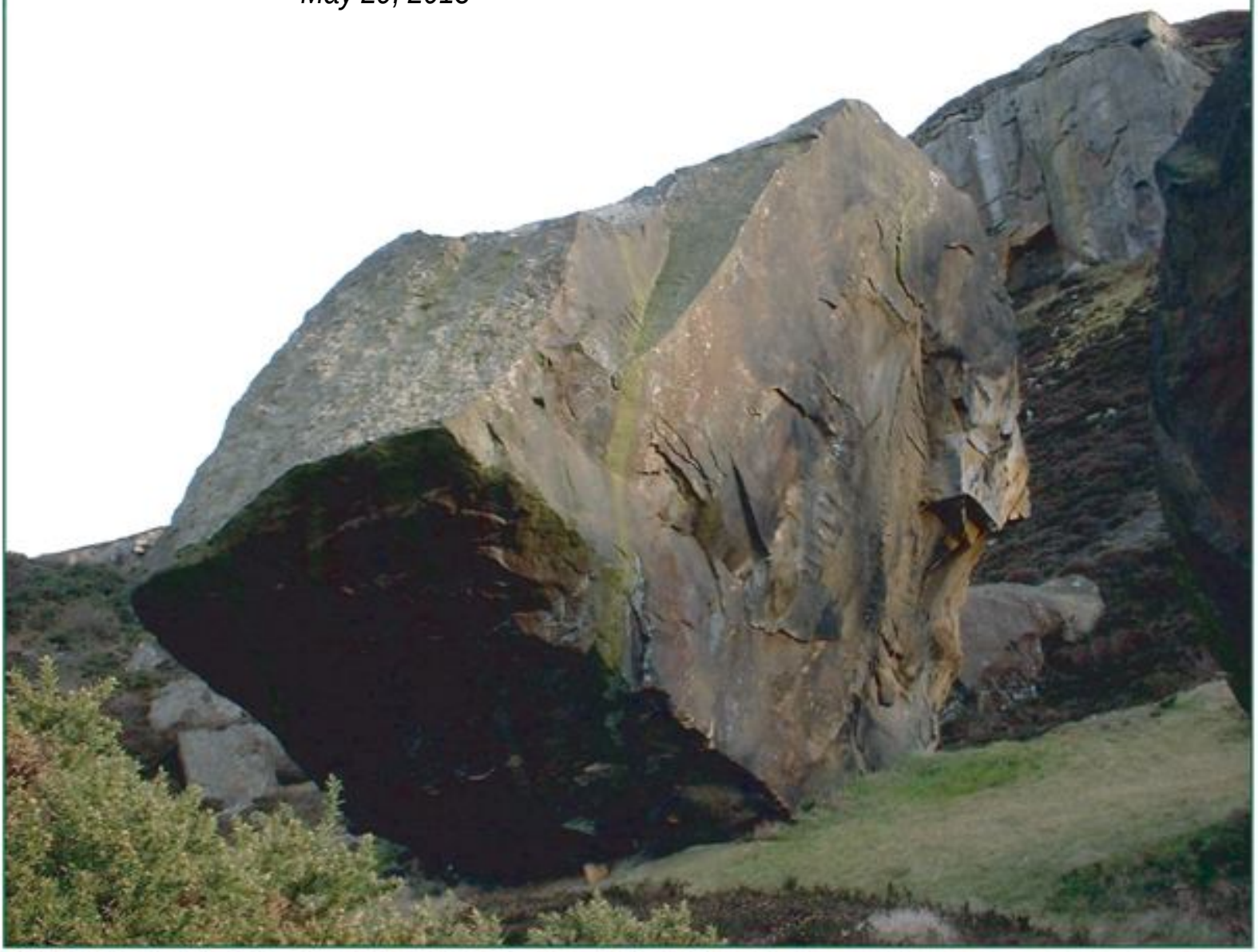
GEO HYDRO ENGINEERS

Report of Subsurface Exploration and Geotechnical Engineering Evaluation

Proposed Sewer Extensions
Watkinsville, Georgia

Prepared for Carter Engineering Consultants, Inc.
May 29, 2013



Mr. Mark Campbell, P.E.
Carter Engineering Consultants, Inc.
1551 Jennings Mill Road
Building 500, Suite B
Bogart, Georgia 30622

May 29, 2013

Report of Subsurface Exploration
and Geotechnical Engineering Evaluation
Proposed Sewer Extensions
Watkinsville, Georgia
Geo-Hydro Project Number 130245.00

Dear Mr. Campbell:

Geo-Hydro Engineers, Inc. has completed the authorized subsurface exploration for the above referenced project. The scope of services for this project was outlined in our proposal number 15880 dated March 30, 2012.

PROJECT INFORMATION

We understand that the City of Watkinsville is planning the installation of new 8-inch diameter sanitary sewer lines throughout the city as indicated on Exhibit 1 in the Appendix. The project involves the installation of a total of 6,900 lineal feet of new sewer line.

The majority of the alignment is within the roadway right of way in an area primarily of commercial development. There are four potential areas where jack-and-bore may be used to allow for roadway crossings. Most of the alignment is open and grassed with two locations where the alignment may be wooded. Topography along the alignment is typical for the Watkinsville area and is gently rolling. The right-of-way along the roads contains numerous underground and overhead utilities.

EXPLORATORY PROCEDURES

Field Exploration

The subsurface exploration consisted of 17 machine-drilled soil test borings performed at the approximate locations shown on Figure 2 in the Appendix. The borings were located in the field by Geo-Hydro and Carter Engineering based on the proposed alignment site plan provided to us. The borings were performed at accessible locations to avoid existing underground utilities and traffic safety concerns. In general, the locations of the borings should be considered approximate.

