

**2016 SPLOST NORTH MAINLAND PH III FORCEMAIN IMPROVEMENTS
BRUNSWICK, GLYNN COUNTY, GEORGIA**

ATTACHMENT A

**August 23, 2019, Terracon Geotechnical Engineering Investigation, Glynco Linear
Force Water Main, Brunswick, Glynn County, Georgia, Terracon Project No.
ES195146.**

Geotechnical Engineering Investigation

Glynco Linear Force Water Main
Brunswick, Glynn County, Georgia

August 23, 2019
Terracon Project No. ES195146

Prepared for:
Thomas & Hutton
Savannah, Georgia

Prepared by:
Terracon Consultants, Inc.
Savannah, Georgia

Offices Nationwide
Employee-Owned

Established in 1965
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Terracon

August 23, 2019



Thomas & Hutton
50 Park of Commerce Way
Savannah, Georgia 31405

Attn: Mr. Chris Stovall, P.E., LEED AP
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Re: Geotechnical Engineering Investigation

Glynco Linear Water Force Main
Brunswick, Glynn County, Georgia
Terracon Project No.: ES195146

Dear Mr. Stovall:

Terracon Consultants, Inc. (Terracon) has completed the Geotechnical Engineering Investigation for the above-referenced project. The services were performed in general accordance with our proposal No. PES195146 dated June 17, 2018. This report presents the findings of the subsurface exploration and provides geotechnical recommendations for the proposed forcemain installation.

We appreciate the opportunity to be of service to you. Should you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,

Terracon Consultants, Inc.

Shannon McCarthy, E.I.T.
Senior Staff Geotechnical Engineer

Daniel Laitano, E.I.T.
Staff Engineer

cc: 1 – Client (PDF)
1 – File



Guoming Lin, Ph.D., P.E., D.GE.
Senior Principal



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Geotechnical

Environmental

Construction Materials

Facilities

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EXECUTIVE SUMMARY

This report presents the findings of our Geotechnical Engineering Investigation for the proposed force main replacement to be located along Harry Driggers Boulevard, Canal Road, and near Old Jessup Road in Glynn County, Georgia. The investigation included a field exploration program and engineering evaluation of the subsurface conditions. Based on the results of the subsurface exploration and analyses, the following geotechnical considerations were identified:

- n The subsurface profiles along Harry Driggers Boulevard are relatively uniform at the boring locations, consisting of mostly silty sands to clayey sands with clay mixtures to the hand auger boring termination depths of approximately 5 feet below ground surface (BGS). A generalized soil profile is provided in **Section 3.1**, and more detailed subsurface conditions are presented on the individual boring locations in **Appendix A**.
- n Along Canal Road, the subsurface soils consist of mainly silty sands in the upper 2.5 feet BGS followed by varying soils, from silty sands to clayey sands to the hand auger boring termination depth of approximately 5 feet BGS.
- n Along Old Jesup Road, the subsurface soils included silty sands to 1.5 feet BGS followed by sandy clays to the hand auger boring (HA10) termination depth of 5 feet BGS. At the SPT boring B3, variable soil ranging from silty sand to clayey sand to sandy clay mixtures were encountered to the boring termination depth of approximately 40 feet BGS.
- n The groundwater depths were measured on Harry Driggers Boulevard in the SPT and Hand Auger Borings (B1, B2, and HA1 through HA6) at approximately 1.5 to 5 feet BGS. On Canal Road, groundwater was not encountered in any of hand auger borings except for SPT boring B2 at approximately 3.5 feet BGS. On Old Jesup Road, the groundwater was encountered at depths BGS of 1.5 and 5 feet on HA10 and B3, respectively.
- n For the force main installation, the open-cut excavations may require protective measures. Depending upon the location and depth of the cut, dewatering of the trench excavation should be expected. Loose to medium dense silty sand to clayey sand layers were encountered at a depth of approximately 5 feet below the existing grades along the proposed utility trench path, as shown in **Appendix A**. The relatively clean sands may “flow” under the groundwater table.
- n Based on the subsurface information, excavations for the proposed construction can be accomplished with conventional earthmoving equipment. The individual contractor(s) is responsible for designing and constructing stable, temporary excavations as required to maintain the stability of both the excavation sides and bottom. Excavations should be

Geotechnical Engineering Investigation

Glynco Linear Water Force Main ■ Brunswick, Glynn County, Georgia

August 23, 2019 ■ Terracon Project No. ES195146



sloped or shored following local, and federal regulations, including current OSHA excavation and trench safety standards.

- n For seismic design purposes, the subject site shall be classified as Site Class D in accordance with the International Building Code (IBC) 2012 and ASCE 7-10 Section 11.4.2.

This summary should be used in conjunction with the entire report for design purposes. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the findings and recommendations contained herein. The section titled **GENERAL COMMENTS** should be read for an understanding of the report's limitations.

GEOTECHNICAL ENGINEERING INVESTIGATION

Glynco Linear Water Force Main Brunswick, Glynn County, Georgia

Terracon Project No. ES195146
August 23, 2019

1.0 INTRODUCTION

Terracon Consultants (Terracon) has completed our Geotechnical Engineering Investigation for the proposed force main replacement to be located in Glynn County, Georgia. The general location of the force main alignment, the boring locations and the sections are shown on the Site Location Map in **Exhibit A-1, Appendix A**.

Based on the information provided by Thomas & Hutton, the proposed a new 16 or 18-inch diameter water force main line extending along an approximately 19,000-foot section of Harry Driggers Boulevard and Canal Road as well as a 1400-foot-long section near Old Jesup Road will be installed. For ease of discussion in this project, we have divided the force main route into two sections as discussed below

- n Section 1: This section includes sections where horizontal directional drilling (HDD) will be performed starting and ending at existing ground surface and having a maximum depth in approximately the center of the route.
 - o HDD1 refers to the force main that will go under the wetland area along Harry Driggers Boulevard extending from HA2 to HA3 and extending to a maximum depth of 35 feet below ground existing surface at roughly the location of B1.
 - o HDD2 refers to the force main that will along the southern most section of Harry Driggers Boulevard, across the intersection with Glynco Parkway (at a maximum depth of 15 feet below existing ground surface) and end just south of the intersection along Canal Road.
 - o HDD3 refers to the force main that will go along Old Jessup Road and extends under the canal. The approximate maximum depth of the main will be 15 feet below the existing ground surface under the canal.
- n Section 2: This section includes sections where conventional methods of excavation and backfilling will be used for installation.
 - o T1 and T2 refers to the force main route along Harry Driggers Boulevard.
 - o T3 refers to the force main along Canal Road until just past the intersection with Rosewood Drive.

The following tables provide the field exploration schedule performed in each section.

Section	Label(s)	Number of Borings	Exploration Type	Approximate Boring Depth Below Existing Grades (ft.)	Location
Section 1	HDD1	3 (B1, HA2, HA3)	Standard Penetration Boring (SPT) and Hand auger boring (HA)	40 SPT, 5 HA	Start, middle and end of HDD
	HDD2	B2 (B2, HA7)		50 SPT 5 HA	Middle and end of HDD
	HDD3	2 (B3, HA10)		40 SPT 5 HA	Start of HDD
Section 2	T1	HA1 and HA2	Hand auger boring (HA)	5 HA	Along route
	T2	HA3 through HA6			
	T3	HA7 through HA9			

A detailed presentation of the subsurface soils encountered at each borehole location during our site exploration can be found in the SPT and hand auger boring logs included in **Appendix A** of this report, along with a site location map and exploration location plan.

The purpose of this study is to provide subsurface information and geotechnical engineering recommendations relative to:

- subsurface soil conditions
- site preparation
- bore drilling potential issues
- groundwater conditions
- lateral earth pressure parameters
- seismic considerations

2.0 PROJECT INFORMATION

2.1 Project Description

Item	Description
Proposed improvements	The proposed improvement will include the installation of a new linear water force main line along Harry Driggers Boulevard and Canal Road and extending near Old Jessup Road.

Item	Description
Grading	The site grading plan has not been made available at this time. It is anticipated that the finished surface will be near the existing grades.
Current ground cover and access conditions	Asphalt, grassed and gravel surfaces of existing roads.
Existing topography	Slope and level surfaces.

Should any of the above information or assumptions be inconsistent with the planned construction, Terracon should be informed so that modifications to this report can be made as necessary.

3.0 SUBSURFACE CONDITIONS

3.1 Typical Profile

Based on the results of our field exploration, the subsurface conditions along the waterline alignment vary significantly and can be generalized as follows:

Description	Approximate Depth to Stratum Bottom from Existing Grade	Material Encountered	Consistency / Relative Density	
Stratum 1	4 to 12	Silty sands.	Loose to medium dense	
Stratum 2	50, end of boring	Sands with clays to sandy clay.	Medium dense to dense	Soft to stiff

Details of the subsurface conditions encountered at each boring location are presented on the individual SPT and hand auger boring logs in **Appendix A** of this report. These subsurface exploration records represent an interpretation of subsurface conditions at the test locations. The soil conditions between the test locations may vary. Stratification boundaries on the logs represent the approximate depth of changes in soil types; the transition between materials may be gradual.

3.2 Groundwater

On Harry Driggers Boulevard and Canal Road, the groundwater depths were measured in the SPT Borings (B1 and B2) at approximately 4 feet BGS at the time of our field exploration.

Groundwater was also encountered in the hand auger borings HA1 through HA9 at depths ranging from 1.5 feet to 5 feet BGS.

Groundwater depth at SPT Boring B1 was determined from a hand auger boring in the upper 5 feet BGS. The hand auger boring was performed in the upper 5 feet due to the concern over the possibility of hitting the underground utility during the soil boring. In SPT Boring B2 and B3, we inserted a tape measure in the borehole to obtain the groundwater depth upon the completion of the boring.

On Old Jessup Road, groundwater was encountered in the SPT Boring (B3) at an approximate depth of 5.5 feet and in the hand auger boring (HA10) at the approximate depth of 1.5 feet.

The surface conditions and the site topography appear to have influenced the water level elevation. It is recommended that groundwater be checked immediately prior to construction activities. If the groundwater level is determined to affect the excavation process, the contractor should plan for dewatering of the open trench and the entrance and exit pits according to the anticipated construction methods used.

