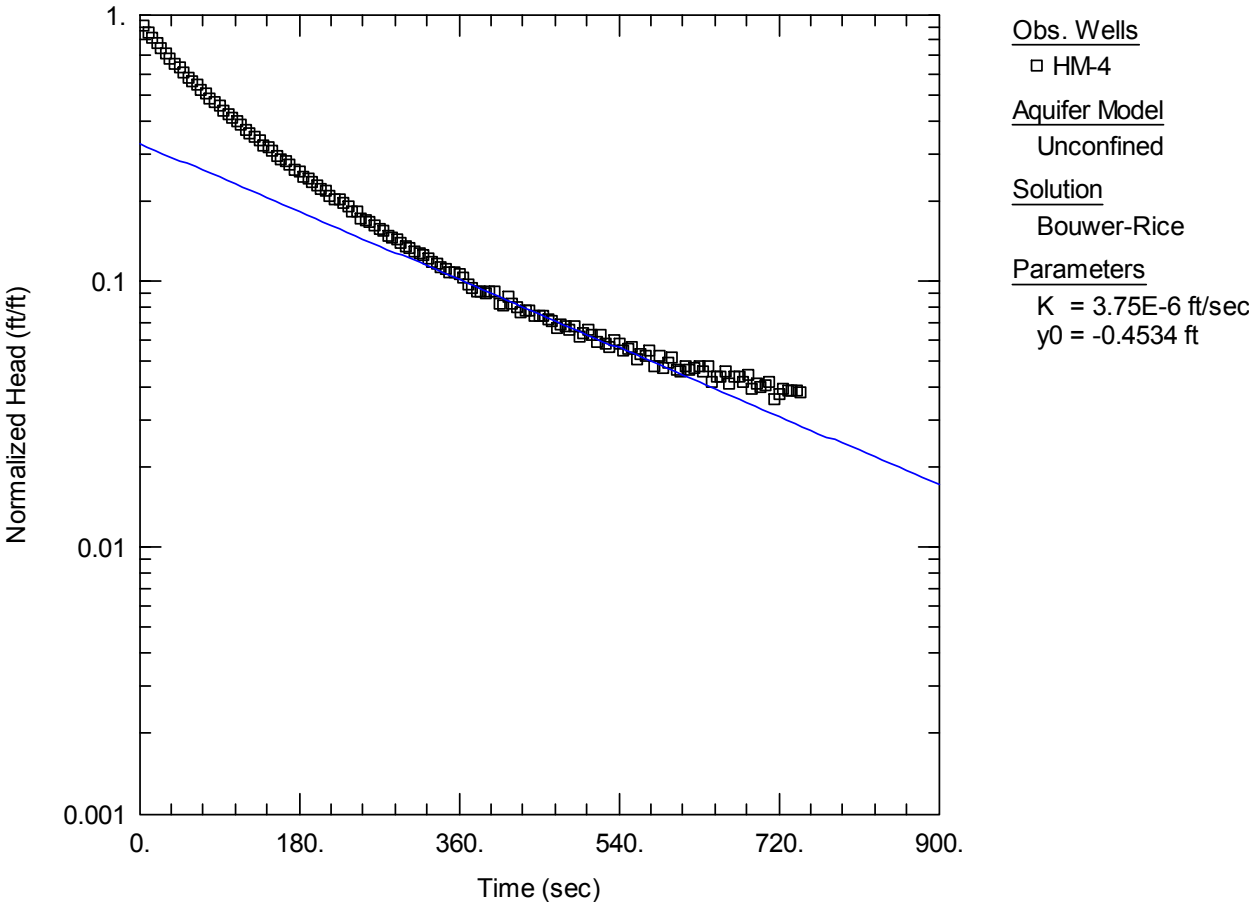
- HM-4 Slug In Run 1 – **Low** Solution



- HM-4 Slug Out Run 1 – **High** Solution

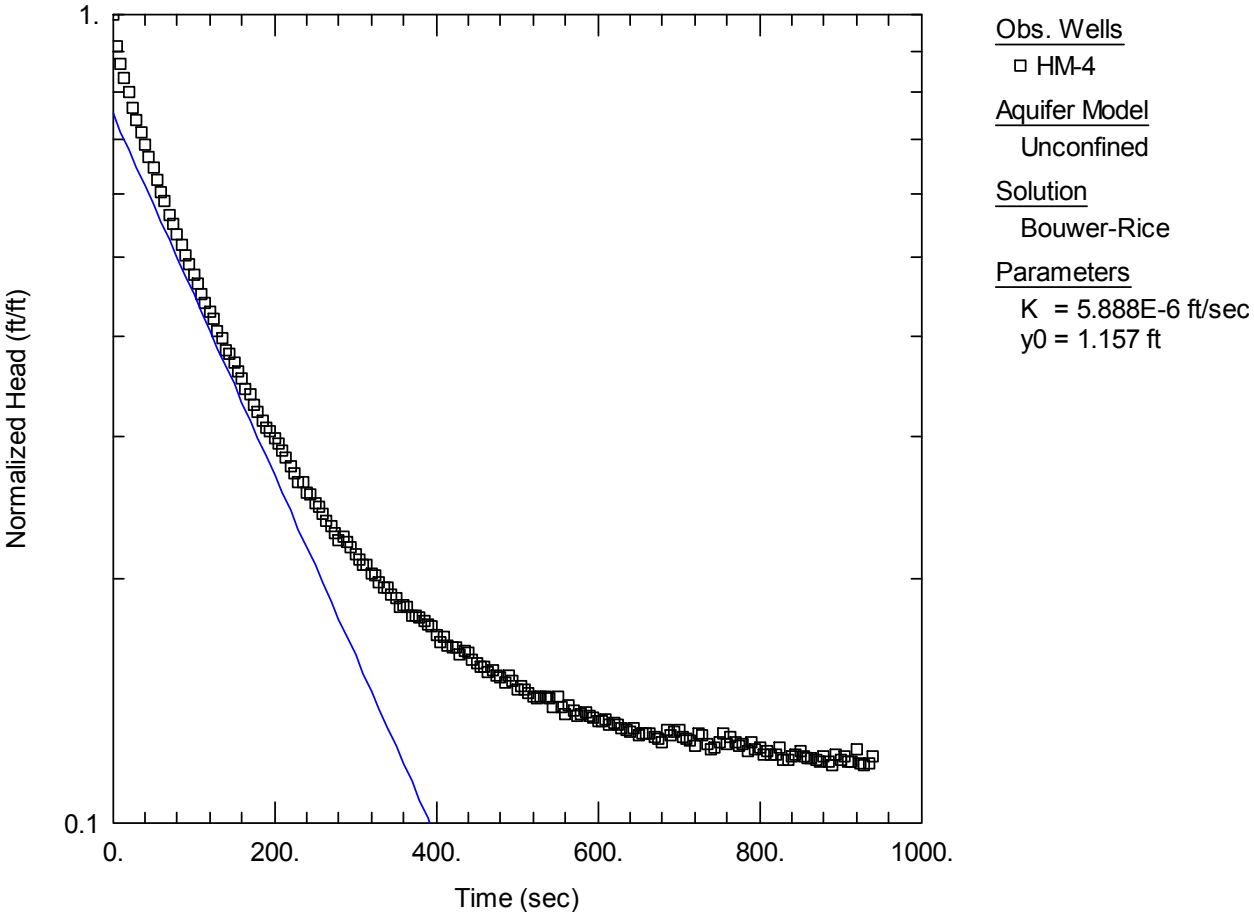


- HM-4 Slug Out Run 1 – **Automatic** Solution



- HM-4 Slug Out Run 1 – **Low** Solution

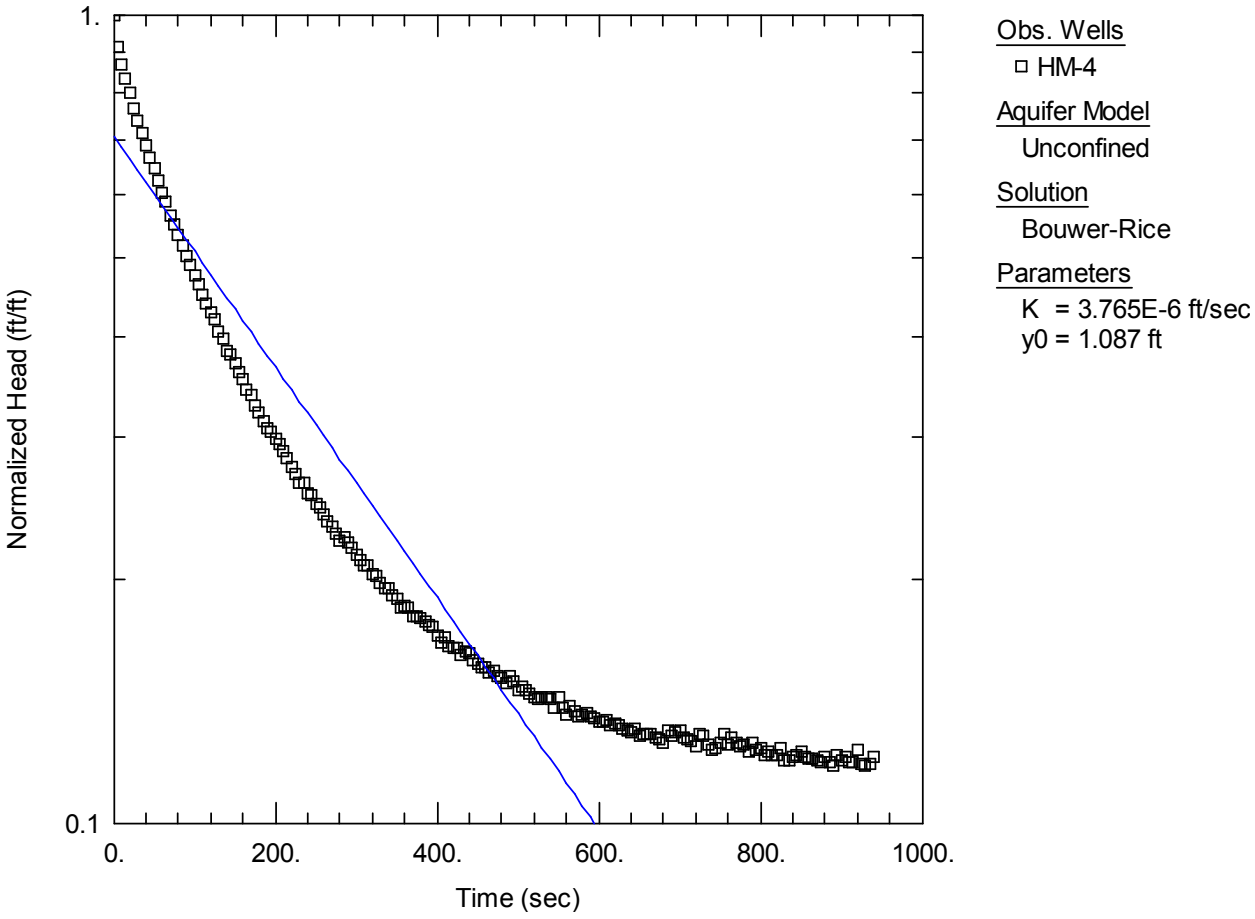
HM-4 RUN 2 SOLUTIONS



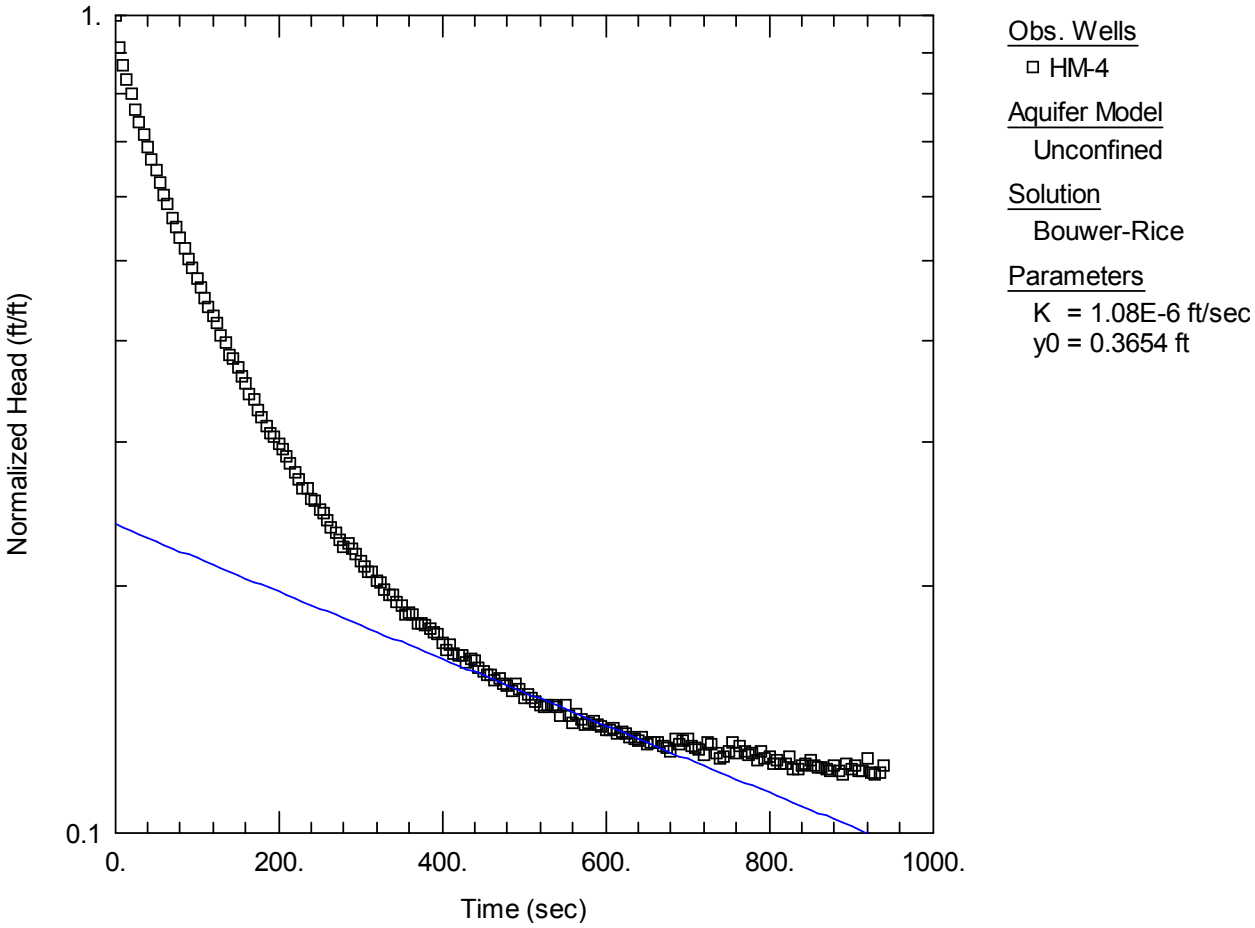
- HM-4 Slug In Run 2 – **High** Solution