Standard penetration testing, as provided for in ASTM Dl586, was performed at select intervals in the machine-drilled borings. Soil samples obtained from the drilling operation were examined and classified in general accordance with ASTM D2488 (Visual-Manual Procedure for Description of Soils). Soil classifications include the use of the Unified Soil Classification System described in ASTM D2487

(Classification of Soils for Engineering Purposes). The soil classifications also include our evaluation of the geologic origin of the soils. Evaluations of geologic origin are based on our experience and may be subject to some degree of interpretation.

REGIONAL GEOLOGY

The project site is located in the Southern Piedmont Geologic Province of Georgia. Soils in this area have been formed by the in-place weathering of the underlying crystalline rock, which accounts for their classification as "residual" soils. Residual soils near the ground surface that have experienced advanced weathering frequently consist of red brown clayey silt (ML) or silty clay (CL). The thickness of this surficial clayey zone may range up to roughly 6 feet. For various reasons, such as erosion or local variation of mineralization, the upper clayey zone is not always present.

With increased depth, the soil becomes less weathered, coarser grained, and the structural character of the underlying parent rock becomes more evident. These residual soils are typically classified as sandy micaceous silt (ML) or silty micaceous sand (SM). With a further increase in depth, the soils eventually become quite hard and take on an increasing resemblance to the underlying parent rock. When these materials have a standard penetration resistance of l00 blows per foot or greater, they are referred to as partially weathered rock. The transition from soil to partially weathered rock is usually a gradual one, and may occur at a wide range of depths. Lenses or layers of partially weathered rock are not unusual in the soil profile.

Partially weathered rock represents the zone of transition between the soil and the indurated metamorphic rocks from which the soils are derived. The subsurface profile is, in fact, a history of the weathering process that the crystalline rock has undergone. The degree of weathering is most advanced at the ground surface, where fine-grained soil may be present. Conversely, the weathering process is in its early stages immediately above the surface of relatively sound rock, where partially weathered rock may be found.

The thickness of the zone of partially weathered rock and the depth to the rock surface have both been found to vary considerably over relatively short distances. The depth to the rock surface may frequently range from the ground surface to 80 feet or more. The thickness of partially weathered rock, which overlies the rock surface, may vary from only a few inches to as much as 40 feet or more.

Overall geologic conditions along sections of the sanitary sewer alignment have been modified by previous grading activities for the roadways, utilities, commercial developments, etc.

TEST BORING SUMMARY

In general, the overburden soils (fill and residuum) consisted mostly of sandy clay, silty sand, clayey sand, and sandy silt typical of the Piedmont region. Fill materials were encountered in 9 of the 17 borings extending to depths ranging from about 3 to 8 feet. Due to the commercial development along the roadways, we expect that fill materials are largely related to roadway construction and localized commercial construction. The quality of fill materials should be expected to vary along the alignment.

Four of the borings (W-6, W-7, W-10, and W-17) encountered partially weathered rock beginning at depths ranging from about 3 to 12 feet. Partially weathered rock is locally defined as residual material having a standard penetration resistance of 100 blows per foot or greater.

Materials causing auger refusal were encountered in borings W-10 and W-17 at depths of 13 feet and 8 feet, respectively. Auger refusal is the condition that prevents further advancement of the boring using conventional soil drilling techniques. The remaining borings were extended to their planned termination depths without encountering auger refusal.

At the time of drilling groundwater was not encountered in the test borings For safety reasons, the borings were backfilled immediately upon completion. It is important to note that groundwater levels will fluctuate depending on seasonal variations of precipitation and other factors, and may occur at higher elevations in the future.

For more detailed descriptions of subsurface conditions, please refer to the summary table and test boring records included in the Appendix.

EVALUATIONS AND RECOMMENDATIONS

The following evaluations are based on the information available on the proposed sanitary sewer alignment, the data obtained from the exploratory borings and laboratory testing, and our experience with soils and subsurface conditions similar to those encountered at the explored locations. Because the subsurface exploration represents a statistically small sampling of subsurface conditions, it is possible that conditions between the test borings may be substantially different from those indicated by the borings.

Excavation Characteristics

Borings W-6, W-7, W-10, and W-17 encountered partially weathered rock and borings W-10 and W-17 encountered materials causing auger refusal. Depending on the planned invert elevation, difficult excavation conditions may be expected in these areas. Partially weathered rock can typically be removed with adequate equipment. However, larger boulders, rock lenses, and rock seams within partially weathered rock can hinder excavation. The depth of this weathered rock horizon will vary along the alignment. A budget contingency should be included for rock excavation.

It is important to note that the geology of the Piedmont is characterized by variable subsurface conditions. Due to the widely-spaced nature of the borings, it is likely that subsurface conditions intermediate of the borings will be different than those indicated by the test borings "bracketing" any given location. Weathered rock, mass rock, boulders, and rock seams may all be encountered at different locations along the alignment.

For construction bidding and field verification purposes it is common to provide a verifiable definition of rock in the project specifications. The following is a typical definition of trench rock:

- Trench Rock: Material occupying an original volume of at least one-half cubic yard which cannot be excavated with a hydraulic excavator having a minimum flywheel power rating of 123 kW (165 hp); such as a Caterpillar 322C L, John Deere 230C LC, or a Komatsu PC220LC-7; equipped with a short tip radius bucket not wider than 42 inches.

Crossings

We understand that four roadway crossings will be required for the sanitary sewer alignment installation. It is anticipated that the crossings will require jack-and-bore to facilitate pipe installation at a depth of about 10 to 12 feet.

Based on the results of borings W-3, W-6, W-10, W-13, and W-14 soil and weathered rock will likely be encountered during pipe installation. The impact these materials will have at these locations will be dependant on the planned invert elevation. Jack-and-bore is typically not capable of transitioning between soil and denser materials. Once the actual locations and inverts of jack-and-bore crossings and established,

it would be prudent to perform supplemental borings to evaluate in more detail the subsurface conditions at the crossing locations and the driving and receiving pits.