It should be noted that groundwater levels tend to fluctuate with the seasonal and climatic variations, as well as with construction activities. As such, the possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project. The groundwater table should be checked prior to construction to assess its effect on site work and other construction activities.

3.3 Laboratory Test

Laboratory tests such as natural moisture content, grain size distribution, and Atterberg limits were performed on the selected representative soil samples. The results of the laboratory test can be found in **Appendix B** of this report.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

Based on the information made available, we understand the proposed force main will be constructed using the horizontal directional drilling method in Section 1 and using an open trench method in Section 2. We understand the force main will be installed at maximum depths of approximately 35 feet BGS (HDD1) and 15 feet BGS (HDD2 and HDD3). In section 2 the water force main will be installed at approximately 4 feet BGS.

It is anticipated that excavations for the proposed construction can be accomplished with conventional earthmoving equipment. The individual contractor(s) is responsible for designing and constructing stable, temporary excavations as required to maintain the stability of both the excavation sides and bottom. Excavations should be sloped or shored following local, and federal regulations, including current OSHA excavation and trench safety standards. Ground water was found at close to ground surface in some borings which could cause cave in and the need for

The selection of the appropriate method for directional drilling is the contractor's responsibility. The contractor should select the appropriate boring machine and excavation method for directional drilling based on the subsurface soils and groundwater conditions indicated in the soil boring logs. In our investigation, Terracon did not find any hard layers that will slow down drilling. The groundwater was shallow and therefore at areas with relatively clean sands may "flow" under differential pressures or cave into open excavations or voids. The contractor should prepare the construction tools and procedures for the subsurface conditions.

Stockpiling of excavated material in the proximity to the excavation is not recommended. In general, a distance of one half of the excavation depth on both sides of the trench should be kept clear of any excavated materials. If this is not possible due to the space limitations, the retaining wall design should take into considerations the surcharge loads from the excavated materials.

Care should be taken during excavations as there is the possibility that sloughing, or caving of the excavation trench or excavation slope may cause movement of the surrounding soils leading to possible settlement of the neighboring structures or features.

4.1.1 Construction Monitoring Considerations

Despite our best efforts for the thorough geotechnical exploration, the actual subsurface conditions may vary from the anticipated conditions because the subsurface exploration records provided in **Appendix A** represent an interpretation of subsurface conditions at the boring locations and the subsurface conditions between the test locations may vary.

During excavation and force main installation, ground movements like settlement and lateral movement may occur and should be monitored and controlled. The monitoring program should include measurements of the groundwater table, ground vibration, lateral ground movements outside excavation, and monitoring of existing cracks at selected locations on the neighboring structures. Terracon can develop a more detailed plan for condition survey and monitoring as construction plans are developed.

We recommend Terracon should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation; placement and compaction of controlled compacted fills; backfilling of excavations to the completed subgrade.

4.2 Earthwork

The site work conditions will be largely dependent on the weather conditions and the contractor's means and methods in controlling surface drainage and protecting the subgrade. Site preparation should include installation of a site drainage system and excavation for the open trench. Following paragraphs present our considerations and recommendations for the site and subgrade preparation.

4.2.1 Site Drainage

An effective drainage system should be installed prior to site preparation and grading activities to intercept surface water and to improve overall shallow drainage. The drainage system may consist of perimeter ditches supplemented with parallel ditches and swales to prevent surface water flow into the boring pits. Pumping equipment should be prepared to remove groundwater from the trench sections. The site should be graded to shed water and avoid ponding over the subgrade.

4.2.2 Horizontal Directional Drilling

Please note: as the proposed waterline is located alongside busy streets and roadways, the contractor should take necessary precautions to avoid damages to the existing roads and other structures in the vicinity of the project area.

4.2.3 Pipe Bedding and Excavations

The soils at the base of the excavations will be variable along the path of the force water main and care should be taken so that these soils are not disturbed during construction. We anticipate sands with clayey sands, silty sands, and clayey to silty sands will be encountered at the proposed pipe bedding depth (4 ft.) in T1, T2, and T3, respectively. Disturbed or unstable materials should be removed before placing any granular bedding material. Where groundwater, lower strength soils, and unstable conditions are encountered, a greater thickness of bedding material should be provided. The material for pipe bedding can consist of No. 57 stone or those referenced in **Section 4.2.4**. The minimum thickness of the bedding material should be 12 inches.

Depending upon the location, dewatering of the force main trench should be expected. We recommend the excavation to be shored with trench boxes or other means to control erosion of the saturated sands into the trench during construction.

Sloped excavation could be used for the trenching; however; the groundwater should be lowered to a minimum of 2 feet below the bottom of the excavation and the excavation side slopes should be 2 horizontal to 1 vertical or flatter. The excavations should conform to OSHA guidelines.

4.2.4 Fill Material Consideration

The subsurface conditions largely consist of clays, clayey sands, and silty sands to the SPT and hand auger boring termination depths. Please see the attached individual boring logs provided in **Appendix A**.

Sands with silts and silty sands are generally considered suitable for structural fill; and the sandy clays are deemed unsuitable for structural fill. Based on the grain size analyses, the near surface soils should be suitable for backfill. However, the clayey soils encountered in HA1, HA2, HA6, and HA10 at approximate depth of 1.5 to 4.5 feet BGS may not be suitable for structural fill.

It is strongly recommended that Terracon be retained during construction to determine the suitability of the onsite soil as fill material. Imported soils (if required for the project) for use as fill material should conform to low volume change materials as indicated in the following specifications:

Structural fill should be placed over a stable or stabilized subgrade. The soils to be used as structural fill should be free of organics, roots, or other deleterious materials. It should be a non-plastic granular material containing less than 25 percent fines passing the No. 200 sieve. If necessary, soils with more than 25 percent fines may be used as fill in less critical areas under close control of moisture and compaction.

4.2.5 Compaction Requirements

All structural fills should be placed in thin (8 to 10 inches loose) lifts and compacted to a minimum of 95% of the soil's Standard Proctor maximum dry density (ASTM D698). Fill brought to the site should be within 3 percent (wet or dry) of the optimum moisture content.

Utility trench backfill can be compacted to 90% Standard Proctor density. Prior to fill placement, the backfill area should be densified with a vibratory plate compactor to achieve a uniform subgrade. Areas where excessive deflection is observed should be undercut, backfilled and then properly compacted.

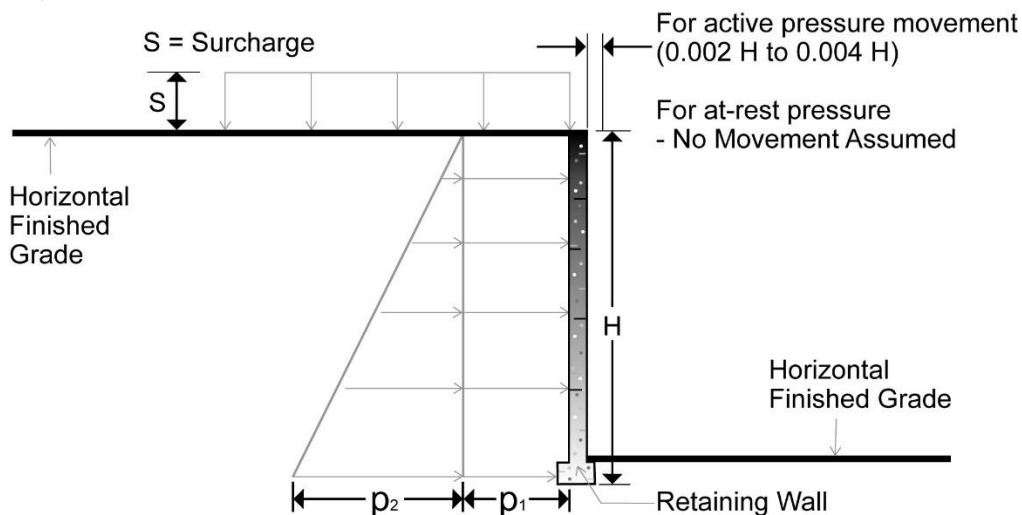
Some manipulation of the moisture content (such as wetting, drying) will be required during the filling operation to obtain the required degree of compaction. The manipulation of the moisture content is highly dependent on weather conditions and site drainage conditions. Therefore, the contractor should prepare for both dry and wet fill materials to obtain the specified compaction during grading. A sufficient number of density tests should be performed to confirm the required compaction of the fill material.

4.3 Lateral Earth Pressure Considerations

This project does not include independent permanent retaining walls; however, the temporary entrance and exit pits for the bore process may require temporary shoring retaining walls. The temporary retaining walls with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to those indicated in the following table.

The earth pressure parameters are recommended based on the soil material obtained in the borings. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained. Two wall restraint conditions are shown.

Active earth pressure is commonly used for design of free-standing cantilever retaining walls and assumes wall movement. The "at-rest" condition assumes no wall movement. The recommended design lateral earth pressures do not include a factor of safety or possible hydrostatic pressure on the walls.



Earth Pressure Coefficients

Earth Pressure Conditions	Coefficient for Backfill Type	Equivalent Fluid Density (pcf)	Surcharge Pressure, p_1 (psf)	Earth Pressure, p_2 (psf)
Active (K_a)	Granular - 0.36	42	$(0.36)S$	$(42)H$
At-Rest (K_o)	Granular - 0.53	62	$(0.53)S$	$(62)H$
Passive (K_p)	Granular - 2.77	319	---	---

Applicable conditions to the above include:

- For active earth pressure, wall must rotate about base, with top lateral movements of about $0.002 H$ to $0.004 H$, where H is wall height.

- n For passive earth pressure to develop, wall must move horizontally against the fill to mobilize resistance.
- n Uniform surcharge, where S is surcharge pressure.
- n In situ soil backfill weight a maximum of 115 pcf.
- n Horizontal backfill, compacted between 95 percent of modified Proctor maximum dry density. The excavation pit may require a design with sloped backfill depending on its proximity to the existing canal and roadway.
- n Loading from heavy compaction equipment or dynamic loading not included.
- n No hydrostatic pressures acting on wall.
- n No safety factor included in soil parameters.