UNITED CONSULTING

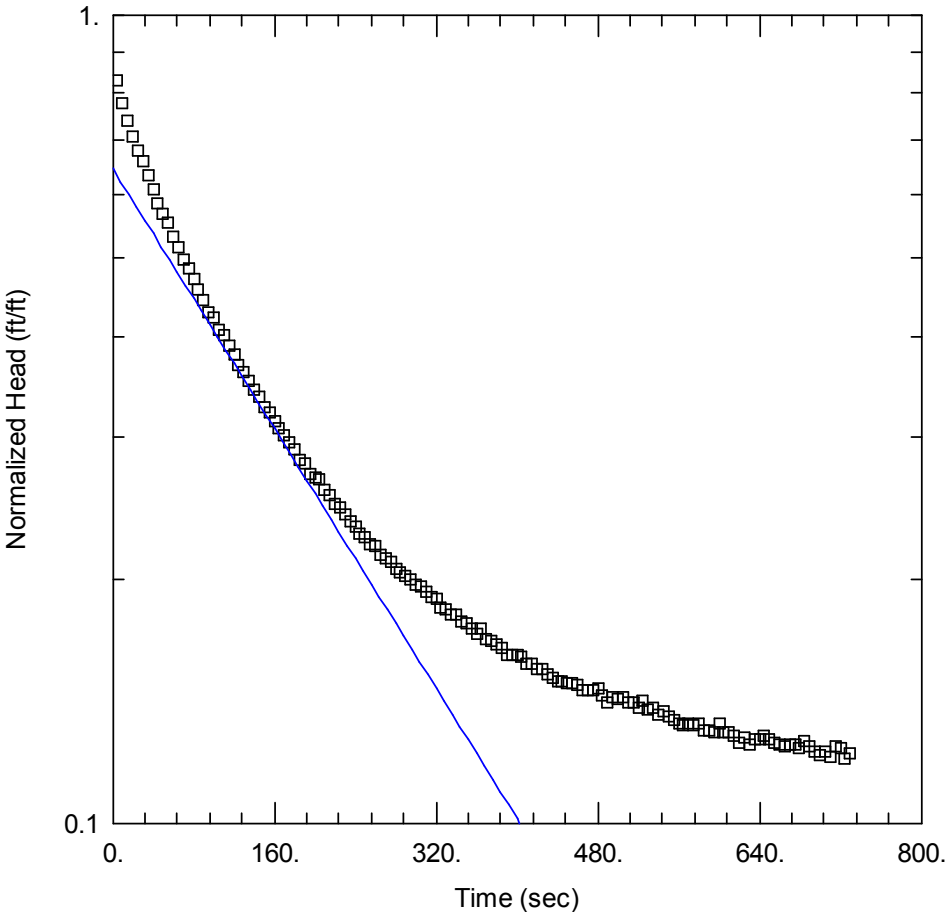
Data Processed and Output by: AQTESOLV®v.4.50.002



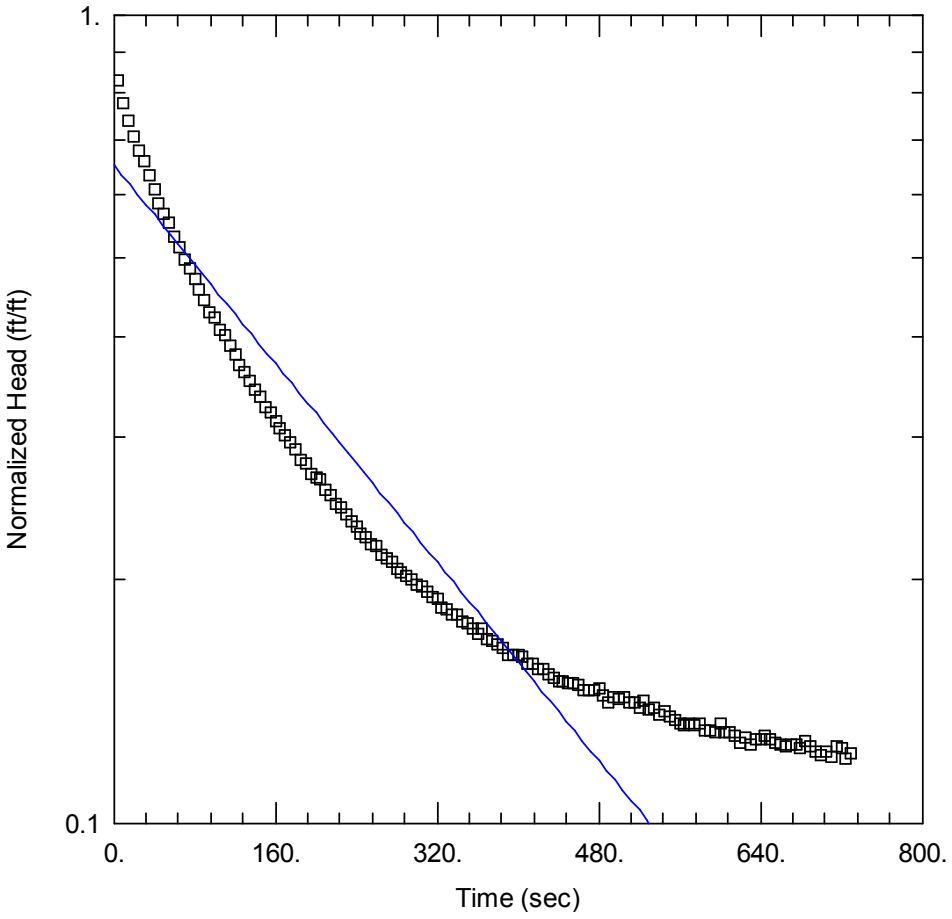
- HM-4 Slug In Run 2 – **Automated** Solution