Earth Slopes

Temporary construction slopes should be designed in strict compliance with OSHA regulations. The exploratory borings indicate that most soils along the alignment are Type B or C as defined in 29 CFR 1926.650 (1994 Edition). In general, we recommend that temporary construction slopes be no steeper than 1.5H:1V for excavation depths of 20 feet or less. However, temporary excavation slopes in firm residual soils above the groundwater level can have a gradient of 1H:1V. Temporary construction slopes should be closely observed on a daily basis by the contractor's "competent person" for signs of mass movement: tension cracks near the crest, bulging at the toe of the slope, etc. The responsibility for excavation safety and stability of temporary slopes should lie solely with the contractor.

We recommend that extreme caution be observed in trench excavations. Several cases of loss of life due to trench collapses in Georgia point out the lack of attention given to excavation safety on some projects. We recommend that applicable local and federal regulations regarding temporary slopes, and shoring and bracing of trench excavations be closely followed.

Temporary Excavation Bracing

If at a given location a sloped excavation is not feasible, temporary excavation bracing will be required. The most appropriate type of excavation bracing will be dictated by subsurface conditions at the specific excavation or pit location. Typically, the contractor will design and implement temporary excavation bracing as part of means and methods. Temporary excavation support systems submitted by the contractor should be reviewed by Carter Engineering and Geo-Hydro.

Construction Dewatering

Groundwater is not anticipated to be a concern for the planned sanitary sewer installation. However, groundwater may be encountered in low-lying areas along the alignment. If necessary, dewatering should be performed to maintain the groundwater level approximately 2 to 3 feet below the lowest prevailing excavation depth. In most cases we expect that direct pumping from the excavation will provide satisfactory temporary construction dewatering. However, the actual dewatering approach will be dictated by conditions at the time of excavation. Sand layers or other more permeable soil layers may significantly increase the amount of water inflow into open excavations.

The amount of temporary dewatering actually required during construction is related not only to the prevailing weather conditions, but also the contractor's sequencing of construction activities. Construction specifications should include performance guidelines for temporary dewatering. Performance guidelines

allow the contractor to select the actual means and methods of construction dewatering. The following sample specification[1] could be used as a guide for development of actual specifications.

> *Control of groundwater shall be accomplished in a manner that will preserve the strength of the foundation soils, will not cause instability of the excavation slopes, and will not result in damage to existing structures. Where necessary to these purposes, the water level shall be lowered in advance of excavation, utilizing trenches, sumps, wells, well points, or similar methods. The water level, as measured in piezometers, shall be maintained a minimum of 3 feet below the prevailing excavation level. Open pumping from sumps and ditches, if it results in boils, loss of soil fines, softening of the ground, or instability of slopes, will not be permitted. Wells and well points shall be installed with suitable screens and filters so that continuous pumping of soil fines does not occur. The discharge shall be arranged to facilitate collection of samples by the Engineer.*

We recommend that pipe bedding be used where groundwater is encountered. This will provide a level, stable base for pipe installation. We recommend #78 crushed stone meeting Georgia DOT specifications for gradation as pipe bedding.

Structural Fill Placement

We anticipate that the overburden soils (fill and residuum) can be reused as structural fill to backfill the pipe trench. Materials selected for use as structural fill should be free of organic matter, waste construction debris, and other deleterious materials. In general, the material should not contain rocks having diameters over 4 inches. It is our opinion that the following soils represented by their USCS group symbols will typically be suitable for use as structural fill and are commonly found in abundance in the Piedmont region: (CL), (SM), and (ML). The following soil types are typically suitable but are not abundant in the Piedmont region: (SW), (SP), (SC), (SP-SM), and (SP-SC). The following soil types are considered unsuitable: (MH), (CH), (OL), (OH), and (Pt).

Laboratory Proctor compaction tests should be performed on representative samples of proposed fill materials to provide data necessary to determine acceptability and for quality control. The moisture content of suitable borrow soils should generally be no more than 3 percentage points above or below their optimum moisture contents at the time of compaction. Tighter moisture limits may be necessary with certain soils.

Suitable fill material should be placed in thin lifts. Lift thickness depends on type of compaction equipment; but in general lifts of 8 inches loose measurement are recommended. The soil should be compacted by heavy compaction equipment such as a self-propelled sheepsfoot roller. Within confined areas, such as around the pipe or manhole structures, we recommend the use of "wacker packers" or

[1] The sample specification was adapted from Construction Dewatering - A Guide to Theory and Practice, John Wiley and Sons, and is not intended for direct use as a construction specification without modifications to reflect specific project conditions.

"Rammax" compactors to achieve the specified compaction. Loose lift thicknesses of 4 to 6 inches are recommended in small area fills.

In general, we recommend that structural fill be compacted to at least 95 percent of the standard Proctor maximum dry density (ASTM D698). Following Georgia DOT guidelines, the upper 12 inches of pavement subgrade soils should be compacted to at least 100 percent of the standard Proctor maximum dry density. Geo-Hydro should perform density tests during fill placement.

Based on the results of test borings and our observations, the existing fill materials appear to be suitable for reuse as structural fill. However, it is possible that some excavated fill may not be suitable for reuse. Geo-Hydro should observe the excavation of existing fill materials to evaluate their suitability for reuse. Soft, unstable fill soils free of deleterious materials may be reusable after routine moisture adjustment. Highly organic soils and debris-laden soils will not be suitable for reuse.

The residual soils at the project site appear suitable for reuse as structural fill material. Routine adjustment of moisture content will be necessary to allow proper placement and compaction.