Backfill placed against structures should consist of granular soils. The granular backfill must extend out from the base of the wall at an angle of at least 45 and 60 degrees from vertical for the active and passive cases, respectively. To calculate the resistance to sliding, a value of 0.35 should be used as the ultimate coefficient of friction between the footing and the underlying soil.

Depending on the depth of excavation and long-term groundwater conditions, the unbalanced hydrostatic pressure may be considered in the design of the retaining wall. Hydrostatic pressure should be added to the lateral earth pressures recommended above. These pressures do not include the influence of surcharge, equipment or floor loading, which should be added. Heavy equipment should not operate within a distance closer than the exposed height of retaining walls to prevent lateral pressures more than those provided.

Due to the presence of the roadway adjacent to the likely excavation areas, the effect of vehicular traffic may be considered while designing the lateral support system.

4.4 Seismic Considerations

Based on the findings from the field exploration and our knowledge of the local geological formation in the project area, the site can be classified as Site Class D in accordance with IBC 2012 and ASCE 7-10. The seismic design parameters obtained based on IBC 2012 and ASCE 7-10 are summarized in the table below. The design response spectrum curve, as presented in the appendix, was developed based on the S_{DS} and S_{D1} values.

Summary of Seismic Design Parameters

Site Location (Lat. – Long.)	Site Classification	S_s	S_1	F_a	F_v	S_{DS}	S_{D1}
31.2449° -81.4880°	D	0.295g	0.116g	1.564	2.336	0.307g	0.181g

§ The Site Class for this site was determined based on the soil properties to the maximum exploration depth and estimated soil properties below the maximum exploration depth to 100 feet based on our experience with the geologic conditions of the site area in accordance with the 2012 IBC and ASCE 7-2010.

5.0 GENERAL COMMENTS

Terracon should be consulted to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the project design and specifications. Terracon should also be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

The analyses and recommendations presented in this report are based upon the data obtained from the explorations performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between exploration locations, across the site, or may be caused due to the modifying effects of construction or weather. Bear in mind that the nature and extent of such variations may not become evident until construction has started or until construction activities have ceased. If variations do appear, Terracon should be notified immediately so that further evaluation and supplemental recommendations can be provided. The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, and bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or hazardous conditions. If the owner is concerned about the potential for such contamination or pollution, please advise so that additional studies may be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project and site discussed, and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either expressed or implied, are intended or made. Site safety, excavation support and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes, and then either verifies or modifies the conclusions of this report in writing.

APPENDIX A

Field Exploration

- § Exhibit A-1 Site Location Map
- § Exhibit A-2 Exploration Location Plan
- § Exhibit A-3 Field Exploration Description
- § Exhibit A-4 SPT Cross Section
- § Exhibit A-5 SPT Boring Logs
- § Exhibit A-6 Hand Auger Boring Logs

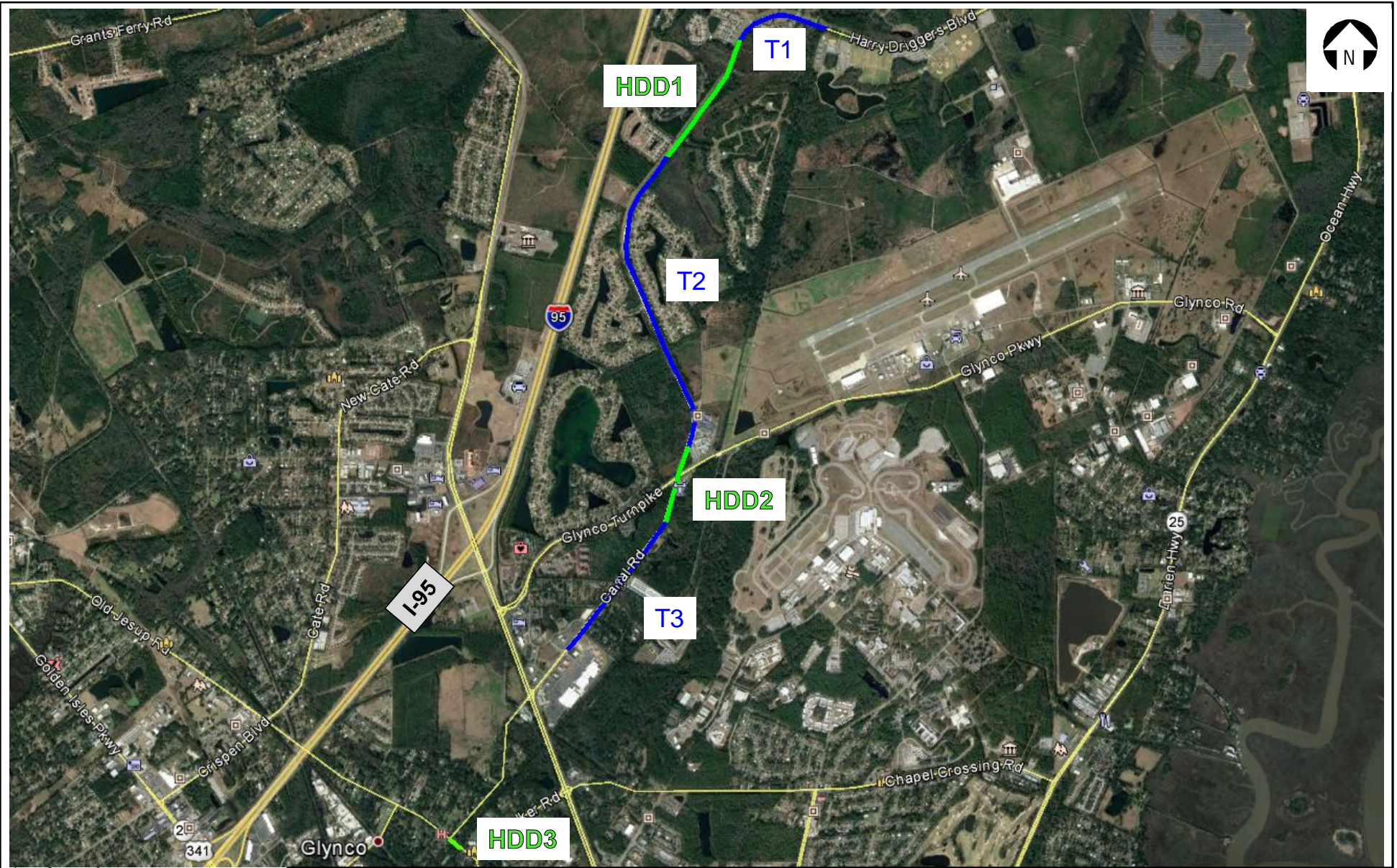


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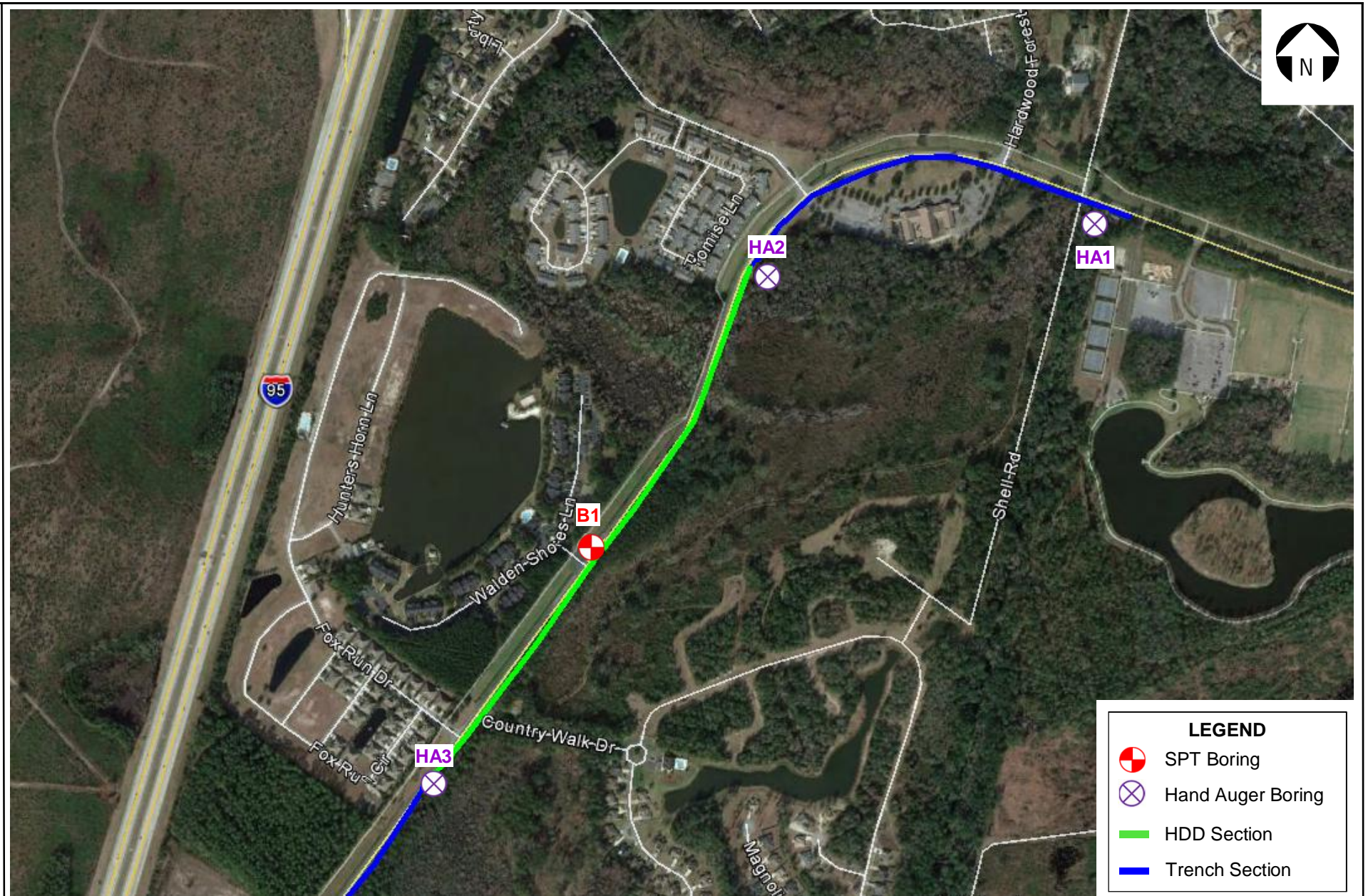
2201 Rowland Avenue Savannah, Georgia 31404
Phone (912) 629 4000 Fax (912) 629 4001