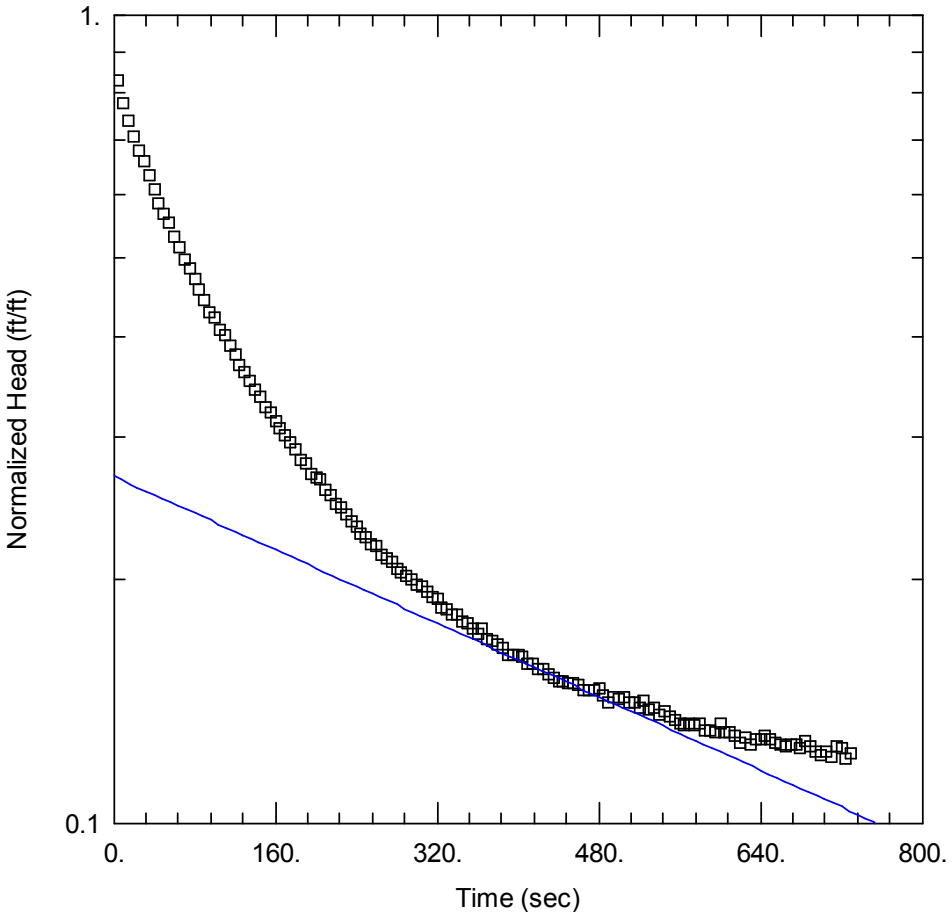
- HM-4 Slug In Run 2 – **Low** Solution



- HM-4 Slug Out Run 2 – **High** Solution

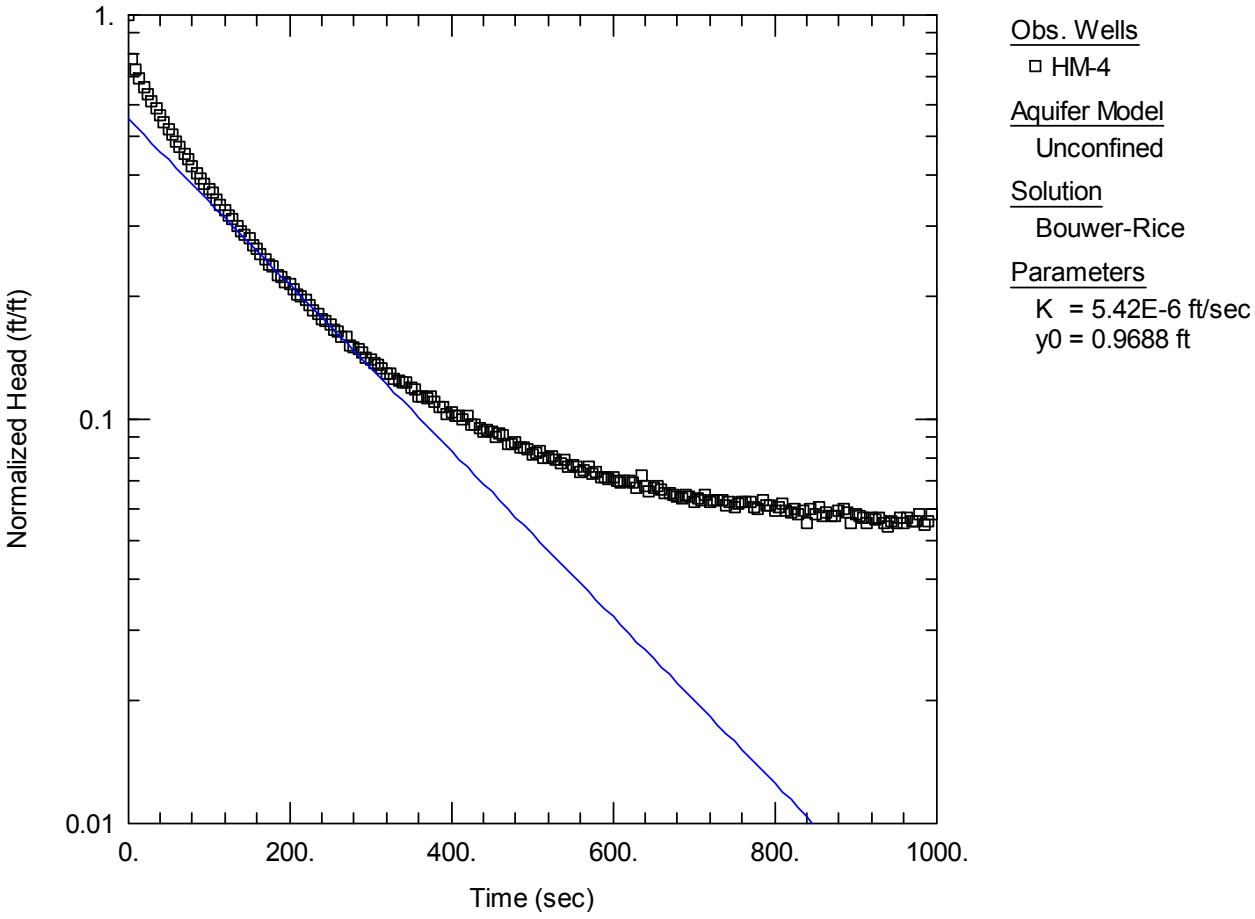


- HM-4 Slug Out Run 2 – **Automated** Solution



- HM-4 Slug Out Run 2 – **Low** Solution

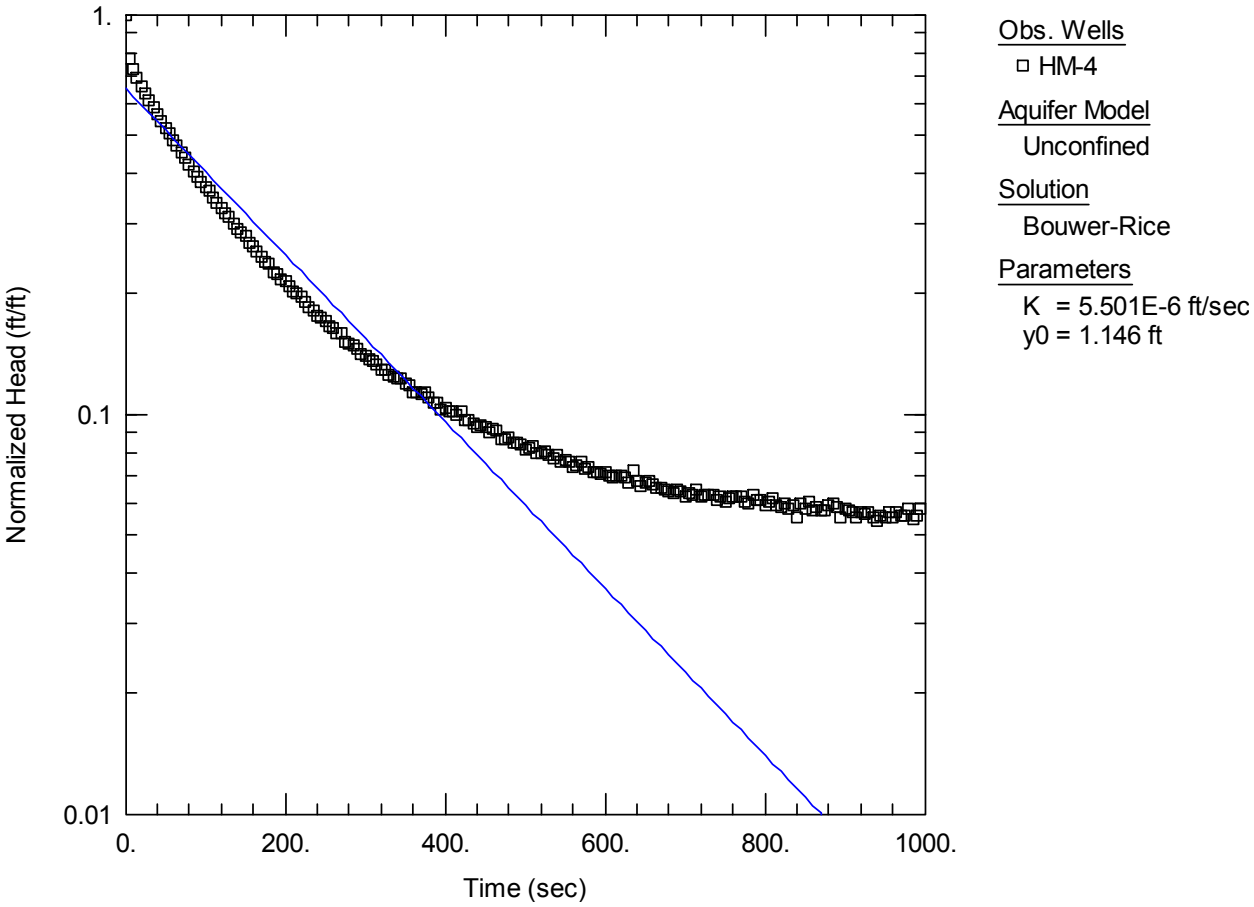
HM-4 RUN 3 SOLUTIONS



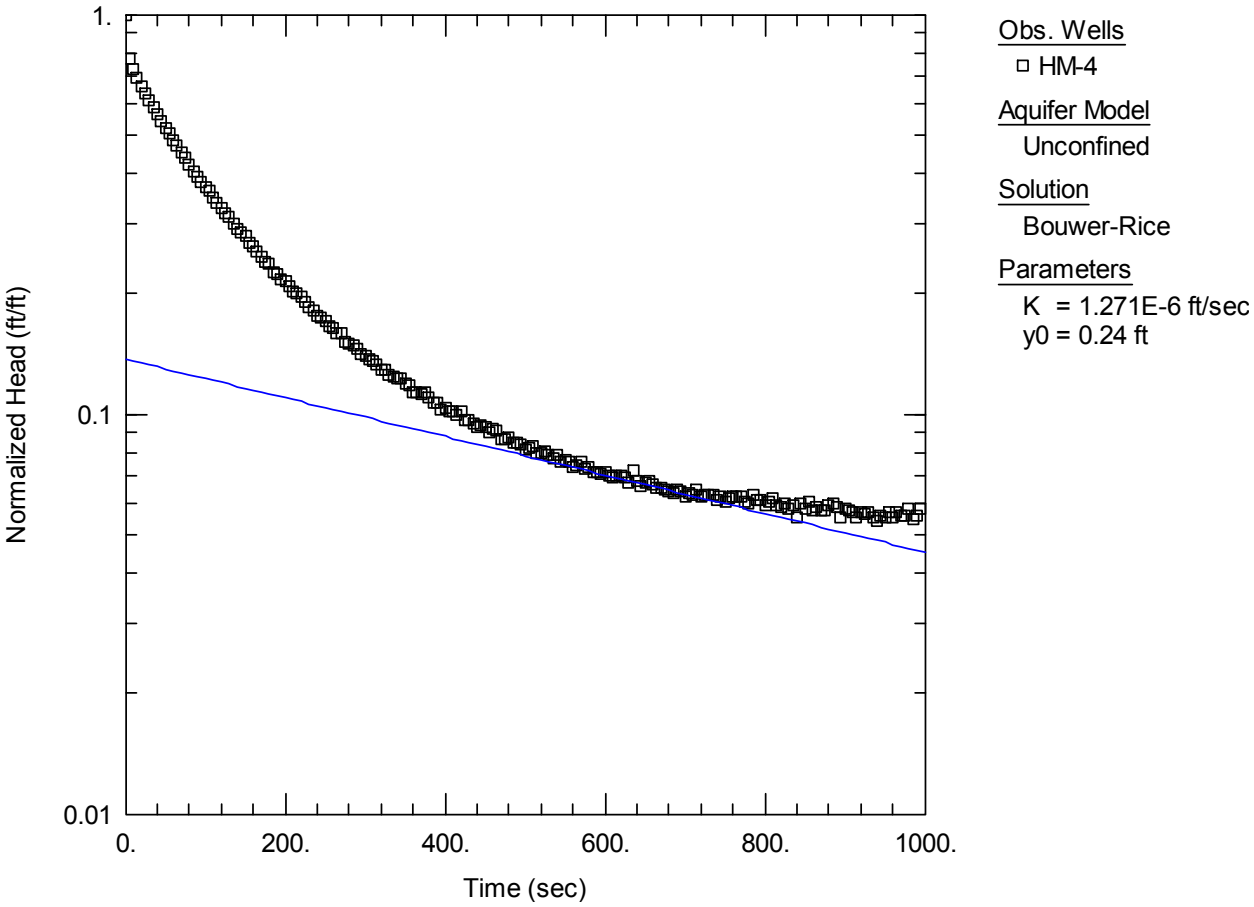
- HM-4 Slug In Run 3 – **High** Solution

UNITED CONSULTING

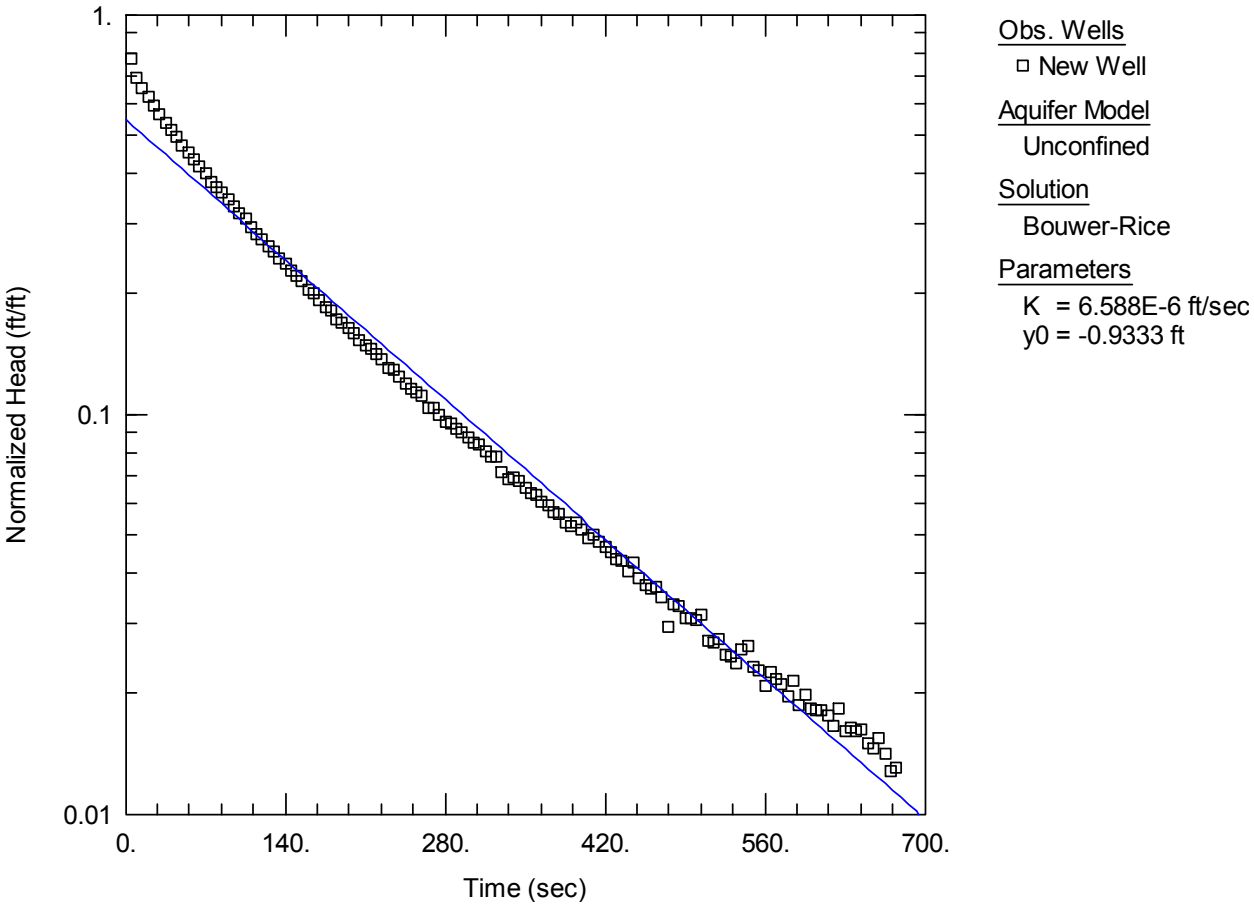
Data Processed and Output by: AQTESOLV®v.4.50.002



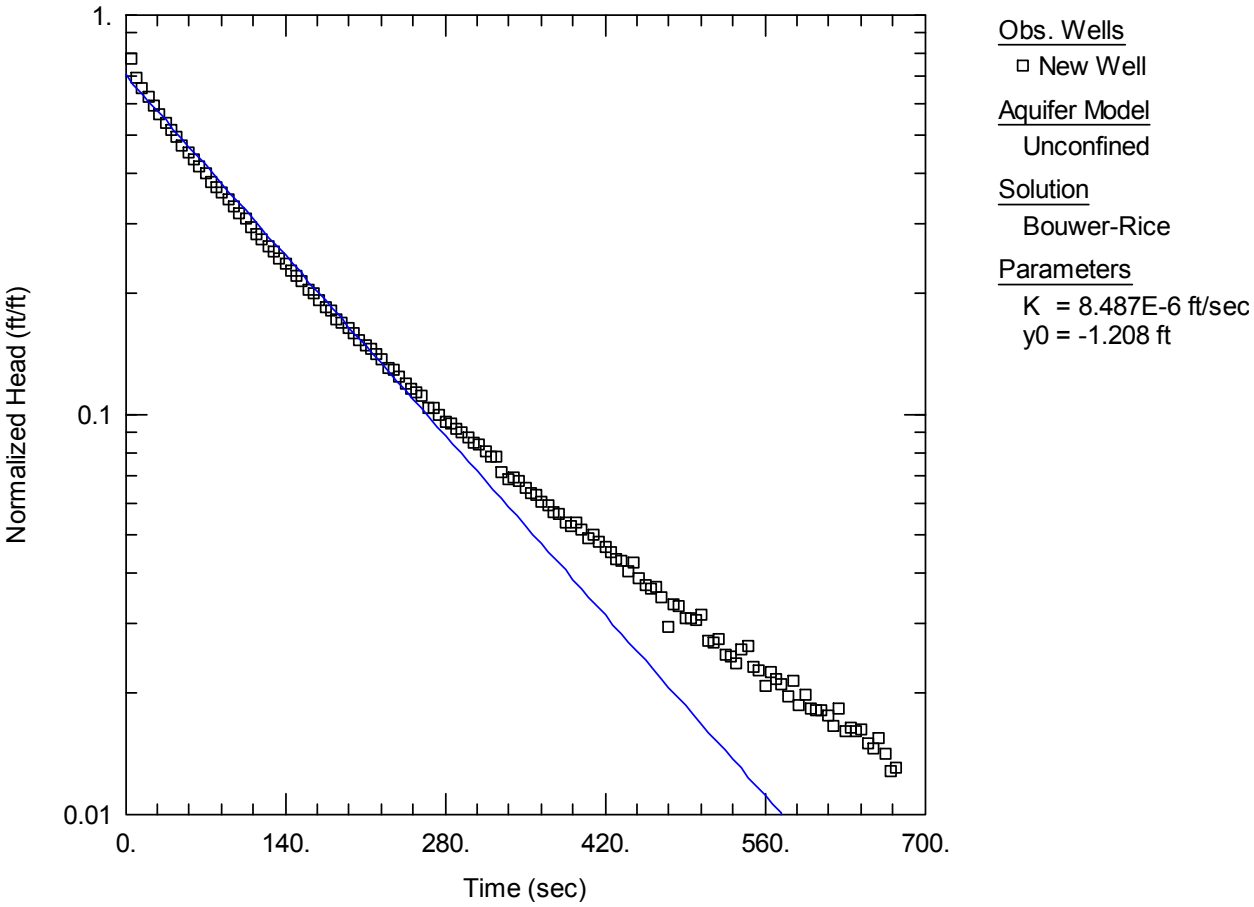
- HM-4 Slug In Run 3 – **Automated** Solution