Pipe Support

Based on the results of the test borings and our observations, it is likely that conditions varying from loose fill materials to partially weathered rock or rock will be exposed at bearing elevation for the sewer line. In order to limit potential differential settlement and stress concentrations at the interface of dissimilar bearing materials, soft soils should be removed and pipe bedding consisting of crushed stone should be placed as necessary. This approach will provide a stable and relatively level working surface during installation of pipe sections.

We recommend that project plans require at least 6 inches of #78 crushed stone meeting Georgia DOT specifications as bedding for the pipe. This approach should result in satisfactory removal of the upper portion of loose soils, where present, and would establish a relatively uniform bearing surface.

Subsurface conditions will vary, and we recommend that a qualified geotechnical engineer be present during preparation of bearing surfaces for the pipeline.

* * * * *

We appreciate the opportunity to serve as your geotechnical consultant for this project, and are prepared to provide any additional services you may require. If you have any questions concerning this report or any of our services, please call us.

Sincerely,

GEO-HYDRO ENGINEERS, INC.

Brian K. Ingram, P.E.
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Luis E. Babler, P.E.
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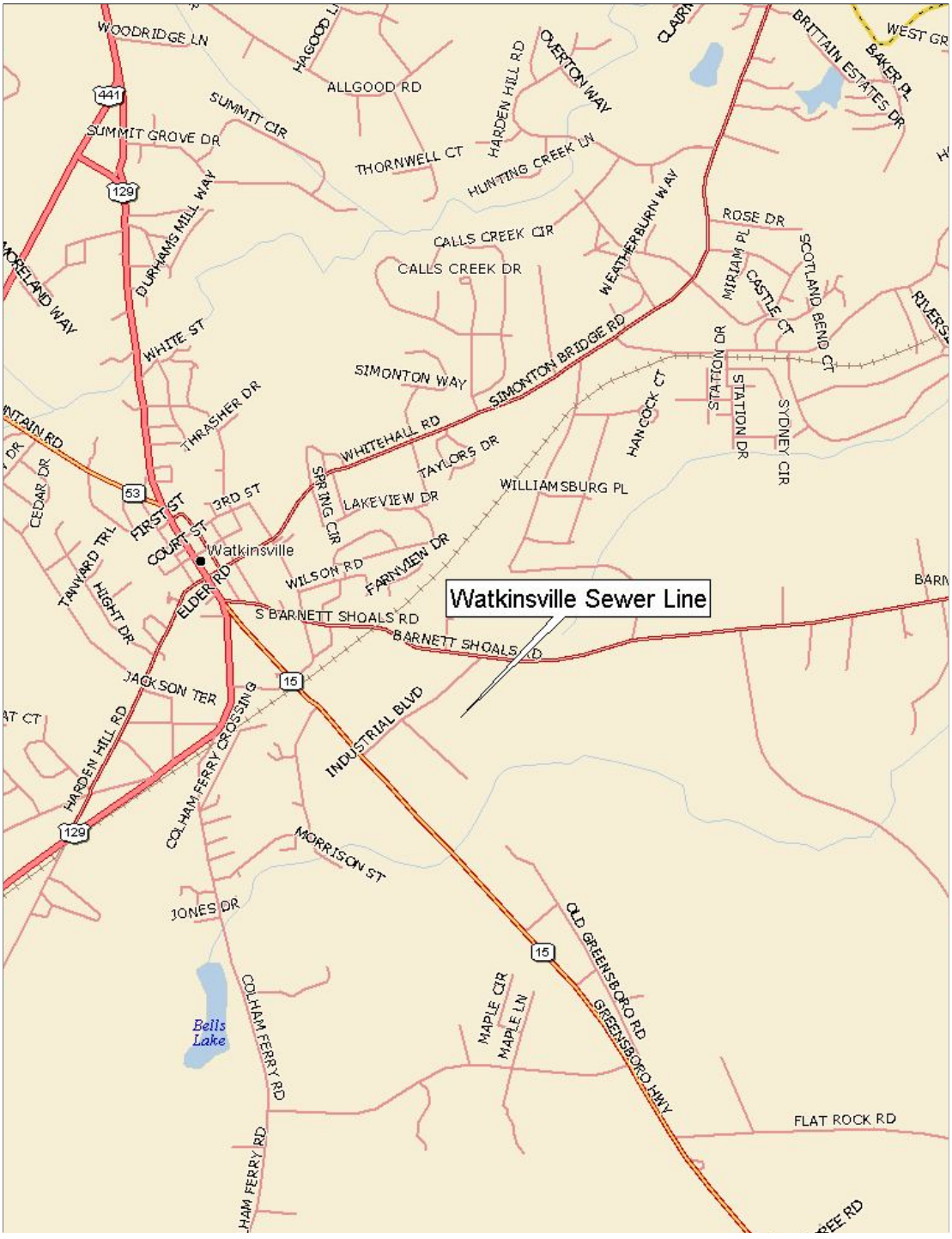
BKI/LEB/130245.00 Watkinsville Sewer Line Report