SITE LOCATION MAP

Glynco Linear Force Water Main
Harry Driggers Boulevard
Brunswick, Glynn County, Georgia

Exhibit

A-1



LEGEND	
	SPT Boring
	Hand Auger Boring
	HDD Section
	Trench Section

Image Courtesy of Google Earth™

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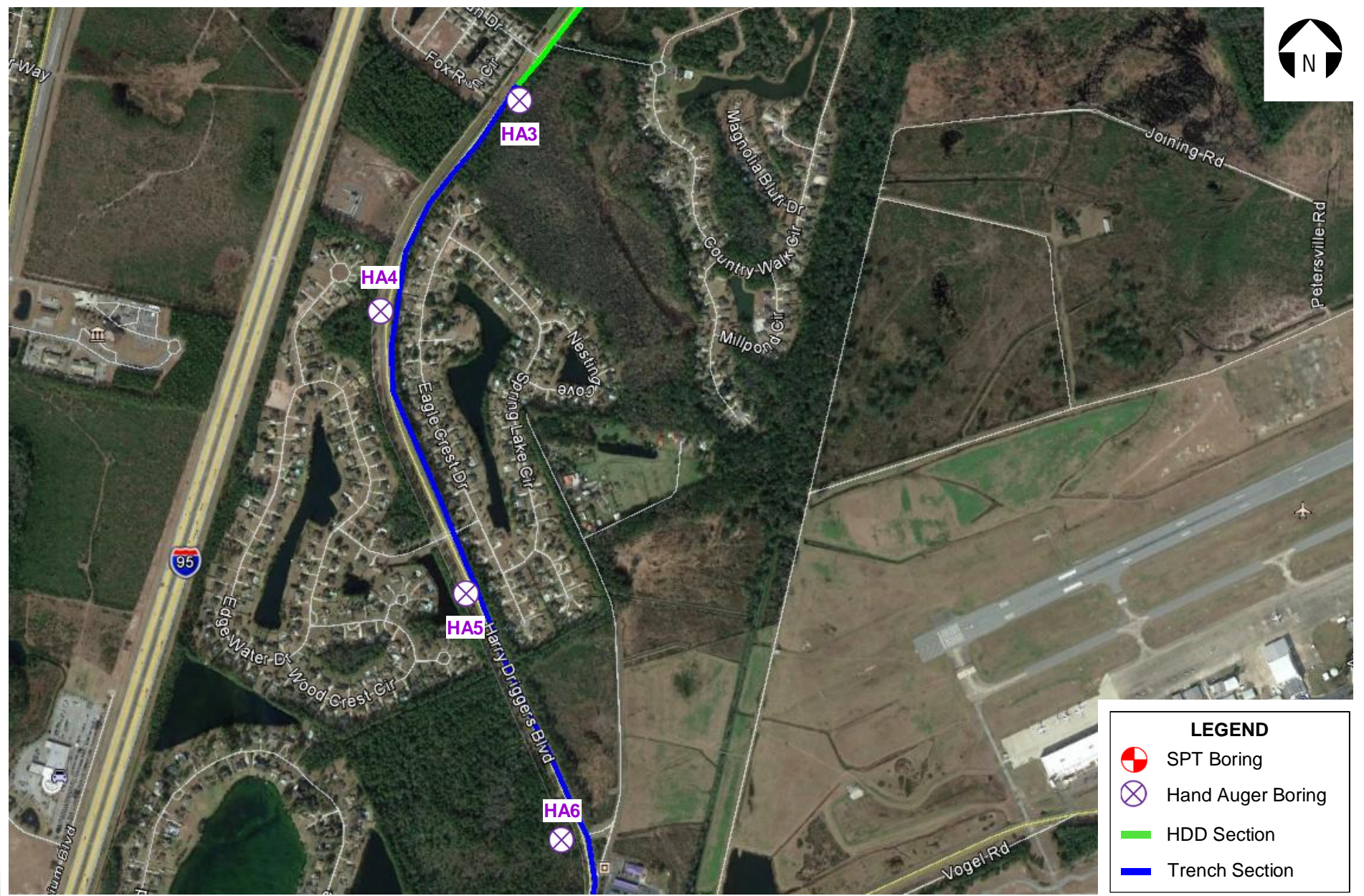
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EXPLORATION LOCATION PLAN

Glynco Linear Force Water Main
Harry Driggers Boulevard
Brunswick, Glynn County, Georgia

Exhibit:	A-2-1
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LEGEND





-  SPT Boring
-  Hand Auger Boring
-  HDD Section
-  Trench Section

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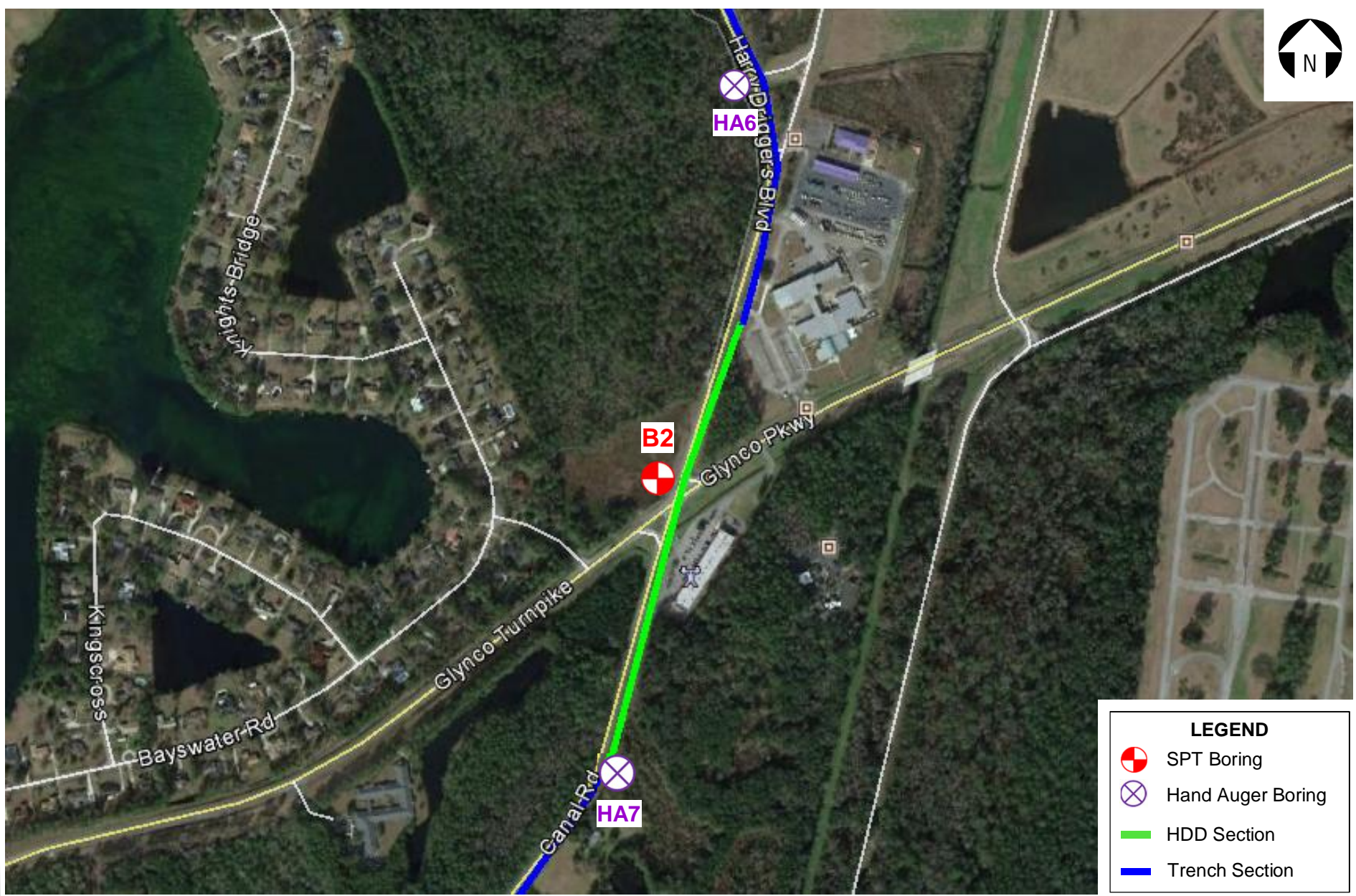
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EXPLORATION LOCATION PLAN

Glynco Linear Force Water Main
 Harry Driggers Boulevard
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Exhibit:
A-2-2



LEGEND





-  SPT Boring
-  Hand Auger Boring
-  HDD Section
-  Trench Section

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EXPLORATION LOCATION PLAN

Glynco Linear Force Water Main
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Exhibit:
A-2-3