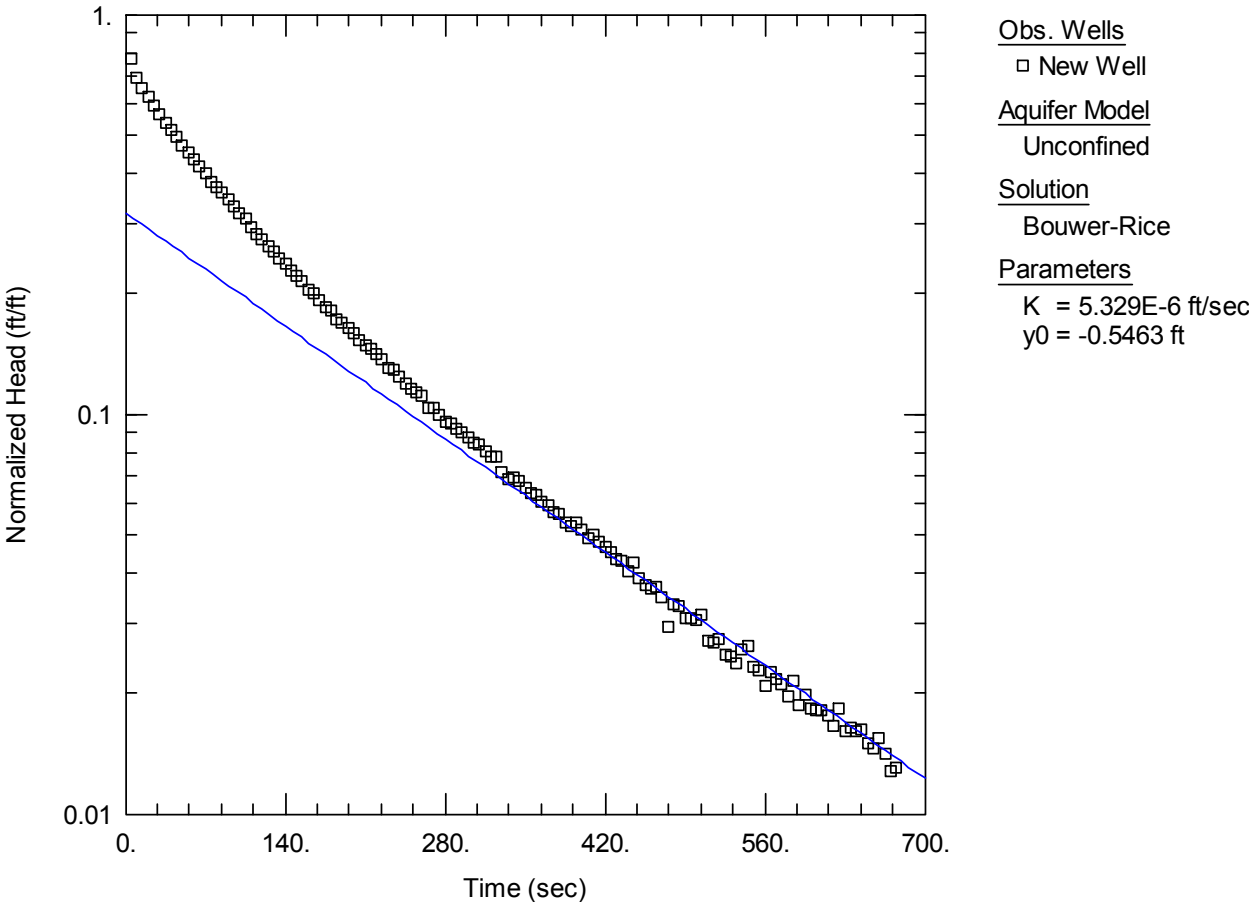
- HM-4 Slug In Run 3 – **Low** Solution



- HM-4 Slug Out Run 3 – **High** Solution

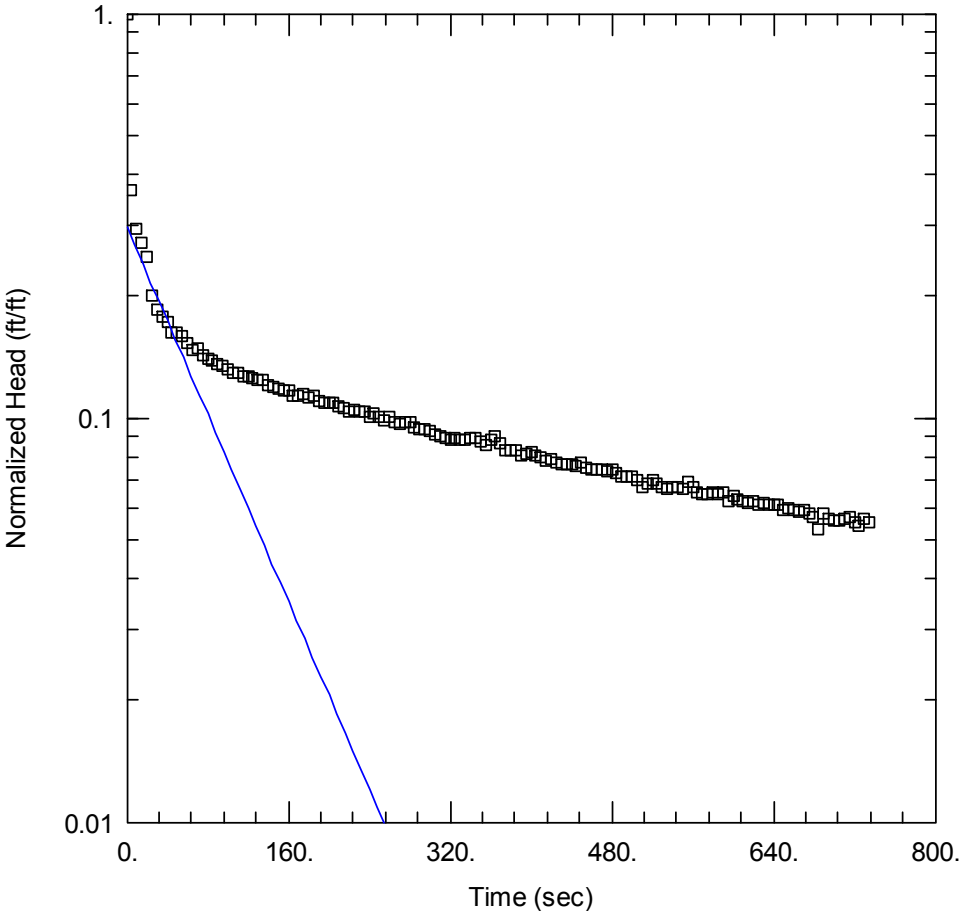


- HM-4 Slug Out Run 3 – **Automated** Solution



- HM-4 Slug Out Run 3 – **Low** Solution

HM-7 RUN 1 SOLUTIONS



Obs. Wells
HM-7

Aquifer Model
Unconfined

Solution
Bouwer-Rice

Parameters
K = 1.52E-5 ft/sec
y0 = 0.6465 ft

- HM-7 Slug In Run 1 – **High** Solution

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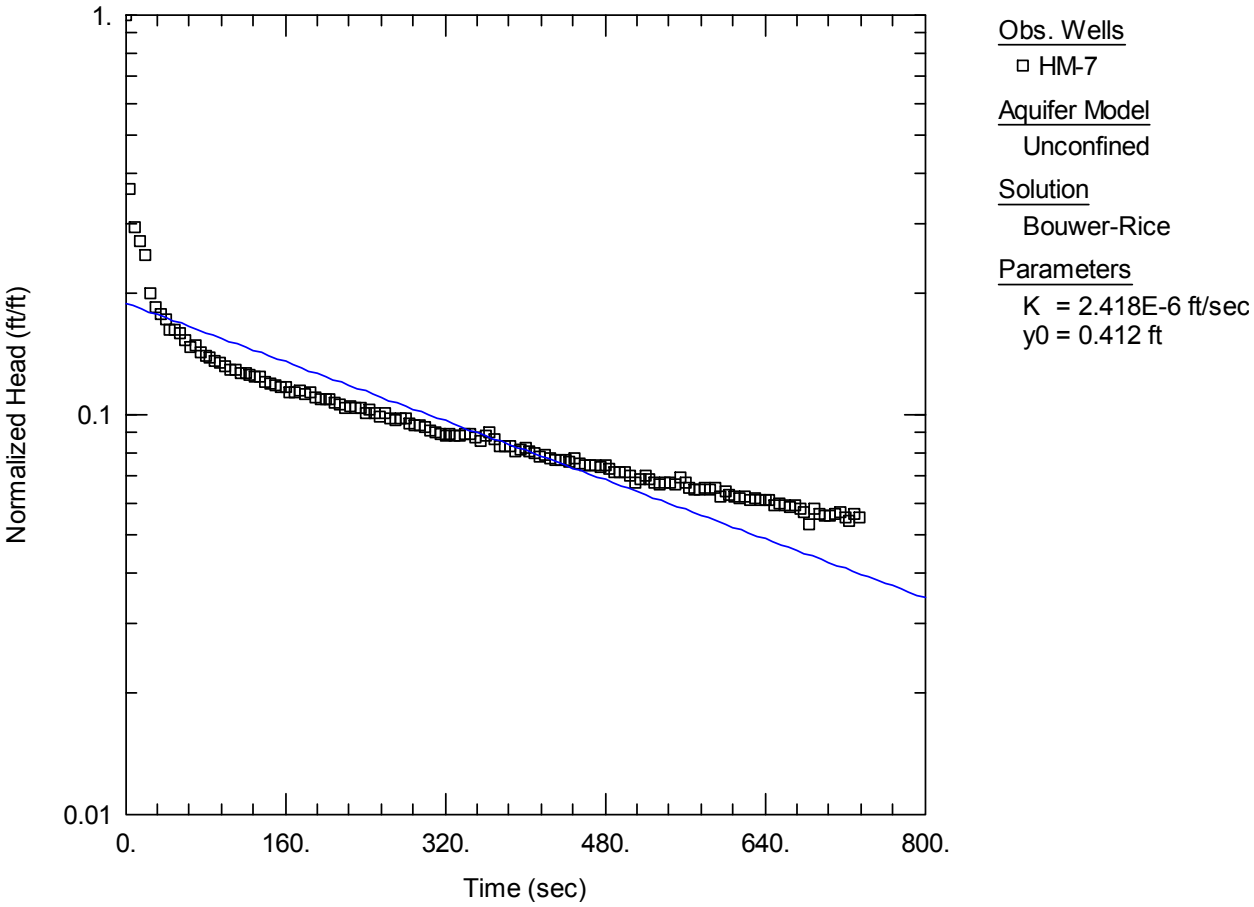
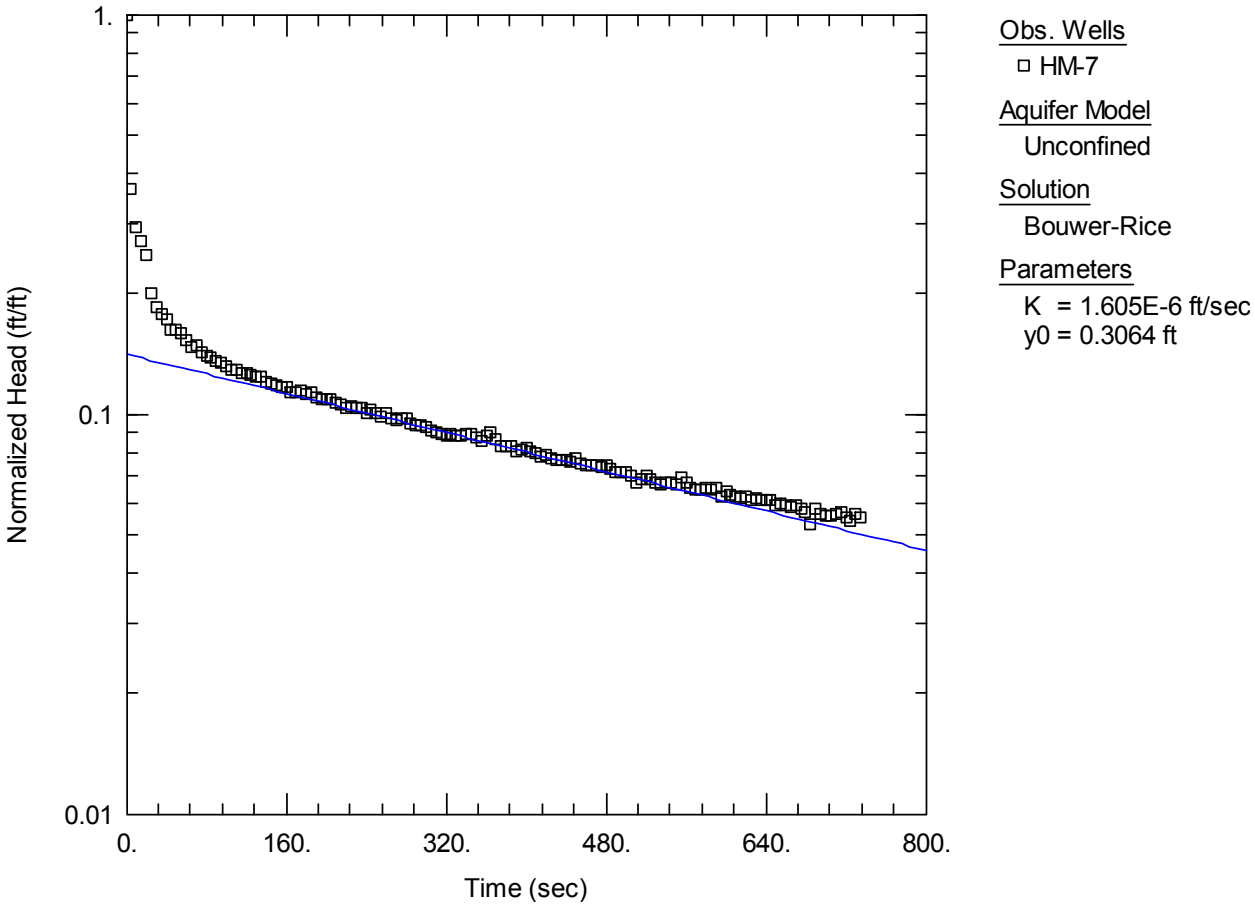
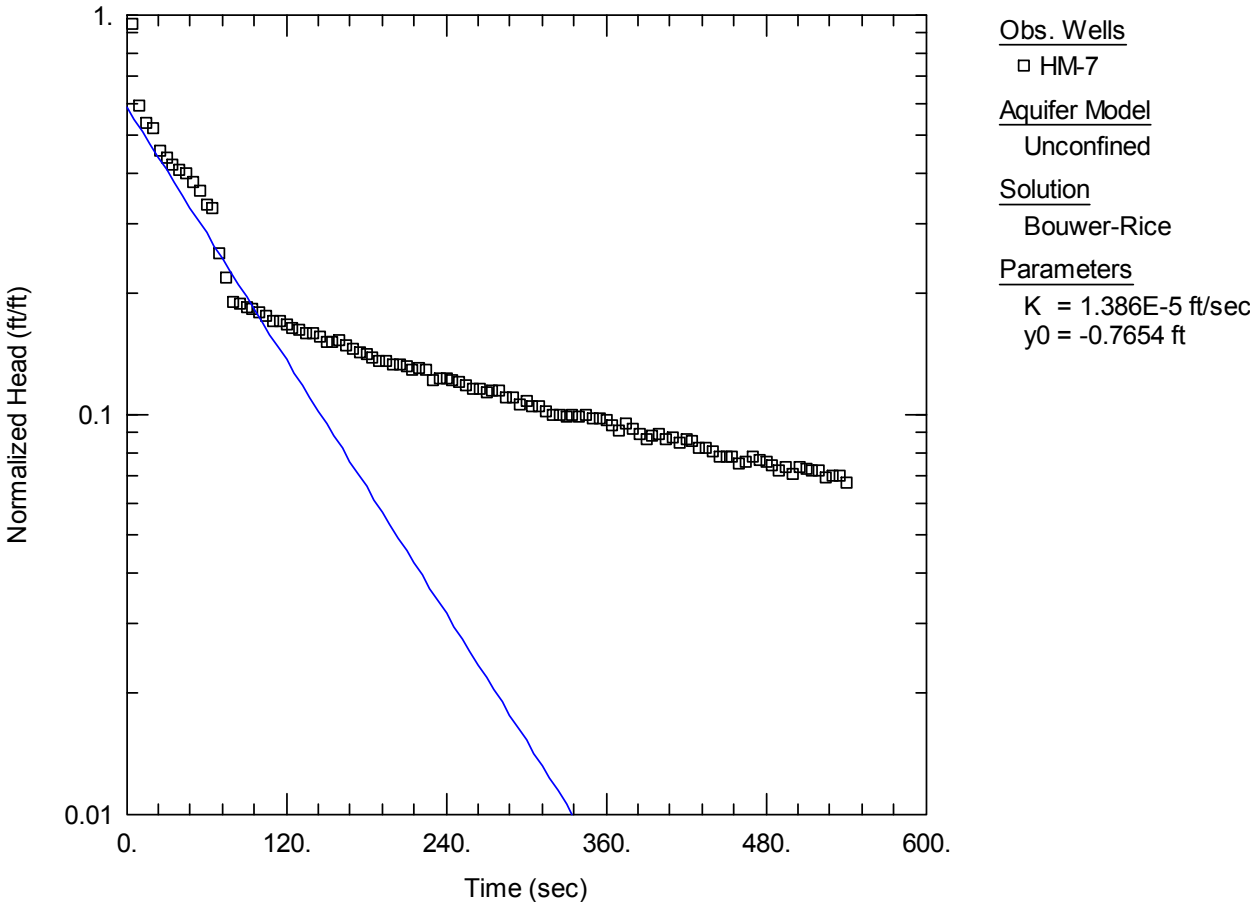