APPENDIX

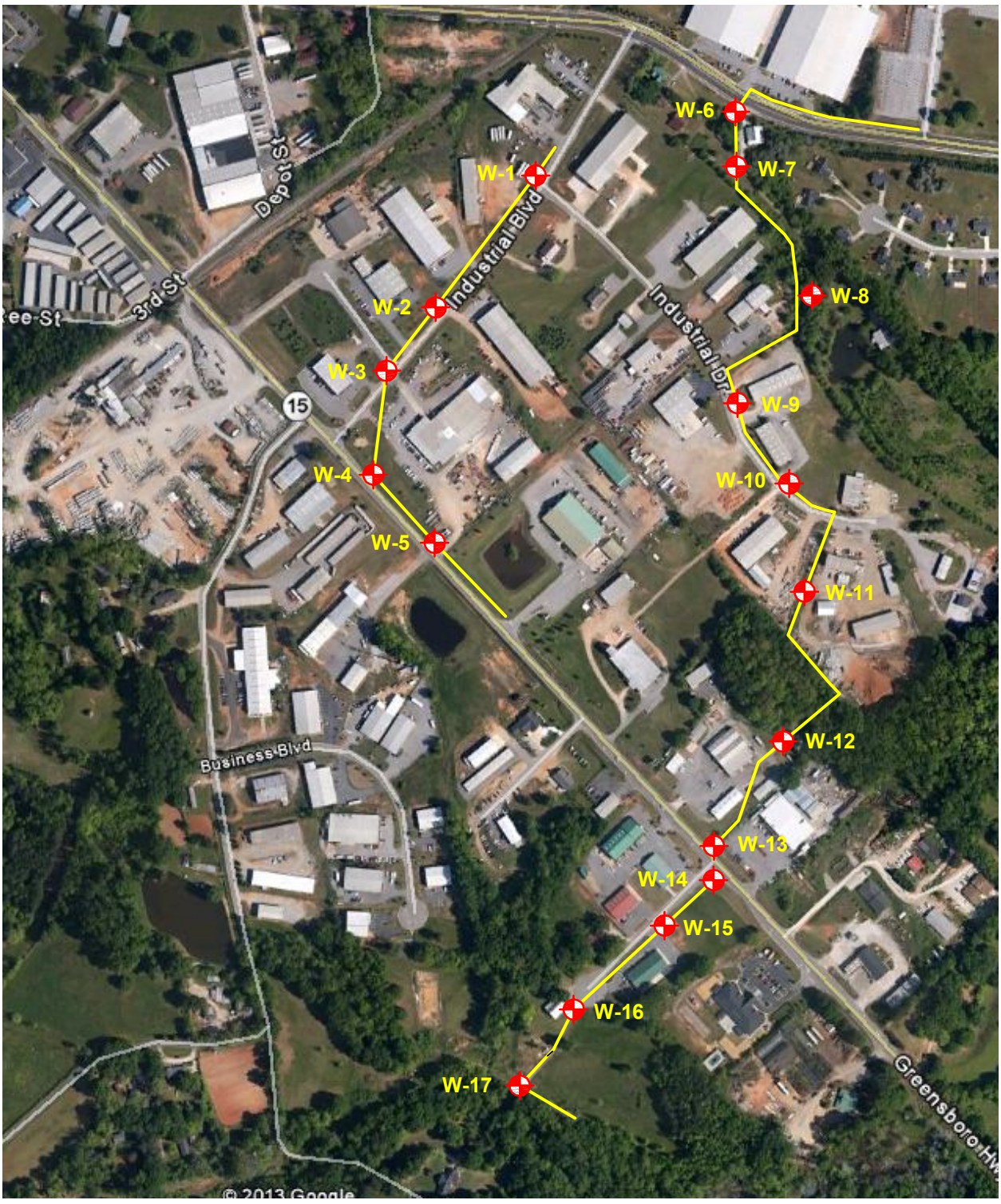


0 0.25 0.5 1 1.5

Approximate Scale, Miles

Figure 1: Site Location Plan

Watkinsville Sewer Extensions
Oconee County, Georgia
Geo-Hydro Project Number 130245.00



LEGEND: Soil Test Boring

0 250 500 1000 1500

Approximate Scale: 1"=500'

Figure 2: Boring Location Plan

Watkinsville Sewer Extensions
Oconee County, Georgia
Geo-Hydro Project Number 130245.00

Symbols and Nomenclature

Symbols

▌	Thin-walled tube (TWT) sample recovered
▯	Thin-walled tube (TWT) sample not recovered
●	Standard penetration resistance (ASTM D1586)
50/2”	Number of blows (50) to drive the split-spoon a number of inches (2)
65%	Percentage of rock core recovered
RQD	Rock quality designation - % of recovered core sample which is 4 or more inches long
GW	Groundwater
	Water level at least 24 hours after drilling
	Water level one hour or less after drilling
ALLUV	Alluvium
TOP	Topsoil
PM	Pavement Materials
CONC	Concrete
FILL	Fill Material
RES	Residual Soil
PWR	Partially Weathered Rock
SPT	Standard Penetration Testing

Penetration Resistance Results	Number of Blows, N	Approximate Relative Density
Sands	0-4	very loose
	5-10	loose
	11-20	firm
	21-30	very firm
	31-50	dense
	Over 50	very dense

	Number of Blows, N	Approximate Consistency
Silts and	0-1	very soft
Clays	2-4	soft
	5-8	firm
	9-15	stiff
	16-30	very stiff
	31-50	hard
	Over 50	very hard

Drilling Procedures

Soil sampling and standard penetration testing performed in accordance with ASTM D 1586. The standard penetration resistance is the number of blows of a 140-pound hammer falling 30 inches to drive a 2-inch O.D., 1.4-inch I.D. split-spoon sampler one foot. Rock coring is performed in accordance with ASTM D 2113. Thin-walled tube sampling is performed in accordance with ASTM D 1587.