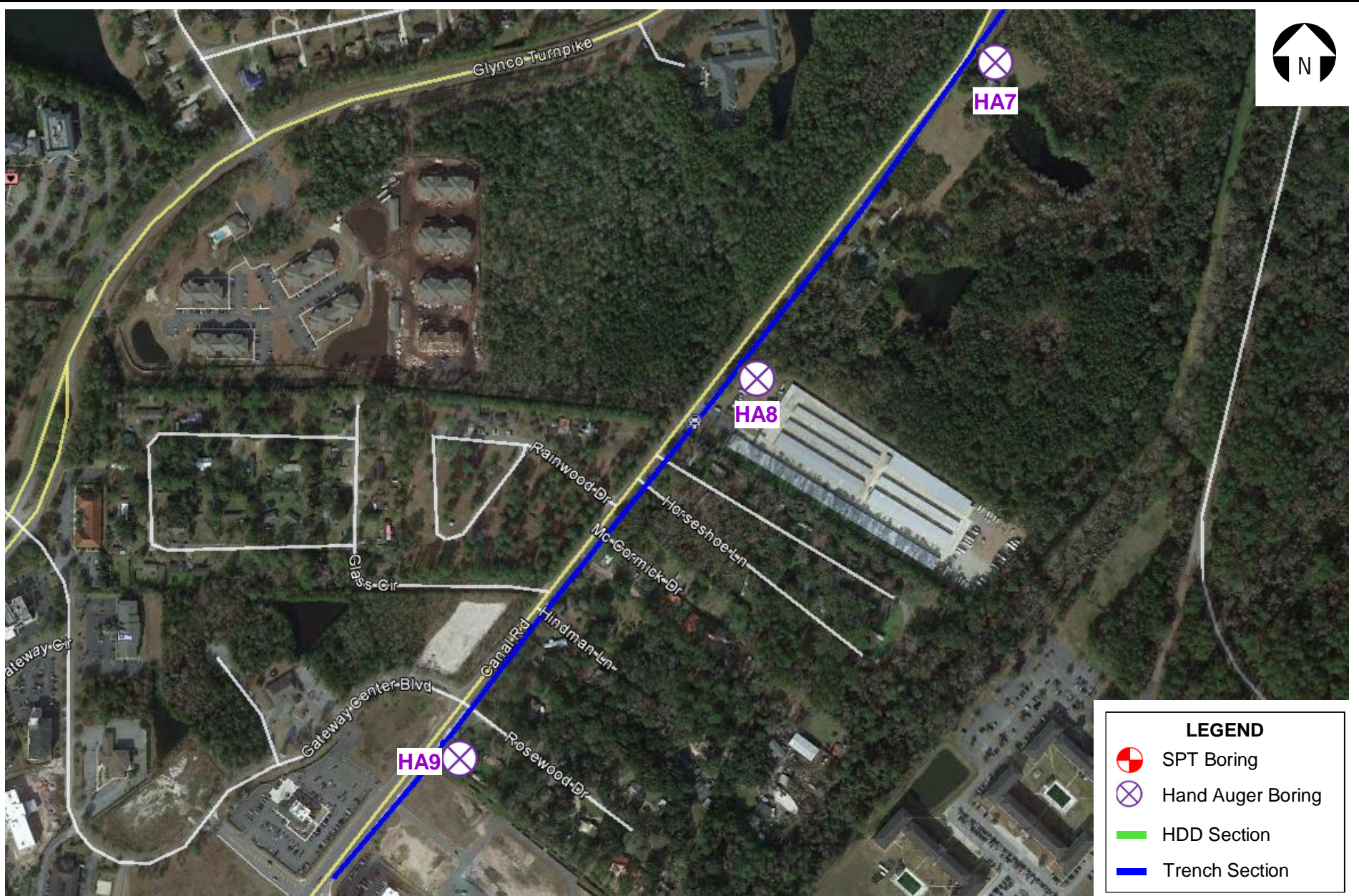


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EXPLORATION LOCATION PLAN

Glynco Linear Force Water Main
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Exhibit:

A-2-4

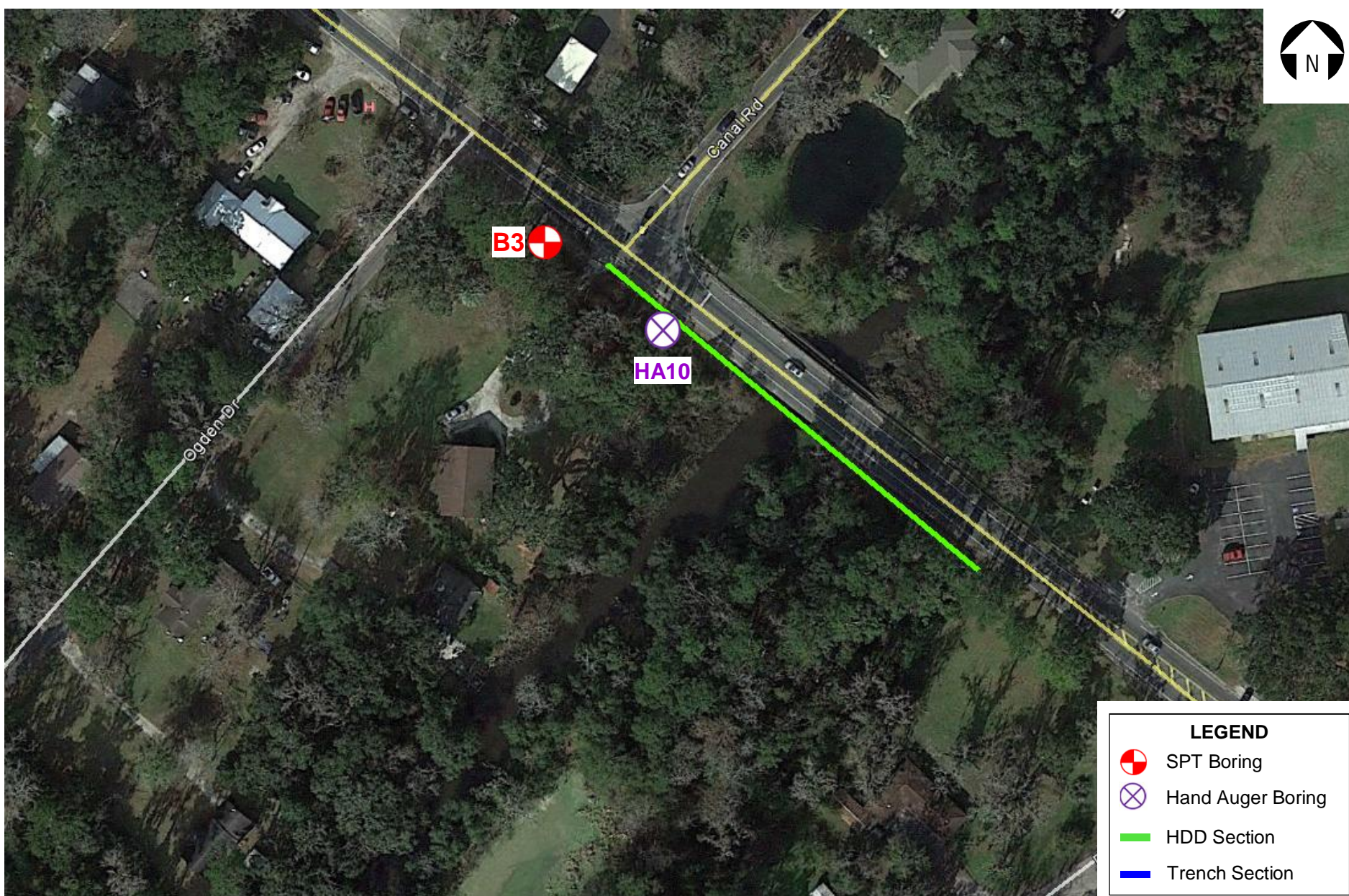


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Drawn by:	DL	Scale:	N.T.S.
Checked by:	GL	File Name:	ES195146
Approved by:	GL	Date:	08/21/2019

Terracon
Consulting Engineers & Scientists

2201 Rowland Avenue Savannah, Georgia 31404
Phone (912) 629 4000 Fax (912) 629 4001

EXPLORATION LOCATION PLAN

Glynco Linear Force Water Main
Harry Driggers Boulevard
Brunswick, Glynn County, Georgia

Exhibit:
A-2-5

Geotechnical Engineering Investigation

Glynco Linear Force Water Main ■ Brunswick, Glynn County, Georgia

August 21, 2019 ■ Terracon Project No. ES195126



Field Exploration Description

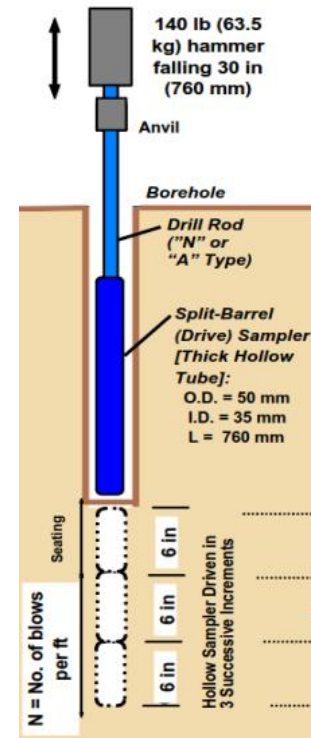
The locations of the Standard Penetration Test (SPT) boring and the Hand Auger (HA) borings were determined by Terracon based on the proposed plan and located in the field using a hand-held GPS unit and in reference to the existing site features. These test locations are shown in the Exploration Location Plan in **Exhibit A-2** and should be considered approximate. These test locations were discussed with the civil engineering prior to performing the field exploration.

Standard Penetration Testing

The SPT boring was performed in accordance with ASTM D1586 with a truck-mounted Acker drilling rig using mud rotatory drilling techniques. Samples of the soil encountered in the boring were obtained using split-barrel sampling procedures. In the split barrel sampling procedure, the number of blows required to advance a standard 2-inch O.D. split barrel sampler the last 12 inches of the typical total 18-inch penetration by means of a 140-pound hammer with a free fall of 30 inches, is the standard penetration resistance value (SPT-N). This value is used to estimate the in situ relative density of cohesionless soils and consistency of cohesive soils. A rope and cathead hammer was used to advance the split-barrel sampler in the boring performed on this site.