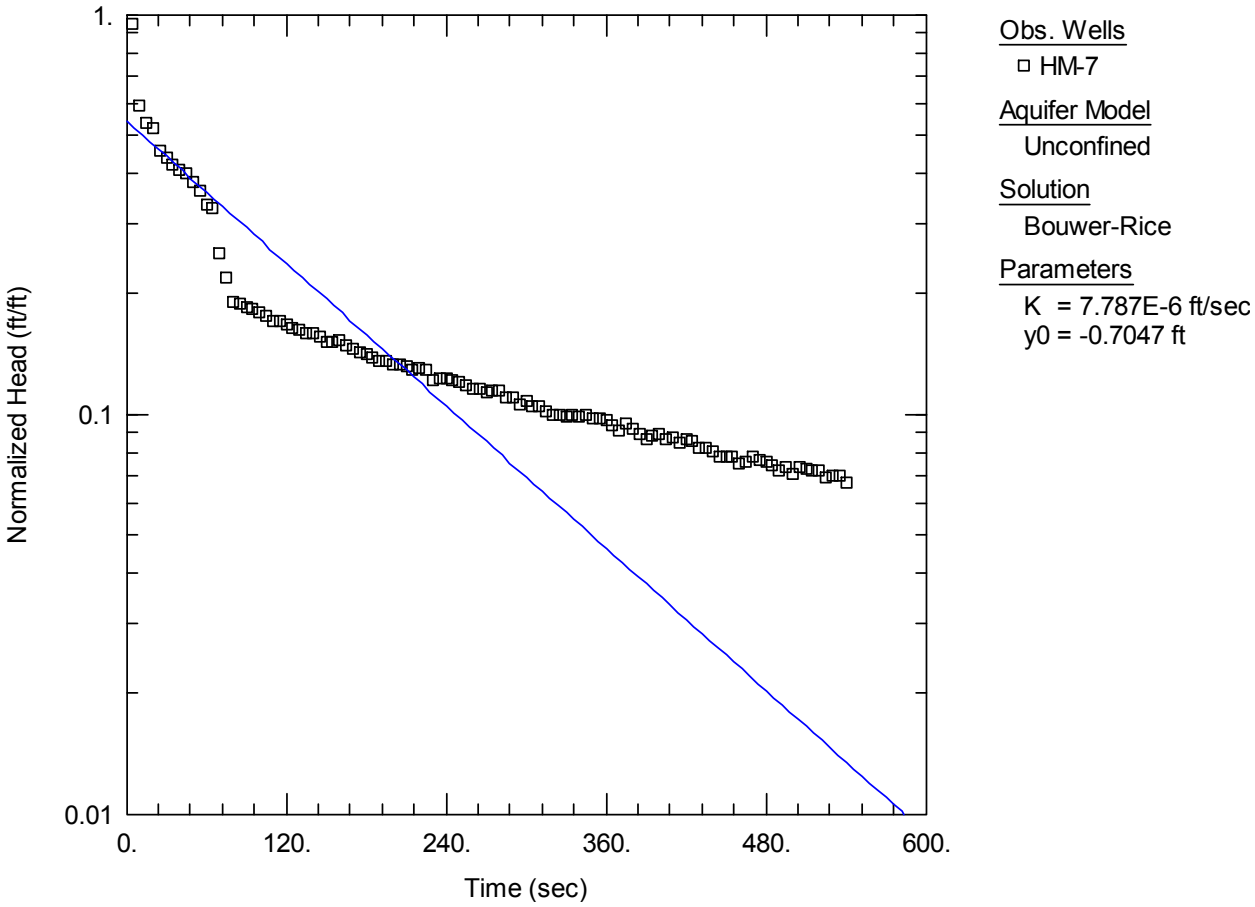
- HM-7 Slug In Run 1 – **Automatic** Solution