W-1

Test Boring Record

GEO HYDRO ENGINEERS

Project: **Watkinsville Sewer Extensions**		Project No: **130245.00**
Location: **Watkinsville, Georgia**		Date: **5/9/13**
Method: **HSA- ASTM D1586**	GWT at Drilling: **Not Encountered**	G.S. Elev:
Driller: **DSA**	GWT at 24 hrs: **NA (Boring Backfilled)**	Logged By: **BKI**

Elev. (Ft)	Depth (Ft)	GWT	Symbol	Description	N	Standard Penetration Test (Blows/Foot)
				Firm brown fine sandy silt (ML) (FILL)	5	
	5			Firm to very firm brown highly micaceous silty fine sand (SM) (RESIDUUM)	25	
					24	
	10				23	
	15			Boring Terminated at 15 feet	20	
	20					

0 10 20 30 40 50 60 70 80 90 100

Remarks:

TEST BORING RECORD BORINGS.GPJ GEO HYDRO.GDT 5/29/13

W-2

Test Boring Record

GEO HYDRO ENGINEERS

Project: **Watkinsville Sewer Extensions**		Project No: **130245.00**
Location: **Watkinsville, Georgia**		Date: **5/9/13**
Method: **HSA- ASTM D1586**	GWT at Drilling: **Not Encountered**	G.S. Elev:
Driller: **DSA**	GWT at 24 hrs: **NA (Boring Backfilled)**	Logged By: **BKI**

Elev. (Ft)	Depth (Ft)	GWT	Symbol	Description	N
	0			Stiff brown fine sandy clay (CL) (RESIDUUM)	15
	5			Very stiff brown micaceous fine sandy silt (ML)	27
	10				25
	15			Boring Terminated at 15 feet	26
	20				22

Standard Penetration Test (Blows/Foot)

0 10 20 30 40 50 60 70 80 90 100

Remarks:

TEST BORING RECORD BORINGS.GPJ GEO HYDRO.GDT 5/29/13

W-3

Test Boring Record

GEO HYDRO ENGINEERS

Project: **Watkinsville Sewer Extensions**		Project No: **130245.00**
Location: **Watkinsville, Georgia**		Date: **5/9/13**
Method: **HSA- ASTM D1586**	GWT at Drilling: **Not Encountered**	G.S. Elev:
Driller: **DSA**	GWT at 24 hrs: **NA (Boring Backfilled)**	Logged By: **BKI**

Elev. (Ft)	Depth (Ft)	GWT	Symbol	Description	N
	0			Stiff to very stiff brown to red-tan fine sandy clay (CL) (RESIDUUM)	11
	5				16
				Very firm to dense brown highly micaceous silty fine sand (SM)	27
	10				37
	15			Boring Terminated at 15 feet	29
	20				

Standard Penetration Test (Blows/Foot)

0 10 20 30 40 50 60 70 80 90 100

Remarks:

TEST BORING RECORD BORINGS.GPJ GEO HYDRO.GDT 5/29/13

W-4

Test Boring Record

GEO HYDRO ENGINEERS

Project: **Watkinsville Sewer Extensions**		Project No: **130245.00**
Location: **Watkinsville, Georgia**		Date: **5/9/13**
Method: **HSA- ASTM D1586**	GWT at Drilling: **Not Encountered**	G.S. Elev:
Driller: **DSA**	GWT at 24 hrs: **NA (Boring Backfilled)**	Logged By: **BKI**

Elev. (Ft)	Depth (Ft)	GWT	Symbol	Description	N
				Loose tan clayey fine sand (SC) (FILL)	6
	5			Stiff to very stiff tan-brown highly micaceous fine sandy silt (ML) (RESIDUUM)	12
					25
	10			Firm to very firm brown highly micaceous silty fine sand (SM)	16
	15			Boring Terminated at 15 feet	21
	20				

Standard Penetration Test (Blows/Foot)

0 10 20 30 40 50 60 70 80 90 100

Remarks:

TEST BORING RECORD BORINGS.GPJ GEO HYDRO.GDT 5/29/13

W-5

Test Boring Record

GEO HYDRO ENGINEERS

Project: **Watkinsville Sewer Extensions**		Project No: **130245.00**
Location: **Watkinsville, Georgia**		Date: **5/9/13**
Method: **HSA- ASTM D1586**	GWT at Drilling: **Not Encountered**	G.S. Elev:
Driller: **DSA**	GWT at 24 hrs: **NA (Boring Backfilled)**	Logged By: **BKI**

Elev. (Ft)	Depth (Ft)	GWT	Symbol	Description	N
				Loose gray slightly micaceous silty fine sand (SM) with rock fragments (FILL)	6
	5			Stiff brown micaceous fine sandy silt (ML) (RESIDUUM)	13
				Firm to very firm tan to gray highly micaceous silty fine sand (SM)	25
	10				16
	15			Boring Terminated at 15 feet	25
	20				

Standard Penetration Test (Blows/Foot)

0 10 20 30 40 50 60 70 80 90 100

Remarks:

TEST BORING RECORD BORINGS.GPJ GEO HYDRO.GDT 5/29/13

W-6

Test Boring Record

GEO HYDRO ENGINEERS

Project: **Watkinsville Sewer Extensions**		Project No: **130245.00**
Location: **Watkinsville, Georgia**		Date: **5/9/13**
Method: **HSA- ASTM D1586**	GWT at Drilling: **Not Encountered**	G.S. Elev:
Driller: **DSA**	GWT at 24 hrs: **NA (Boring Backfilled)**	Logged By: **BKI**

Elev. (Ft)	Depth (Ft)	GWT	Symbol	Description	N
				Firm brown clayey fine sand (SC) (FILL)	11
				Hard red-tan micaceous fine sandy silt (ML) (RESIDUUM)	33
	5				34
					36
	10				
				Partially weathered rock sampled as white slightly micaceous silty fine sand (SM)	
	15			Boring Terminated at 15 feet	50/3"
	20				

Standard Penetration Test (Blows/Foot)

0 10 20 30 40 50 60 70 80 90 100

Remarks:

TEST BORING RECORD BORINGS.GPJ GEO HYDRO.GDT 5/29/13

W-7

Test Boring Record

GEO HYDRO ENGINEERS

Project: **Watkinsville Sewer Extensions**		Project No: **130245.00**
Location: **Watkinsville, Georgia**		Date: **5/9/13**
Method: **HSA- ASTM D1586**	GWT at Drilling: **Not Encountered**	G.S. Elev:
Driller: **DSA**	GWT at 24 hrs: **NA (Boring Backfilled)**	Logged By: **BKI**