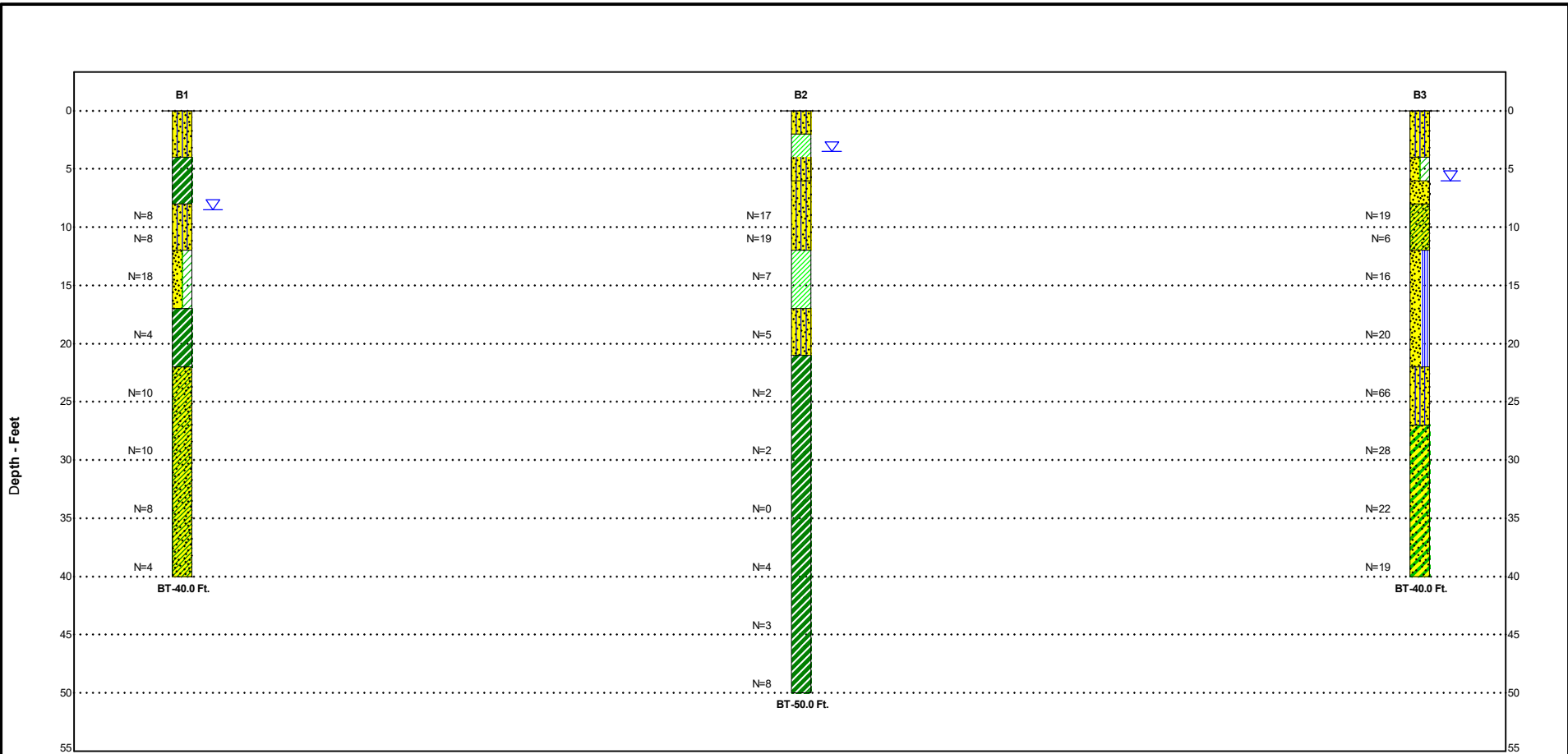
Hand Auger Borings

Hand auger borings were conducted in general accordance with ASTM D 1452-80, Standard Practice for Soil Investigation and Sampling by Auger Borings. In this test, hand auger borings are drilled by rotating and advancing a bucket auger to the desired depths while periodically removing the auger from the hole to clear and examine the auger cuttings. The soils were classified in accordance with ASTM D2488.

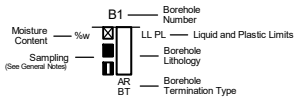


Source: FHWA NHI-06-088

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. SMART FENCE ES195146 GLYNCO LINEAR FORCE W. TERRACON DATA TEMPLATE.GDT 8/27/19



Explanation



- Silty Sand
- Fat Clay
- Poorly-graded Sand with Clay
- Sandy Lean Clay
- Lean Clay

- Poorly-graded Sand
- Poorly-graded Sand with Silt
- Clayey Sand

NOTES:
 See Exhibit A-2 for orientation of soil profile.
 See General Notes in Appendix C for symbols and soil classifications.
 Soils profile provided for illustration purposes only.
 Soils between borings may differ.
 AR - Auger Refusal
 BT - Boring Termination

Project Manager: S.McCarthy
 Drawn by: DL
 Approved by: GL
 Date: 8/21/2019

Project No.: ES195146
 Scale: N.T.S.
 File Name: ES195146

Terracon
 2201 Rowland Ave
 Savannah, GA
 PH. 912-629-4000 FAX. 912-629-4001

SUBSURFACE PROFILE
 GLYNCO LINEAR FORCE WATER MAIN
 HARRY DRIGGERS BLVD
 BRUNSWICK, GA

EXHIBIT
 A-4

BORING LOG NO. B1

PROJECT: Glynco Linear Force Water Main

**CLIENT: Thomas & Hutton Engineering Co
Savannah, GA**

**SITE: Harry Driggers Blvd
Brunswick, GA**

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL ES195146 GLYNCO LINEAR FOR.GPJ TERRACON2012.GDT 8/21/19

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 31.26962° Longitude: -81.48553°	DEPTH (FL)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	DEPTH						
	SILTY SAND (SM) , fine grained, brown, Hand augered, no blow counts.						
	fine grained, dark brown, Hand augered, no blow counts.						
	FAT CLAY (CH) , gray to orange, Hand augered, no blow counts.	4.0	▽				
	Hand augered, no blow counts.					32	
	SILTY SAND (SM) , fine grained, gray to light brown	8.0	▽				
					2-3-5-6 N=8		
	POORLY GRADED SAND WITH CLAY (SP-SC) , with shell fragments, fine to medium grained, dark gray	12.0			6-4-4-5 N=8		
					5-9-9 N=18		
	FAT CLAY (CH) , dark gray	17.0			2-2-2 N=4		
					5-4-6 N=10		
	SANDY LEAN CLAY (CL) , dark gray	22.0			4-4-6 N=10	27	43-17-26
	gray to light brown				4-3-5 N=8		
	dark gray				2-2-2 N=4		
	dark gray	40.0					
	Boring Terminated at 40 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Mud Rotary

See Exhibit A-3 for description of field procedures

Notes:

Abandonment Method:

See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling



Boring Started: 7/22/2019

Boring Completed: 7/22/2019

Drill Rig: D-25

Driller: Suncoast

Project No.: ES195146

Exhibit: A-5-1

BORING LOG NO. B2

PROJECT: Glynco Linear Force Water Main

**CLIENT: Thomas & Hutton Engineering Co
Savannah, GA**

**SITE: Harry Driggers Blvd
Brunswick, GA**

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL ES195146 GLYNCO LINEAR FOR.GPJ TERRACON2012.GDT 8/23/19

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 31.24612° Longitude: -81.4879°	DEPTH (FL)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	DEPTH						
	SILTY SAND (SM) , with trace organics, fine grained, dark brown, medium dense	2.0					
	SANDY LEAN CLAY (CL) , dark brown, medium stiff	4.0	▽		2-4-6-6		
	SILTY SAND (SM) , fine grained, dark brown, medium dense	5.0			3-3-3-3	21	
	fine grained, dark brown, medium dense		▽		2-2-2-5		
	fine to medium grained, dark brown, medium dense				6-8-9-11 N=17		
		10.0			11-10-9-4 N=19		
	SANDY LEAN CLAY (CL) , dark gray, medium stiff	12.0					
	SM - SILTY SAND (SM) , fine grained, dark brown, loose	17.0			4-2-5 N=7		
		21.0			3-4-1 N=5		
	FAT CLAY (CH) , gray to orange, soft	25.0			1-1-1 N=2		
	gray, soft				1-1-1 N=2	45	58-20-38
	with shell fragments, gray, soft				0-0-0 N=0		
	with shell fragments, gray, medium stiff				3-2-2 N=4		
	with shell fragments, gray, soft				1-1-2 N=3		
	with shell fragments, gray, stiff				6-2-6 N=8		
	Boring Terminated at 50 Feet	50.0					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Mud Rotary

See Exhibit A-3 for description of field procedures

Notes:

Abandonment Method:

See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling



Boring Started: 7/22/2019

Boring Completed: 7/22/2019

Drill Rig: D-25

Driller: Suncoast

Project No.: ES195146

Exhibit: A-5-2

BORING LOG NO. B3

PROJECT: Glynco Linear Force Water Main

**CLIENT: Thomas & Hutton Engineering Co
Savannah, GA**

**SITE: Harry Driggers Blvd
Brunswick, GA**

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 31.22265° Longitude: -81.50494°	DEPTH (FL)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
DEPTH							
4.0	SILTY SAND (SM) , with trace gravel, fine grained, dark brown, medium dense with trace organics, fine grained, dark brown, medium dense				6-8-10-9		
6.0	SAND WITH CLAY (SP-SC) , with limestone fragments, fine grained, dark brown, medium dense	5	▽		5-6-4-6	11	
8.0	POORLY GRADED SAND (SP) , with limestone fragments, fine to medium grained, brown, medium dense				16-19-23-29		
12.0	SANDY LEAN CLAY (CL) , with shell fragments, gray, medium stiff	10		X	20-10-9-9 N=19		
				X	4-4-2-7 N=6		
22.0	POORLY GRADED SAND WITH SILT (SP-SM) , fine to medium grained, gray to light brown, medium dense fine to medium grained, gray to light brown, medium dense	15		X	8-6-10 N=16		
		20		X	11-13-7 N=20	30	
27.0	SILTY SAND (SM) , fine grained, gray to light brown, dense	25		X	11-15-51 N=66		
		30		X	6-11-17 N=28		
40.0	CLAYEY SAND (SC) , fine grained, gray, medium dense fine grained, gray, medium dense fine grained, gray, medium dense	35		X	6-9-13 N=22	44	40-17-23
		40		X	7-8-11 N=19		
	Boring Terminated at 40 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Rope and Cathead

Advancement Method:
Mud Rotary

See Exhibit A-3 for description of field procedures

Notes:

Abandonment Method:

See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ At completion of drilling



Boring Started: 7/22/2019

Boring Completed: 7/22/2019

Drill Rig: D-25

Driller: Suncoast

Project No.: ES195146

Exhibit: A-5-3

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL ES195146 GLYNCO LINEAR FOR GPJ TERRACON2012.GDT 8/21/19

Hand Auger Boring Log

Project Name: Glynco Linear Force Water Main

Project No.: ES195146

Project Location: Brunswick, Georgia



Location	Depth (in)	Material Description	USCS Classification
HA1	0 to 2	Dark brown SAND with clay with grass roots	SP-SC
	2 to 6	Gray, light brown, and orange fine clayey SAND	SC
	6 to 12	Gray, light brown, and orange sandy CLAY	CL
	12 to 18	Dark brown, gray, and orange clayey SAND	SC
	18 to 42	Dark brown, dark gray, and orange sandy CLAY	CL
	42 to 48	Gray, brown, and orange SAND with clay	SP-SC
	48 to 60	Light gray and light brown fine to medium SAND	SP
Groundwater @ 60" BGS. No mottling.			