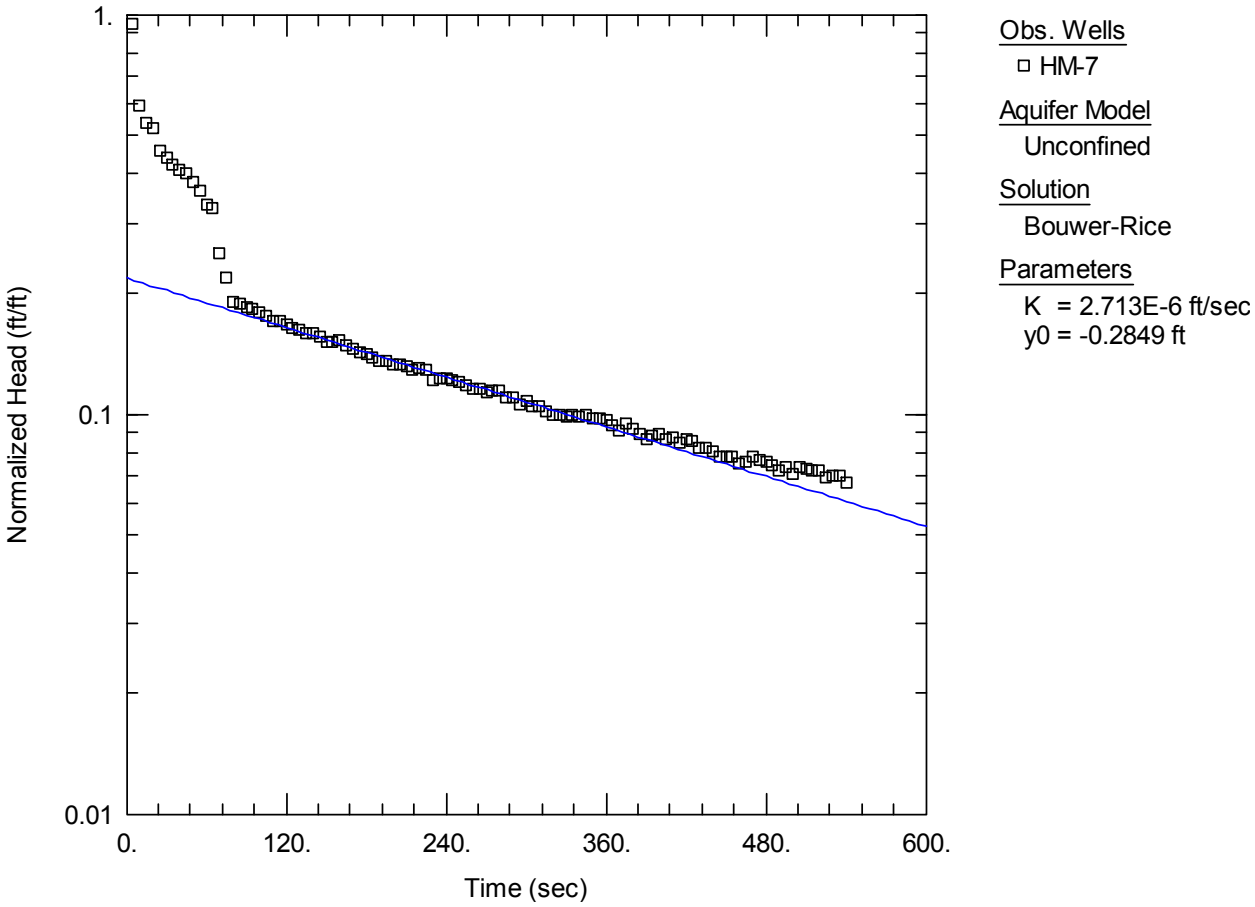
- HM-7 Slug In Run 1 – **Low** Solution



- HM-7 Slug Out Run 1 – **High** Solution

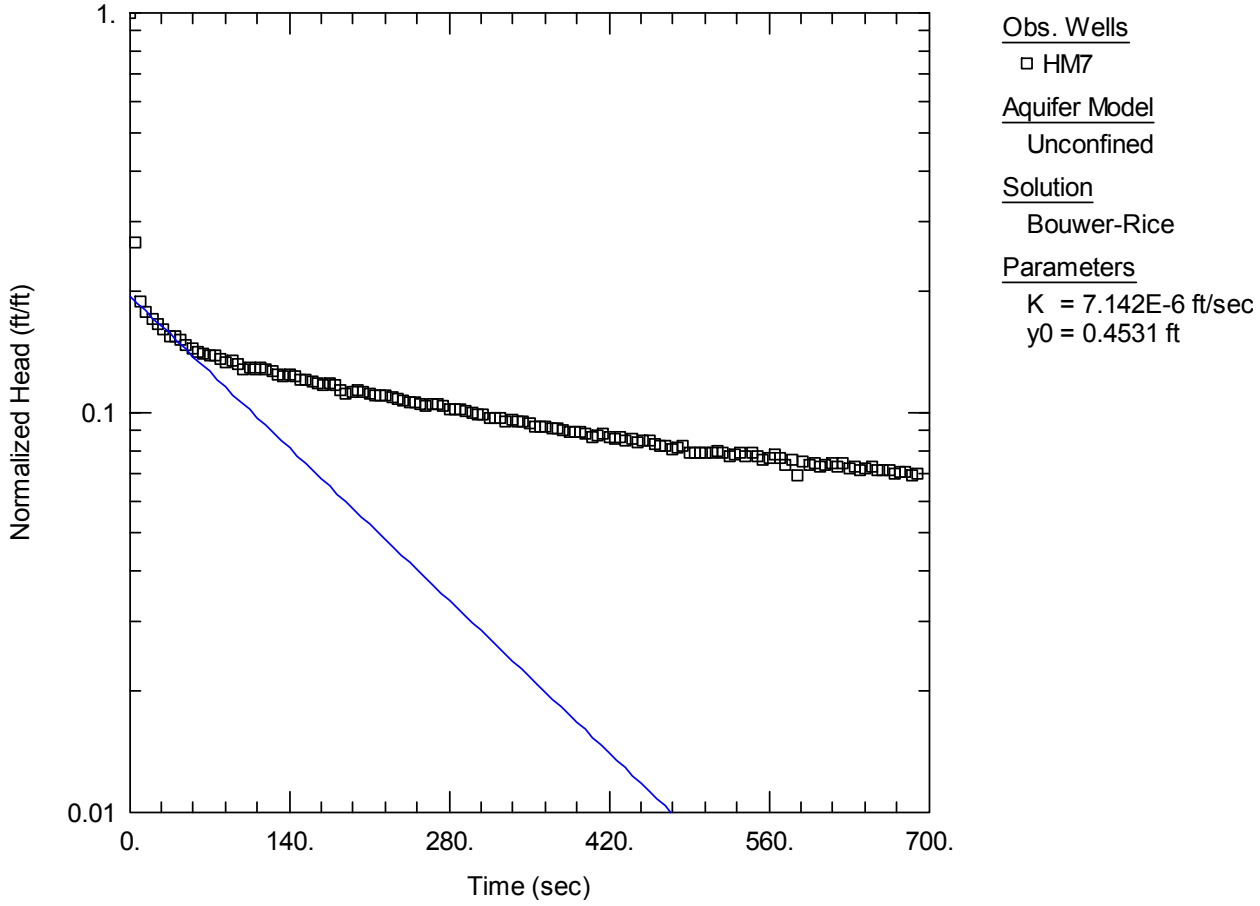


- HM-7 Slug Out Run 1 – **Automatic** Solution



- HM-7 Slug Out Run 1 – **Low** Solution

HM-7 RUN 2 SOLUTIONS



- HM-7 Slug In Run 2 – **High** Solution

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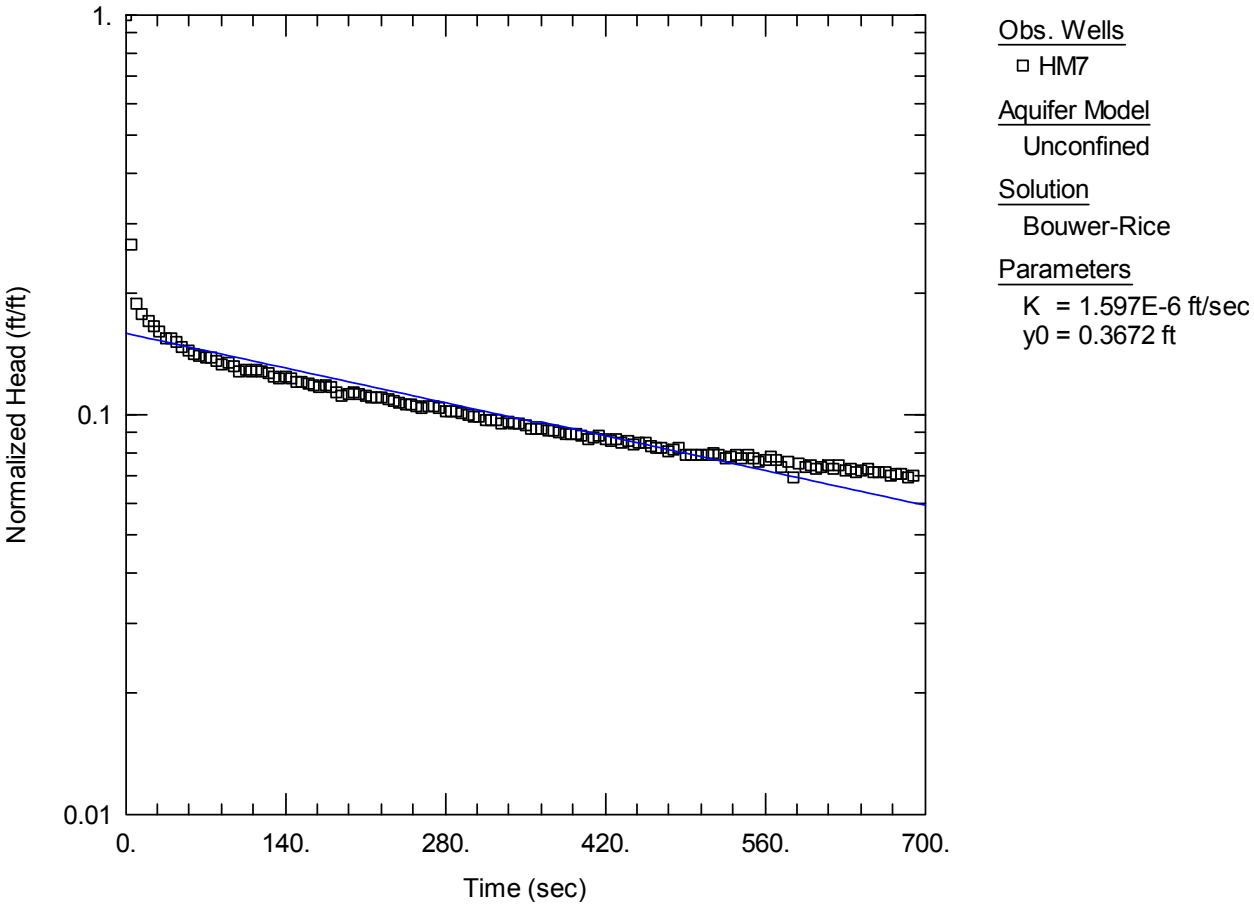
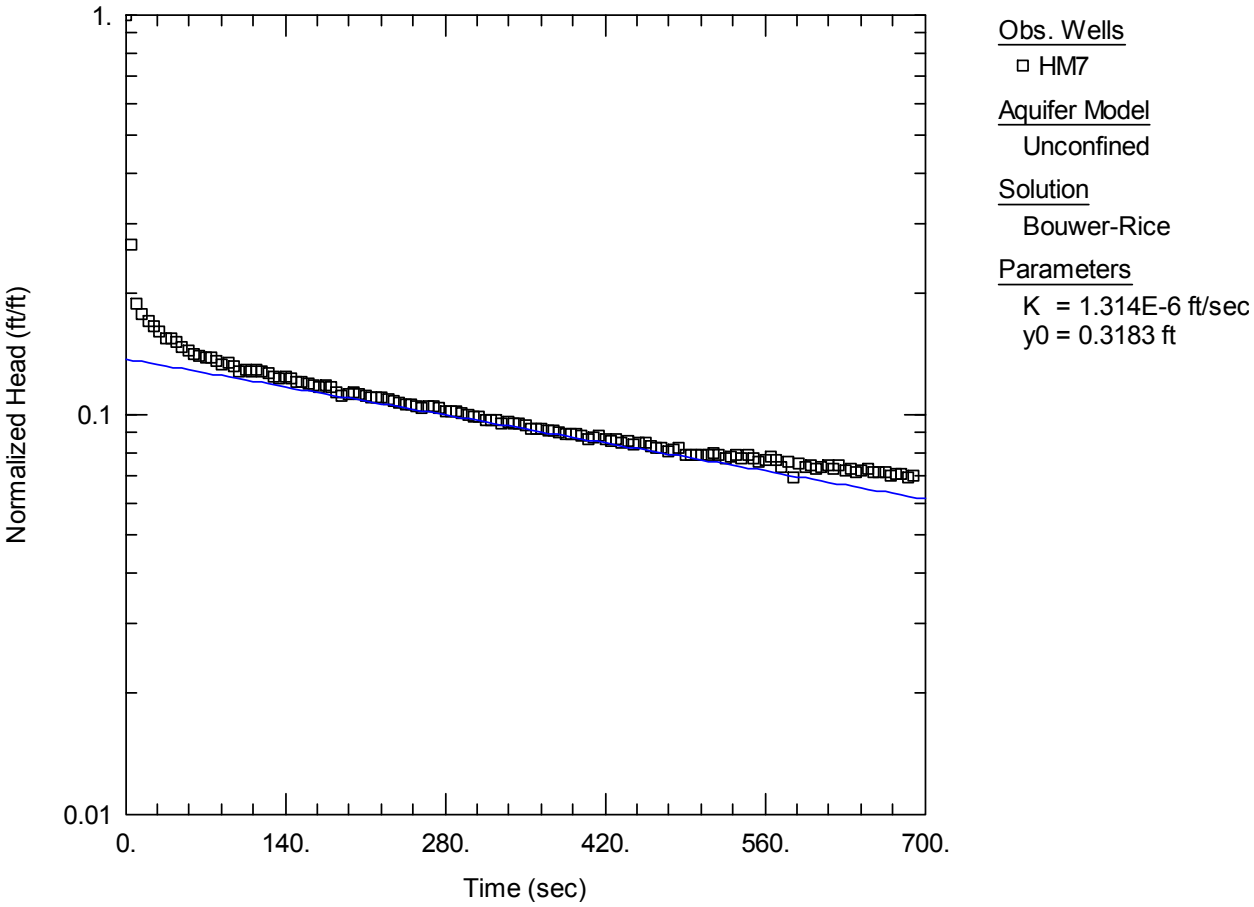
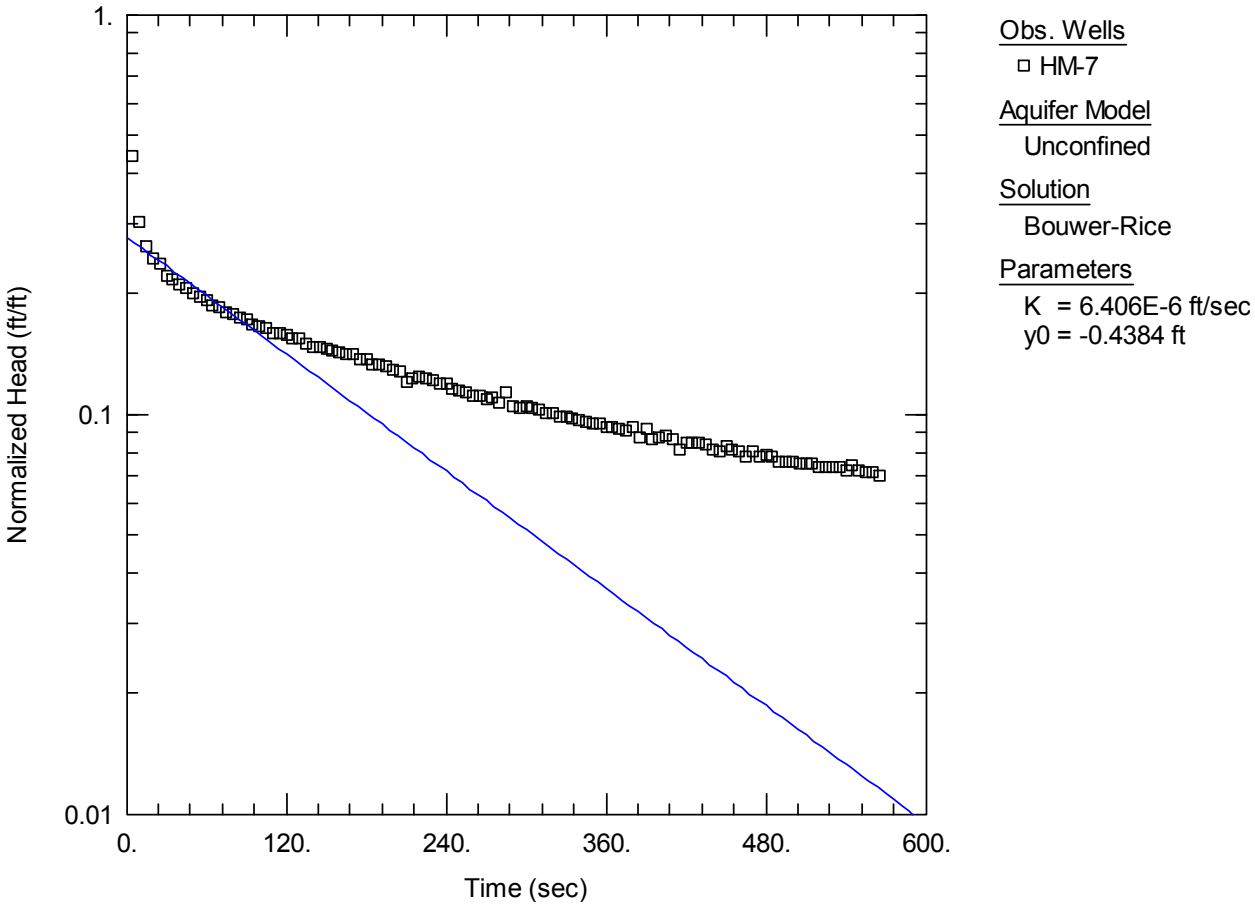
Data Processed and Output by: AQTESOLV®v.4.50.002