Elev. (Ft)	Depth (Ft)	GWT	Symbol	Description	N
	0			Stiff red-tan fine sandy silt (ML) (FILL)	11
	5			Very stiff red-tan fine sandy silt (ML) (RESIDUUM)	29
				Dense to very dense gray highly micaceous silty fine sand (SM)	39
	10				52
				Partially weathered rock - no sample recovered at 15 feet	
	15			Boring Terminated at 15 feet	50/1"
	20				

Standard Penetration Test (Blows/Foot)

0 10 20 30 40 50 60 70 80 90 100

Remarks:

TEST BORING RECORD BORINGS.GPJ GEO HYDRO.GDT 5/29/13

W-8

Test Boring Record

GEO HYDRO ENGINEERS

Project: **Watkinsville Sewer Extensions**		Project No: **130245.00**
Location: **Watkinsville, Georgia**		Date: **5/9/13**
Method: **HSA- ASTM D1586**	GWT at Drilling: **Not Encountered**	G.S. Elev:
Driller: **DSA**	GWT at 24 hrs: **NA (Boring Backfilled)**	Logged By: **BKI**

Elev. (Ft)	Depth (Ft)	GWT	Symbol	Description	N
				Loose gray sightly micaceous silty fine sand (SM) with topsoil and rock fragments (FILL)	10
	5			Very stiff red-tan fine sandy silt (ML) with clay (FILL)	17
					26
	10			Firm to very firm brown highly micaceous silty fine sand (SM) (RESIDUUM)	27
	15			Boring Terminated at 15 feet	20
	20				

Standard Penetration Test (Blows/Foot)

0 10 20 30 40 50 60 70 80 90 100

Remarks:

TEST BORING RECORD BORINGS.GPJ GEO HYDRO.GDT 5/29/13

W-9

Test Boring Record

GEO HYDRO ENGINEERS

Project: **Watkinsville Sewer Extensions**		Project No: **130245.00**
Location: **Watkinsville, Georgia**		Date: **5/9/13**
Method: **HSA- ASTM D1586**	GWT at Drilling: **Not Encountered**	G.S. Elev:
Driller: **DSA**	GWT at 24 hrs: **NA (Boring Backfilled)**	Logged By: **BKI**

Elev. (Ft)	Depth (Ft)	GWT	Symbol	Description	N
				Stiff brown fine sandy silt (ML) with clay (RESIDUUM)	11
	5			Very dense brown micaceous silty fine sand (SM)	52
				Very firm tan to gray highly micaceous silty fine sand (SM)	27
	10				25
	15			Boring Terminated at 15 feet	21
	20				

Standard Penetration Test (Blows/Foot)

0 10 20 30 40 50 60 70 80 90 100

Remarks:

TEST BORING RECORD BORINGS.GPJ GEO HYDRO.GDT 5/29/13

W-10

Test Boring Record

GEO HYDRO ENGINEERS

Project: **Watkinsville Sewer Extensions**		Project No: **130245.00**
Location: **Watkinsville, Georgia**		Date: **5/9/13**
Method: **HSA- ASTM D1586**	GWT at Drilling: **Not Encountered**	G.S. Elev:
Driller: **DSA**	GWT at 24 hrs: **NA (Boring Backfilled)**	Logged By: **BKI**

Elev. (Ft)	Depth (Ft)	GWT	Symbol	Description	N	Standard Penetration Test (Blows/Foot)
				Stiff to very stiff red-tan fine sandy silt (ML) with clay (RESIDUUM)	11	
	5				21	
				Dense tan micaceous silty fine sand (SM)	42	
				Partially weathered rock sampled as tan-gray micaceous silty fine sand (SM)	50/4"	
	10					
				Auger Refusal at 13 feet		
	15					
	20					

0 10 20 30 40 50 60 70 80 90 100

Remarks:

TEST BORING RECORD BORINGS.GPJ GEO HYDRO.GDT 5/29/13

W-11

Test Boring Record

GEO HYDRO ENGINEERS

Project: **Watkinsville Sewer Extensions**		Project No: **130245.00**
Location: **Watkinsville, Georgia**		Date: **5/9/13**
Method: **HSA- ASTM D1586**	GWT at Drilling: **Not Encountered**	G.S. Elev:
Driller: **DSA**	GWT at 24 hrs: **NA (Boring Backfilled)**	Logged By: **BKI**

Elev. (Ft)	Depth (Ft)	GWT	Symbol	Description	N
	0			Firm red-tan clayey fine sand (SC) (RESIDUUM)	12
	5			Very firm tan micaceous silty fine sand (SM)	29
	10			Firm to very firm brown to gray highly micaceous silty fine sand (SM)	18 21
	15			Boring Terminated at 15 feet	13
	20				

Standard Penetration Test (Blows/Foot)

0 10 20 30 40 50 60 70 80 90 100

Remarks:

TEST BORING RECORD BORINGS.GPJ GEO HYDRO.GDT 5/29/13

W-12

Test Boring Record

GEO HYDRO ENGINEERS

Project: **Watkinsville Sewer Extensions**		Project No: **130245.00**
Location: **Watkinsville, Georgia**		Date: **5/9/13**
Method: **HSA- ASTM D1586**	GWT at Drilling: **Not Encountered**	G.S. Elev:
Driller: **DSA**	GWT at 24 hrs: **NA (Boring Backfilled)**	Logged By: **BKI**