Location	Depth (in)	Material Description	USCS Classification
HA2	0 to 3	Dark brown and gray fine silty SAND with grass roots	SM
	3 to 6	Dark brown and gray fine silty SAND	SM
	6 to 18	Gray and light brown fine silty SAND	SM
	18 to 54	Gray, light brown, and orange sandy CLAY	CL
	54 to 60	Light gray and light brown fine to medium SAND	SP
No groundwater encountered. Mottling @ 18" BGS.			

Location	Depth (in)	Material Description	USCS Classification
HA3	0 to 4	Brown fine silty SAND with grass roots	SM
	4 to 18	Brown fine silty SAND	SM
	18 to 36	Brown and gray fine silty SAND	SM
	36 to 48	Light brown and gray fine silty SAND	SM
	48 to 54	Light brown fine silty SAND	SM
	54 to 60	Light gray and light brown fine to medium SAND	SP
Groundwater @ 60" BGS. No mottling.			

Location	Depth (in)	Material Description	USCS Classification
HA4	0 to 6	Gray fine silty SAND with grass roots	SM
	6 to 18	Dark gray fine silty SAND with cemented sands	SM
	18 to 36	Light brown and gray fine silty SAND	SM
	36 to 48	Light gray fine silty SAND	SM
	48 to 60	Dark brown fine fine silty SAND	SM
Groundwater @ 60" BGS. No mottling.			

Location	Depth (in)	Material Description	USCS Classification
HA5	0 to 6	Dark gray and brown fine silty SAND with grass roots	SM
	6 to 36	Dark gray and brown fine silty SAND	SM
	36 to 54	Brown fine silty SAND	SM
	54 to 60	Dark gray and dark brown fine silty SAND	SM
Groundwater @ 42" BGS. No mottling.			

Hand Auger Boring Log

Project Name: Glyngo Linear Force Water Main

Project No.: ES195146

Project Location: Brunswick, Georgia



Location	Depth (in)	Material Description	USCS Classification
HA6	0 to 6	Dark brown and dark gray fine silty SAND with grass roots	SM
	6 to 18	Dark brown and dark gray fine silty SAND	SM
	18 to 30	Light gray and brown fine silty SAND with trace organics	SM
	30 to 48	Gary and orange sandy CLAY	CL
	48 to 60	Light gray fine SAND	SP
No groundwater encountered. Mottling @ 30" BGS.			

Location	Depth (in)	Material Description	USCS Classification
HA7	0 to 3	Gray and brown fine silty SAND with grass roots	SM
	3 to 6	Gray and brown fine silty SAND	SM
	6 to 18	Light brown and orange fine silty SAND	SM
	18 to 24	Dark brown fine silty SAND	SM
	24 to 30	Light gray and brown fine silty SAND	SM
	30 to 42	Dark brown and brown fine silty SAND	SM
	42 to 60	Light brown and light orange fine clayey SAND	SC
No groundwater was encountered. No mottling.			

Location	Depth (in)	Material Description	USCS Classification
HA8	0 to 6	Light brown and light gray fine silty SAND	SM
	6 to 18	Light brown fine silty SAND	SM
	18 to 24	Light brown and light gray fine SAND with silt	SP-SM
	24 to 30	Light brown, light gray, and light orange fine SAND with silt	SP-SM
	30 to 42	Gray, brown, and orange fine clayey SAND	SC
	42 to 60	Brown fine silty SAND	SM
No groundwater encountered. Mottling @ 24" BGS.			

Location	Depth (in)	Material Description	USCS Classification
HA9	0 to 3	Brown fine silty SAND with grass roots	SM
	3 to 24	Brown and gray fine silty SAND	SM
	24 to 30	Light brown fine silty SAND	SM
	30 to 36	Light brown and light orange fine clayey SAND	SC
	36 to 48	Light gray SAND with silt	SP-SM
	48 to 60	Light gray, light orange, and brown fine clayey SAND	SC
No groundwater encountered. Mottling @ 30" BGS.			

Location	Depth (in)	Material Description	USCS Classification
HA10	0 to 18	Gray and brown fine clayey SAND with trace organics	SC
	18 to 60	Gray, brown, and orange sandy CLAY with shell fragments	CL
Groundwater @ 18" BGS. Mottling @ 18" BGS.			

APPENDIX B

Laboratory Test Results

- § Exhibit B-1 Summary of Laboratory Test Results
- § Exhibit B-2 Grain Size Distribution
- § Exhibit B-3 Atterberg Limits

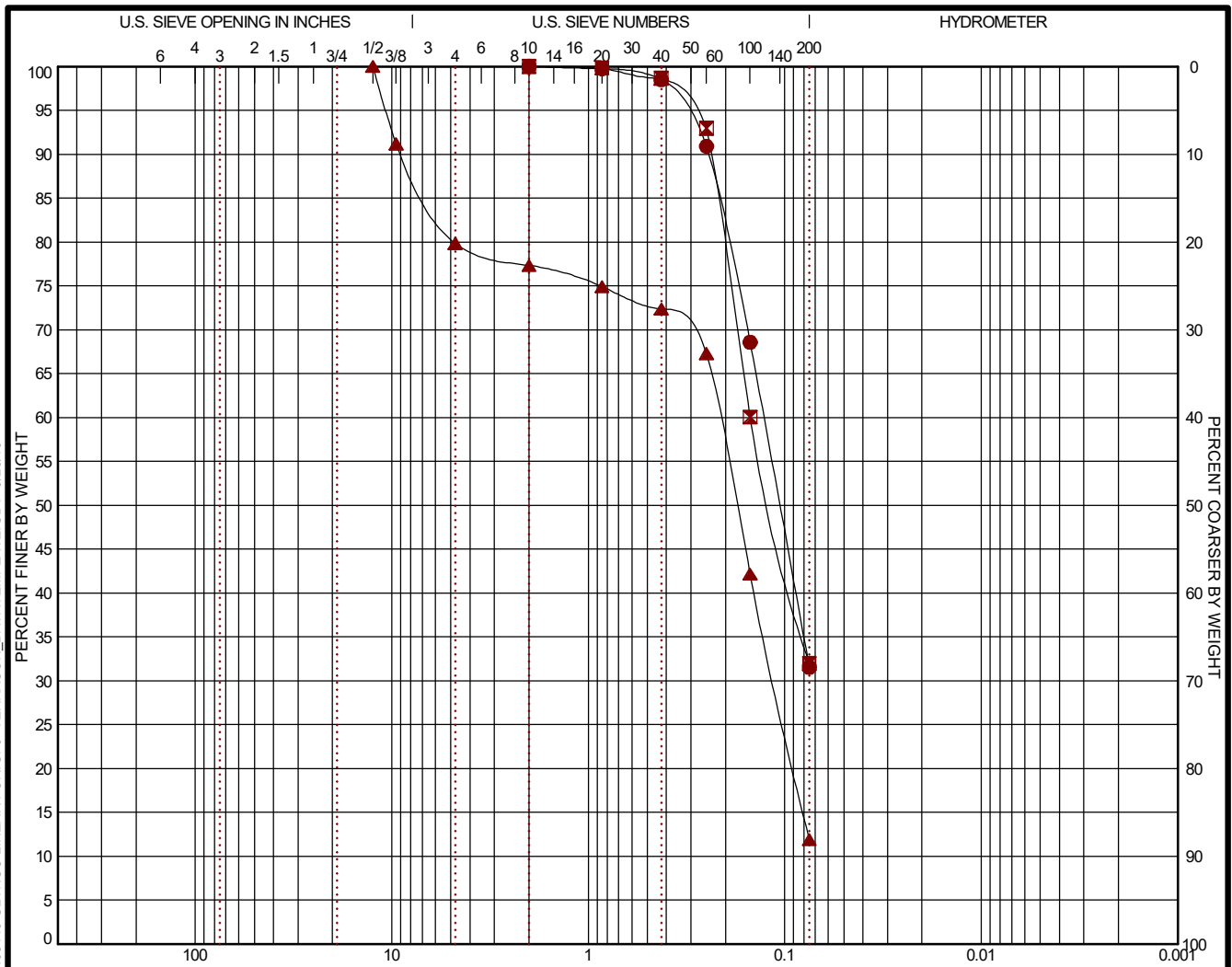
SUMMARY OF LABORATORY RESULTS

BORING ID	Depth (Ft.)	% Gravel	% Sand	% Silt	% Clay	% Fines	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
B1	4 - 6	0.0	68.5			31.5	32			
B1	28.5 - 30						27	43	17	26
B2	4 - 6	0.0	68.1			31.9	21			
B2	28.5 - 30						45	58	20	38
B3	4 - 6	20.2	67.9			11.9	11			
B3	18.5 - 20	0.0	94.2			5.8	30			
B3	33.5 - 35						44	40	17	23

PROJECT: Glyngo Linear Force Water Main	 2201 Rowland Ave Savannah, GA	PROJECT NUMBER: ES195146
SITE: Harry Driggers Blvd Brunswick, GA	PH. 912-629-4000 FAX. 912-629-4001	CLIENT: Thomas & Hutton Engineering Co Savannah, GA
		EXHIBIT: B-1

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
●	B1	4 - 6	0.0	0.0	68.5		31.5		SM
☒	B2	4 - 6	0.0	0.0	68.1		31.9		SM
▲	B3	4 - 6	0.0	20.2	67.9		11.9		SP-SC