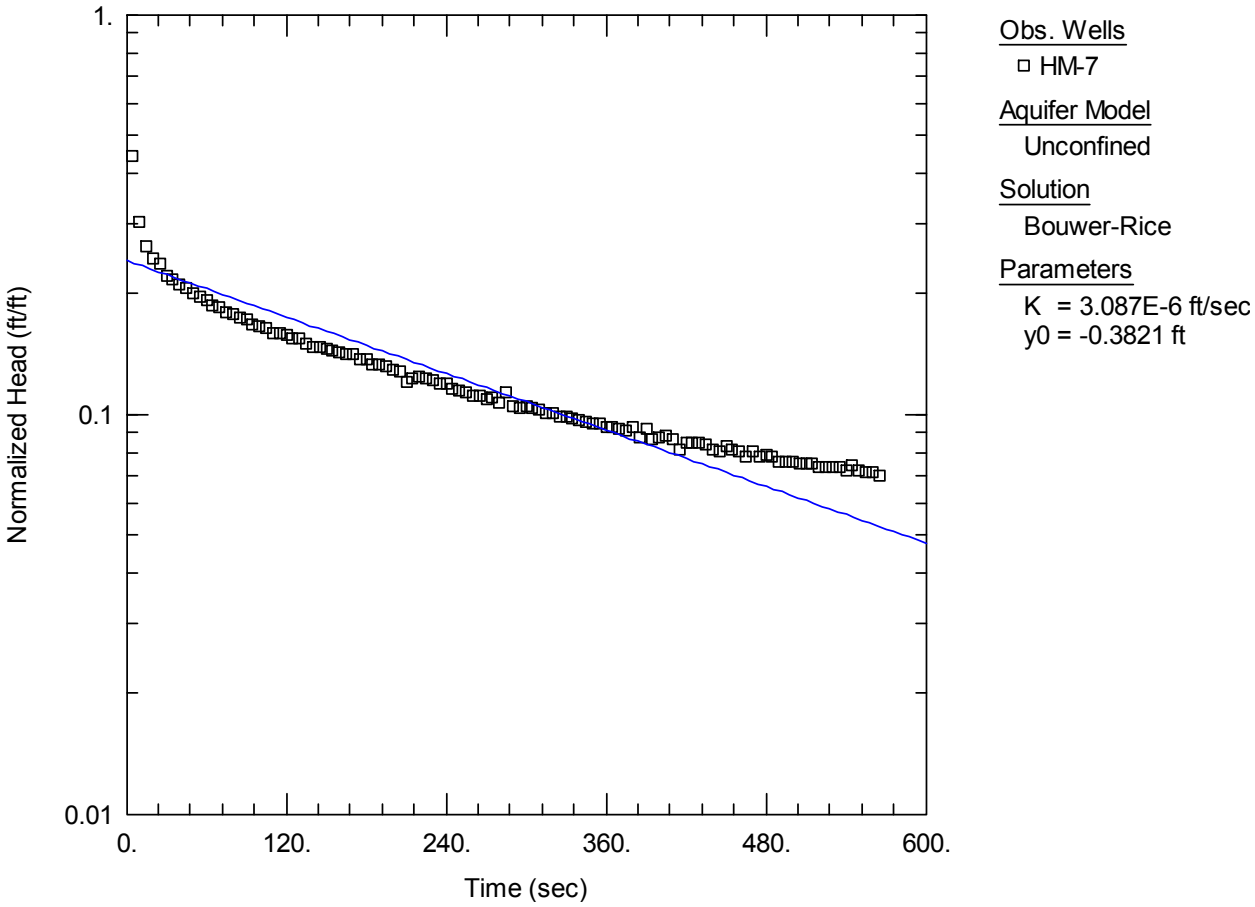
- HM-7 Slug In Run 2 – **Automated** Solution



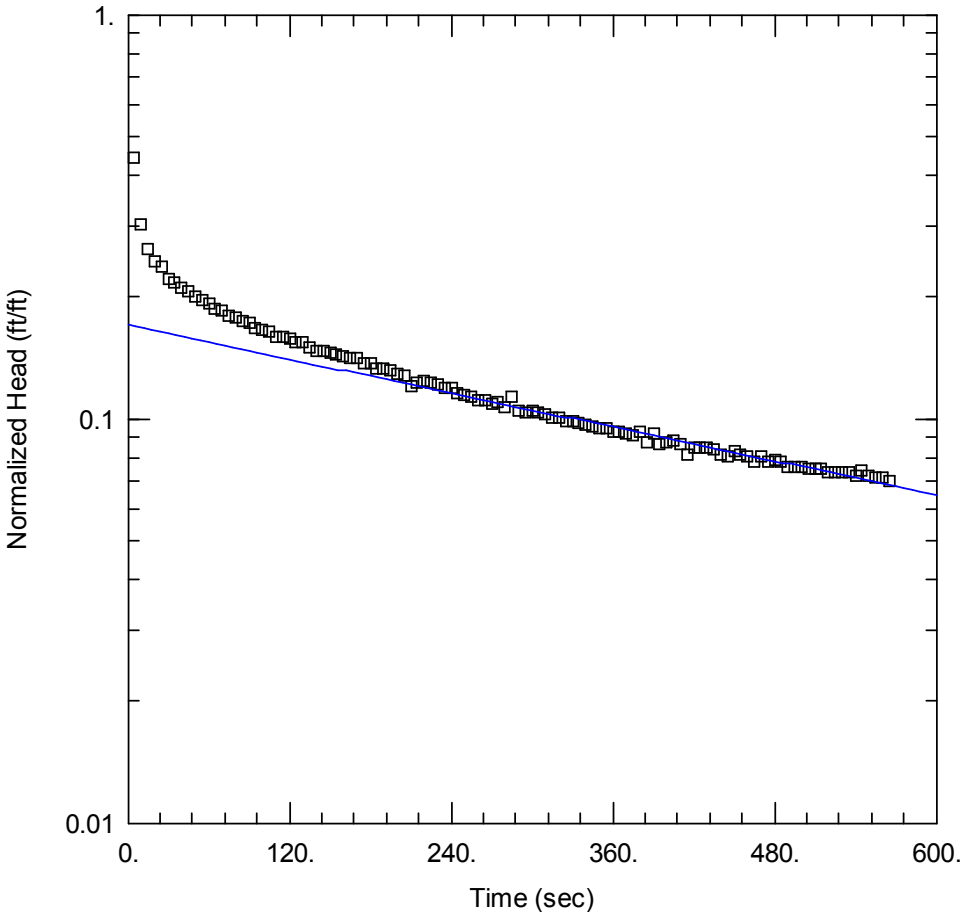
- HM-7 Slug In Run 2 – **Low** Solution



- HM-7 Slug Out Run 2 – **High** Solution

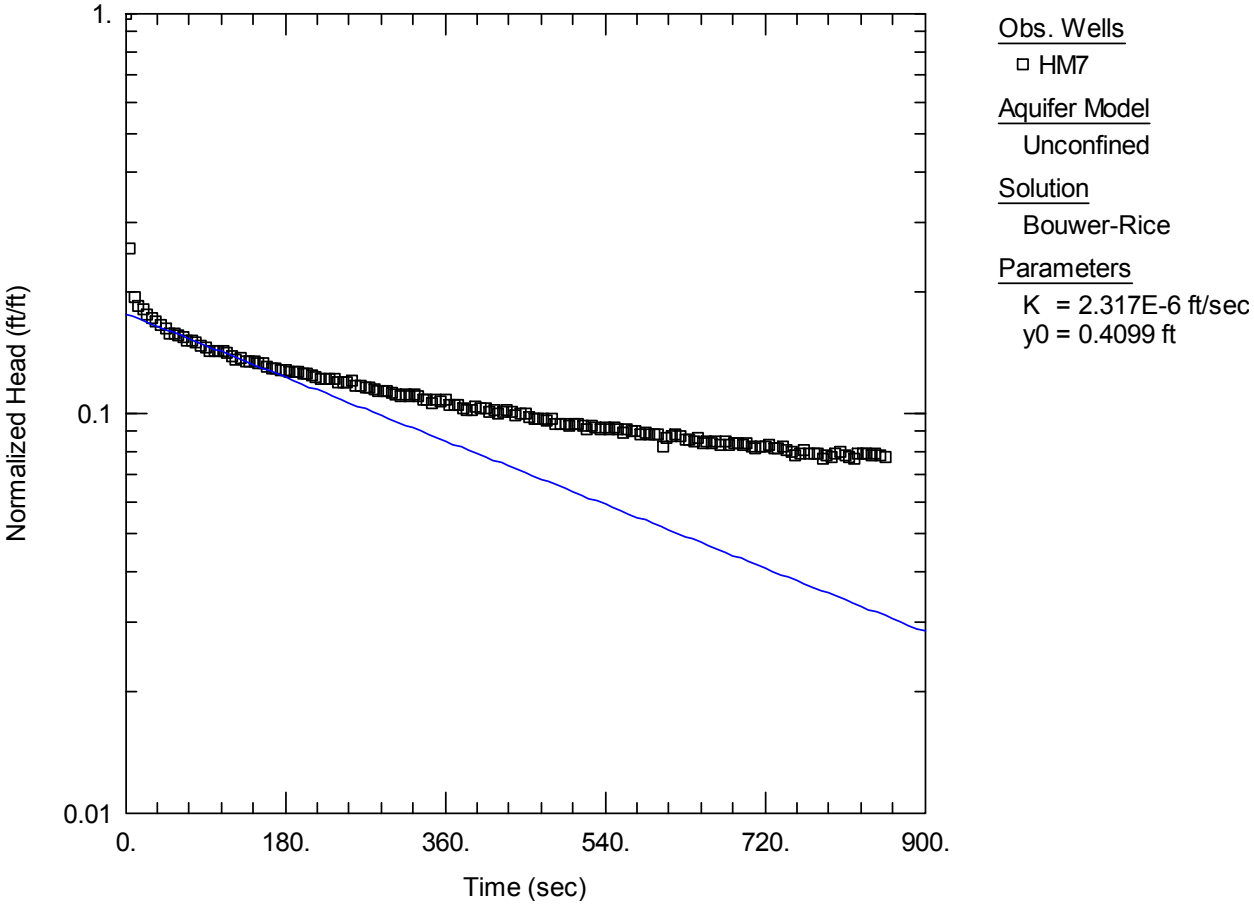


- HM-7 Slug Out Run 2 – **Automated** Solution



- HM-7 Slug Out Run 2 – **Low** Solution

HM-7 RUN 3 SOLUTIONS



- HM-7 Slug In Run 3 – **High** Solution

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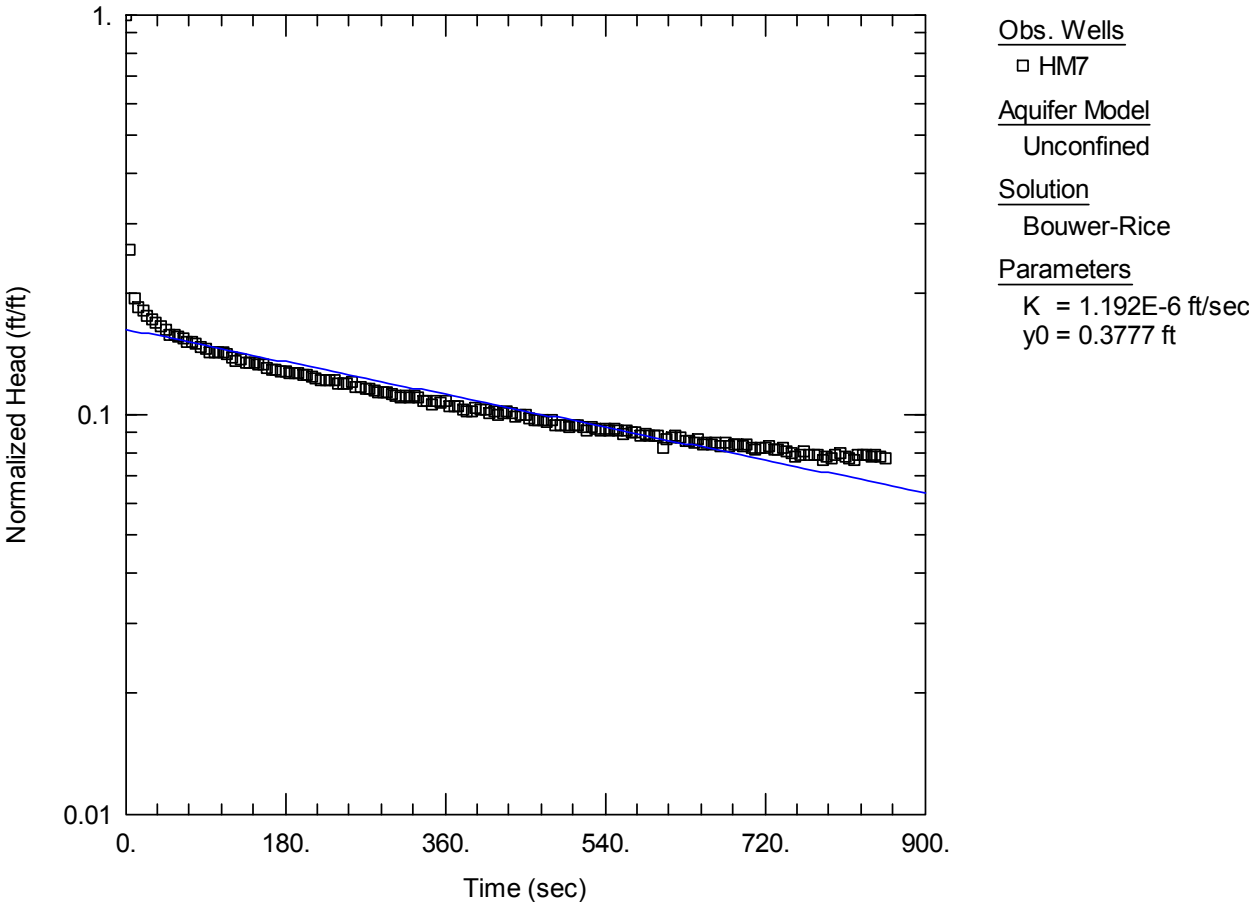
Data Processed and Output by: AQTESOLV®v.4.50.002