Elev. (Ft)	Depth (Ft)	GWT	Symbol	Description	N
				Loose gray silty fine sand (SM) (FILL)	7
				Stiff tan highly micaceous fine sandy silt (ML) (RESIDUUM)	13
	5				12
					12
	10				13
	15			Boring Terminated at 15 feet	
	20				

Standard Penetration Test (Blows/Foot)

0 10 20 30 40 50 60 70 80 90 100

Remarks:

TEST BORING RECORD BORINGS.GPJ GEO HYDRO.GDT 5/29/13

W-13

Test Boring Record

GEO HYDRO ENGINEERS

Project: **Watkinsville Sewer Extensions**		Project No: **130245.00**
Location: **Watkinsville, Georgia**		Date: **5/9/13**
Method: **HSA- ASTM D1586**	GWT at Drilling: **Not Encountered**	G.S. Elev:
Driller: **DSA**	GWT at 24 hrs: **NA (Boring Backfilled)**	Logged By: **BKI**

Elev. (Ft)	Depth (Ft)	GWT	Symbol	Description	N
				Stiff tan fine sandy silt (ML) (RESIDUUM)	13
	5			Stiff to very stiff tan-brown micaceous fine sandy silt (ML)	15
					19
	10			Firm brown micaceous silty fine sand (SM)	20
				Dense brown micaceous silty fine sand (SM)	
	15			Boring Terminated at 15 feet	47
	20				

Standard Penetration Test (Blows/Foot)

0 10 20 30 40 50 60 70 80 90 100

Remarks:

TEST BORING RECORD BORINGS.GPJ GEO HYDRO.GDT 5/29/13

W-14

Test Boring Record

GEO HYDRO ENGINEERS

Project: **Watkinsville Sewer Extensions**		Project No: **130245.00**
Location: **Watkinsville, Georgia**		Date: **5/9/13**
Method: **HSA- ASTM D1586**	GWT at Drilling: **Not Encountered**	G.S. Elev:
Driller: **DSA**	GWT at 24 hrs: **NA (Boring Backfilled)**	Logged By: **BKI**

Elev. (Ft)	Depth (Ft)	GWT	Symbol	Description	N
				Firm tan fine sandy silt (ML) (FILL)	7
				Firm to very firm brown highly micaceous silty fine sand (SM) (RESIDUUM)	17
	5				16
					15
	10				
	15			Boring Terminated at 15 feet	26
	20				

Standard Penetration Test (Blows/Foot)

0 10 20 30 40 50 60 70 80 90 100

Remarks:

TEST BORING RECORD BORINGS.GPJ GEO HYDRO.GDT 5/29/13

W-15

Test Boring Record

GEO HYDRO ENGINEERS

Project: **Watkinsville Sewer Extensions**		Project No: **130245.00**
Location: **Watkinsville, Georgia**		Date: **5/9/13**
Method: **HSA- ASTM D1586**	GWT at Drilling: **Not Encountered**	G.S. Elev:
Driller: **DSA**	GWT at 24 hrs: **NA (Boring Backfilled)**	Logged By: **BKI**

Elev. (Ft)	Depth (Ft)	GWT	Symbol	Description	N
				Firm to very firm tan to brown micaceous silty fine sand (SM) (RESIDUUM)	14
	5				17
					25
				Dense brown micaceous silty fine sand (SM)	
	10				33
	15			Boring Terminated at 15 feet	37
	20				

Standard Penetration Test (Blows/Foot)

0 10 20 30 40 50 60 70 80 90 100

Remarks:

TEST BORING RECORD BORINGS.GPJ GEO HYDRO.GDT 5/29/13

W-16

Test Boring Record

GEO HYDRO ENGINEERS

Project: **Watkinsville Sewer Extensions**		Project No: **130245.00**
Location: **Watkinsville, Georgia**		Date: **5/9/13**
Method: **HSA- ASTM D1586**	GWT at Drilling: **Not Encountered**	G.S. Elev:
Driller: **DSA**	GWT at 24 hrs: **NA (Boring Backfilled)**	Logged By: **BKI**

Elev. (Ft)	Depth (Ft)	GWT	Symbol	Description	N
				Stiff brown slightly micaceous fine sandy silt (ML) (FILL)	9
	5			Very stiff to hard red-brown fine sandy silt (ML) with clay (RESIDUUM)	23
					37
	10			Very dense brown highly micaceous silty fine sand (SM)	54
				Firm brown highly micaceous silty fine sand (SM)	
	15			Boring Terminated at 15 feet	20
	20				

Standard Penetration Test (Blows/Foot)

0 10 20 30 40 50 60 70 80 90 100

Remarks:

TEST BORING RECORD BORINGS.GPJ GEO HYDRO.GDT 5/29/13

W-17

Test Boring Record

GEO HYDRO ENGINEERS

Project: **Watkinsville Sewer Extensions**		Project No: **130245.00**
Location: **Watkinsville, Georgia**		Date: **5/9/13**
Method: **HSA- ASTM D1586**	GWT at Drilling: **Not Encountered**	G.S. Elev:
Driller: **DSA**	GWT at 24 hrs: **NA (Boring Backfilled)**	Logged By: **BKI**

Elev. (Ft)	Depth (Ft)	GWT	Symbol	Description	N	Standard Penetration Test (Blows/Foot)
				Firm tan fine sandy clay (CL) (RESIDUUM)	7	
	5			Partially weathered rock sampled as brown to gray micaceous silty fine sand (SM)	50/3"	
					50/1"	
				Auger Refusal at 8 feet		
	10					
	15					
	20					

0 10 20 30 40 50 60 70 80 90 100

Remarks:

TEST BORING RECORD BORINGS.GPJ GEO HYDRO.GDT 5/29/13

EXHIBIT 1

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WATKINSVILLE SEWER EXHIBIT 1

PROPOSED SEWER EXT.

WATKINSVILLE, GEORGIA

SCALE 1":400'