- HM-7 Slug In Run 3 – **Automated** Solution

UNITED CONSULTING

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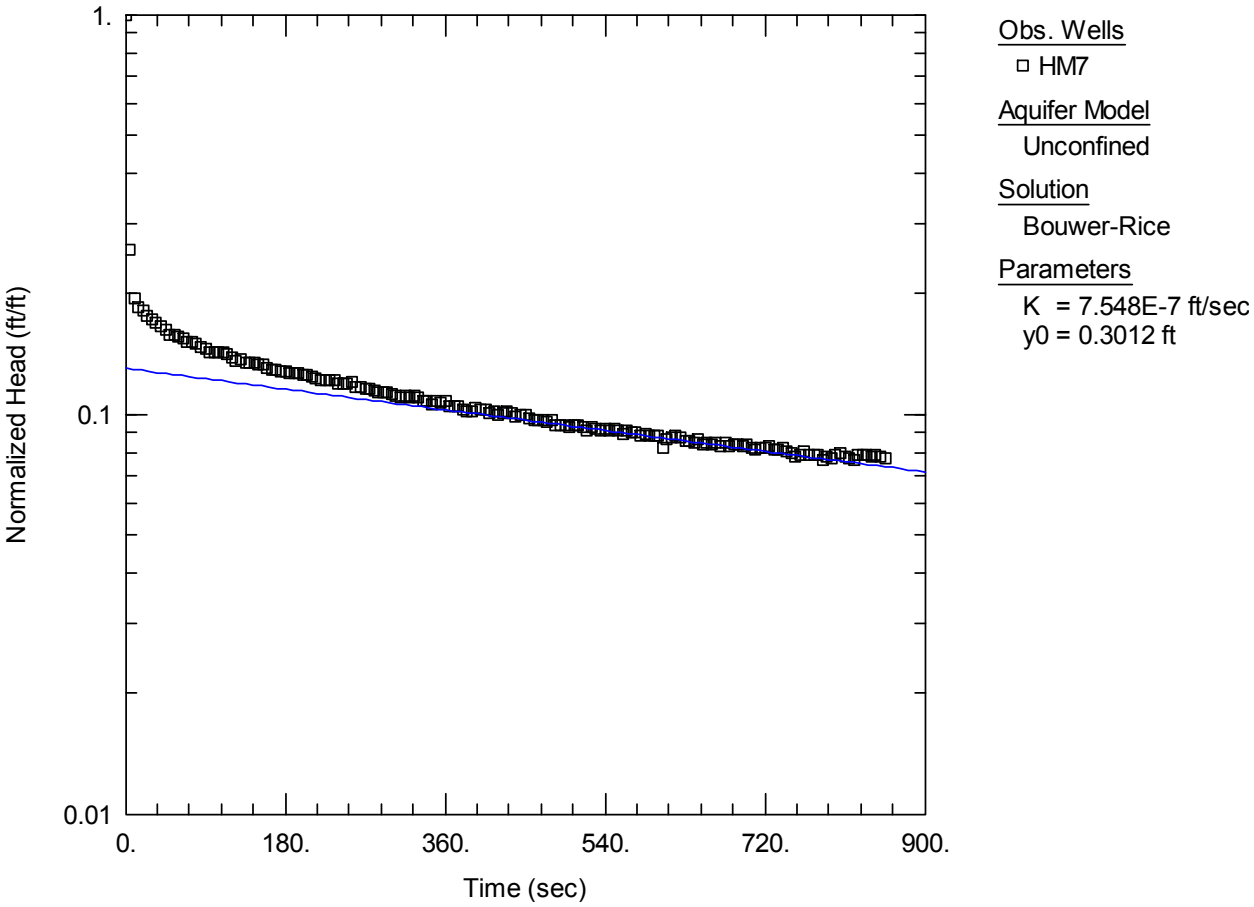
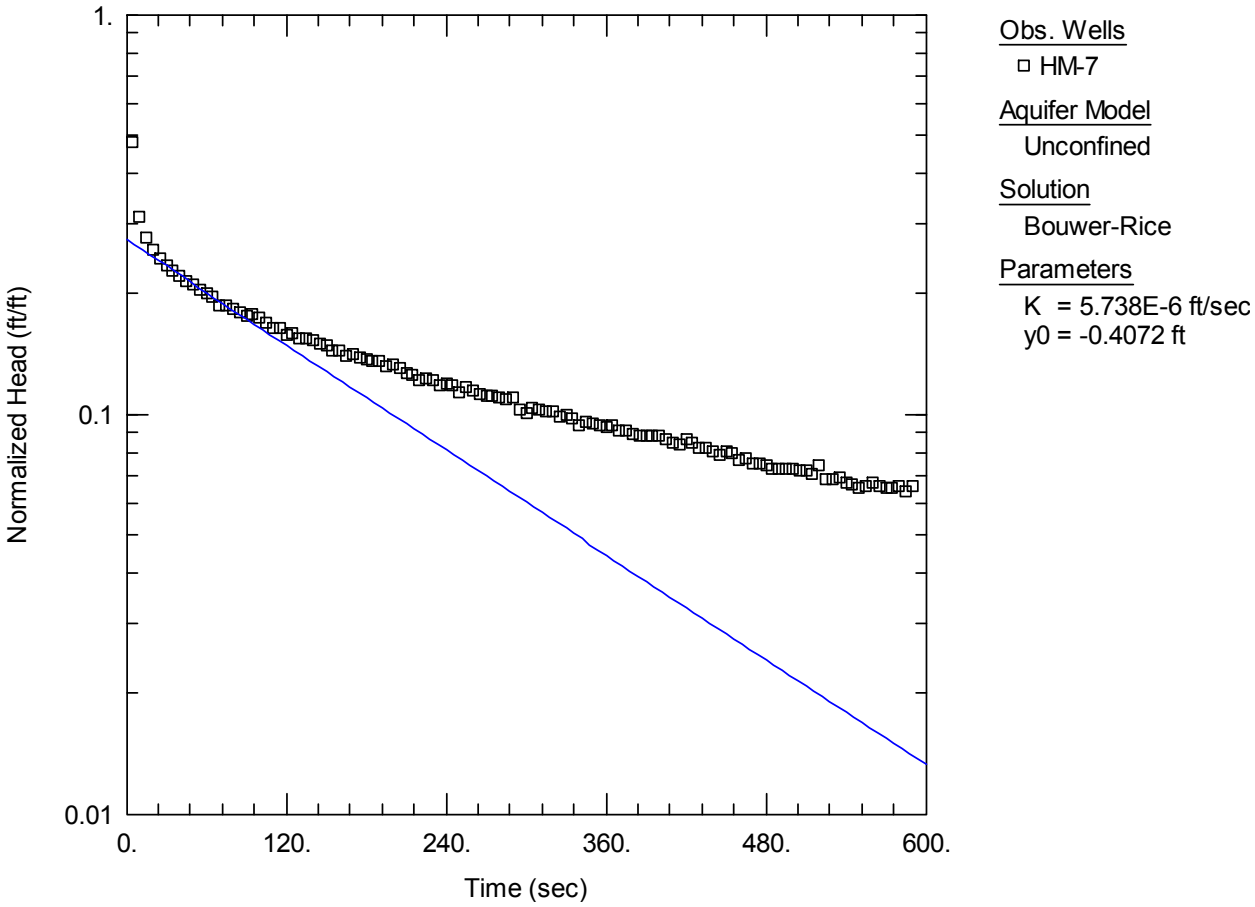
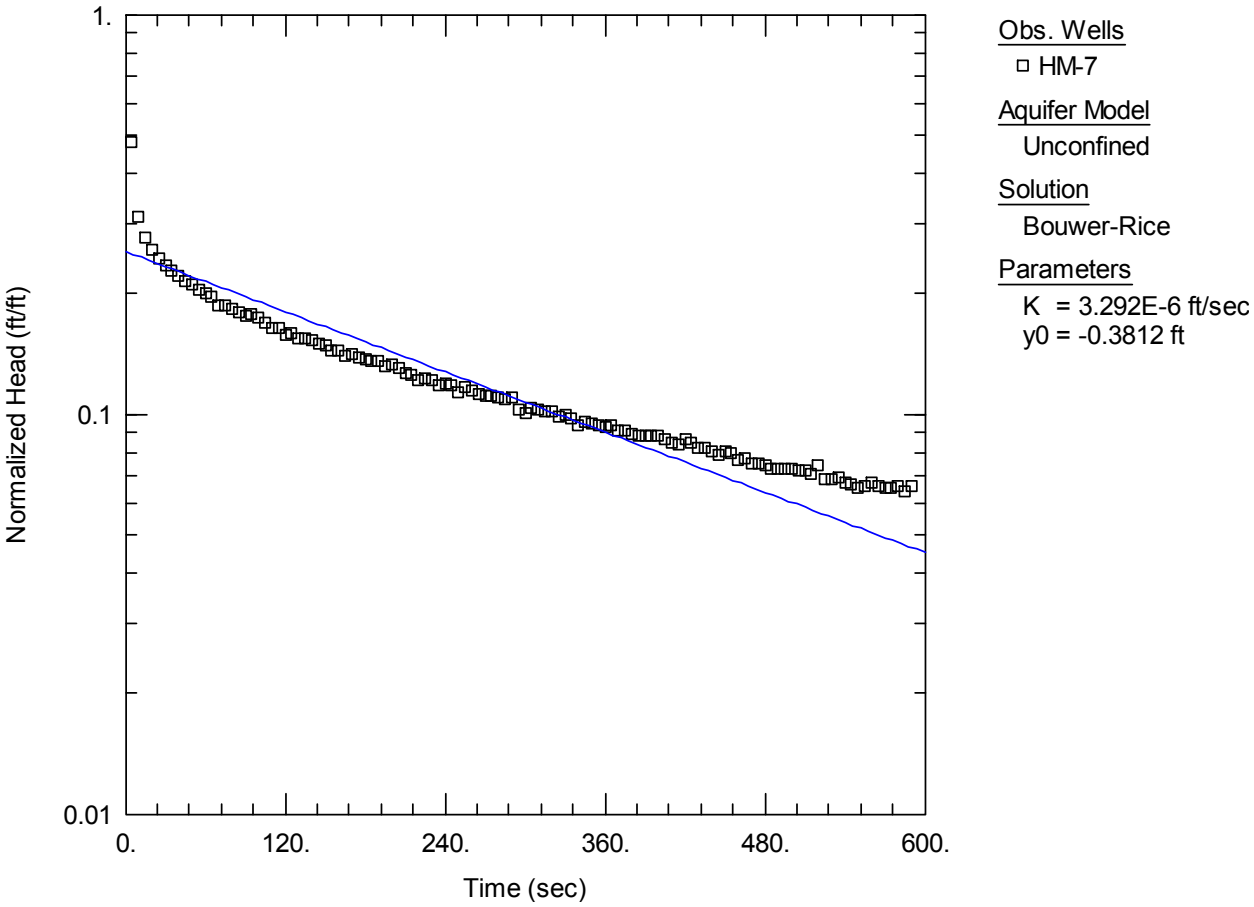


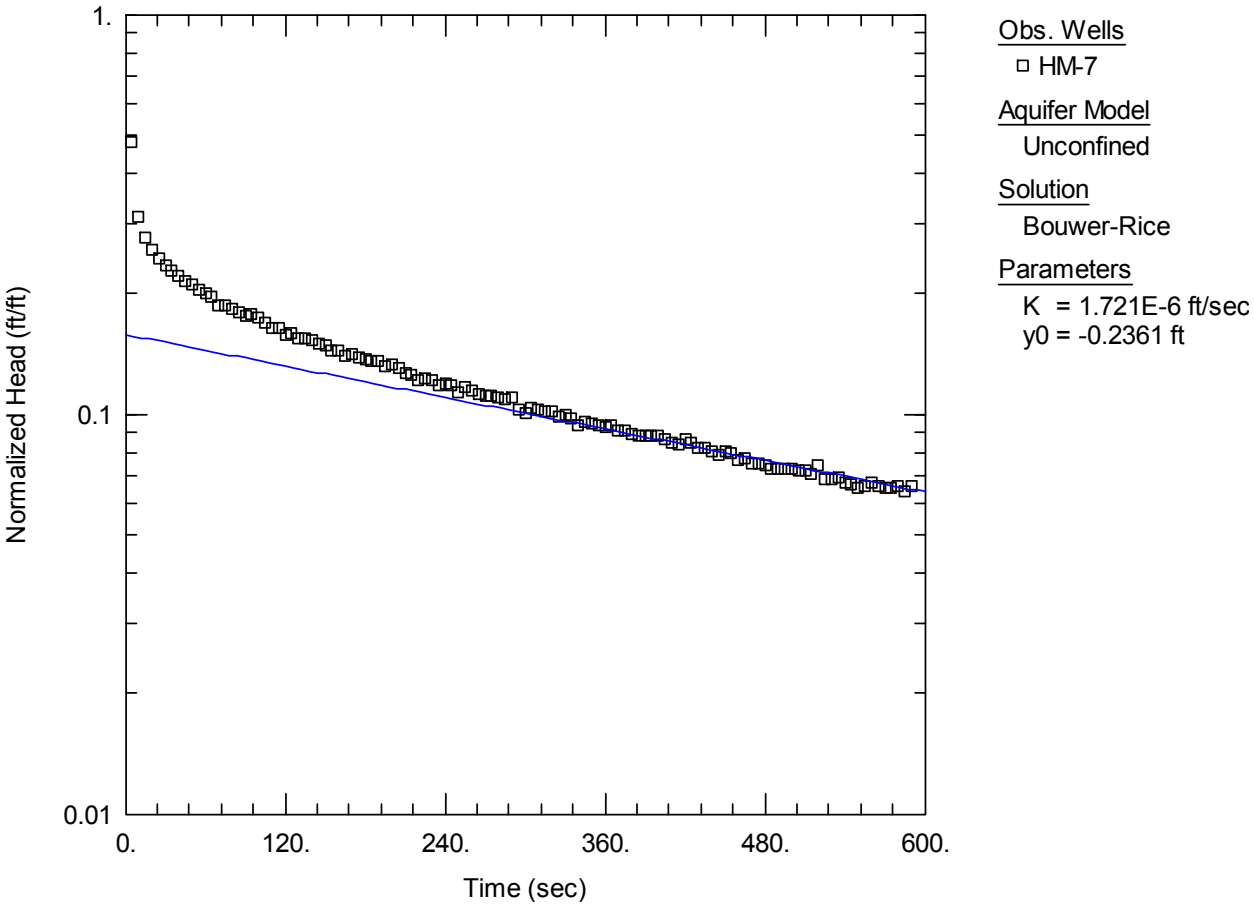
- HM-7 Slug In Run 3 – **Low** Solution



- HM-7 Slug Out Run 3 – **High** Solution



- HM-7 Slug Out Run 3 – **Automated** Solution



- HM-7 Slug Out Run 3 – **Low** Solution

UNITED CONSULTING

Data Processed and Output by: AQTESOLV®v.4.50.002

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

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