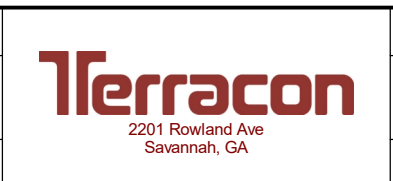
	GRAIN SIZE			SOIL DESCRIPTION	
	●	☒	▲	●	☒
D ₆₀	0.128	0.15	0.216	Silty SAND (SM)	☒ Silty SAND (SM)
D ₃₀			0.114	▲ SAND with clay (SP-SC)	
D ₁₀					
COEFFICIENTS			REMARKS		
C _c			0.83	● Medium dense	☒ Loose
C _u			3.00	▲ Medium dense	

Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
#10	100.0	#10	100.0	1/2"	100.0
#20	99.74	#20	99.84	3/8"	91.18
#40	98.5	#40	98.64	#4	79.83
#60	90.89	#60	92.93	#10	77.33
#100	68.57	#100	60.04	#20	74.91
#200	31.52	#200	31.93	#40	72.35
				#60	67.31
				#100	42.16
				#200	11.88

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 ES195146 GLYNCO LINEAR FOR GPJ TERRACON DATATEMPLATE.GDT 8/20/19

PROJECT: Glyngo Linear Force Water Main

SITE: Harry Driggers Blvd
Brunswick, GA



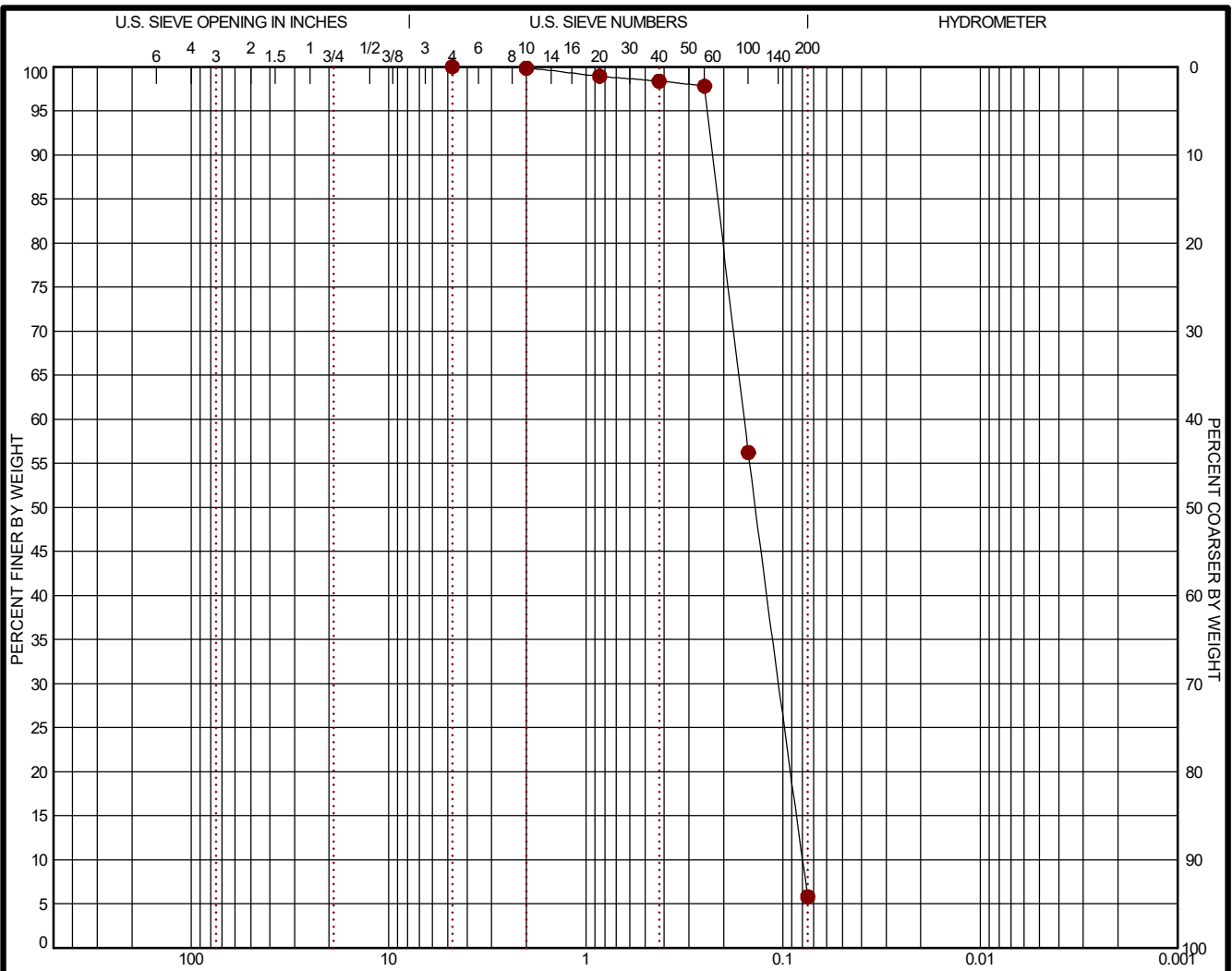
PROJECT NUMBER: ES195146

CLIENT: Thomas & Hutton Engineering Co
Savannah, GA

EXHIBIT: B-2-1

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
● B3	18.5 - 20	0.0	0.0	94.2		5.8		SP-SM

GRAIN SIZE	
●	
D ₆₀	0.157
D ₃₀	0.105
D ₁₀	0.079
COEFFICIENTS	
C _c	0.88
C _u	1.98

Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
● #4	100.0				
#10	99.84				
#20	98.92				
#40	98.37				
#60	97.8				
#100	56.22				
#200	5.8				

SOIL DESCRIPTION
 ● SAND with silt (SP-SM)

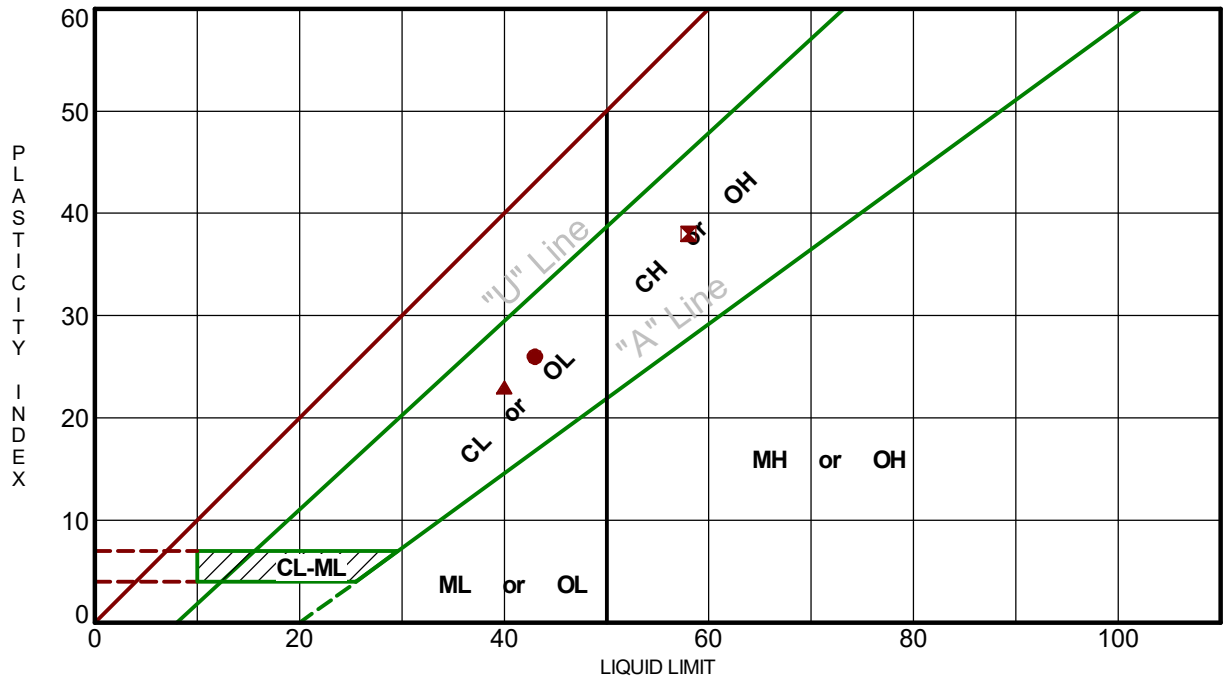
REMARKS
 ● Medium dense

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 ES195146 GLYNCO LINEAR FOR GPJ TERRACON DATATEMPLATE.GDT 8/20/19

PROJECT: Glyngo Linear Force Water Main	Terracon 2201 Rowland Ave Savannah, GA	PROJECT NUMBER: ES195146
SITE: Harry Driggers Blvd Brunswick, GA		CLIENT: Thomas & Hutton Engineering Co Savannah, GA
		EXHIBIT: B-2-2

ATTERBERG LIMITS RESULTS

ASTM D4318



LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS ES195146 GLYNCO LINEAR FOR.GPJ TERRACON DATATEMPLATE.GDT 8/20/19

Boring ID	Depth	LL	PL	PI	Fines	USCS	Description
● B1	28.5 - 30	43	17	26		CL	Sandy lean CLAY
☒ B2	28.5 - 30	58	20	38		CH	Fat CLAY
▲ B3	33.5 - 35	40	17	23		CL	Sandy lean CLAY

PROJECT: Glyngo Linear Force Water Main SITE: Harry Driggers Blvd Brunswick, GA	 2201 Rowland Ave Savannah, GA	PROJECT NUMBER: ES195146 CLIENT: Thomas & Hutton Engineering Co Savannah, GA EXHIBIT: B-3
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APPENDIX C

Supporting Document

- § Exhibit C-1 Seismic Design Parameters
- § Exhibit C-2 General Notes
- § Exhibit C-3 Unified Soil Classification System

Seismic Design Parameters Based on IBC2012 Code and ASCE 7-10 Standard

Glynco Linear Water Force Main
 Terracon Project Number: ES195146



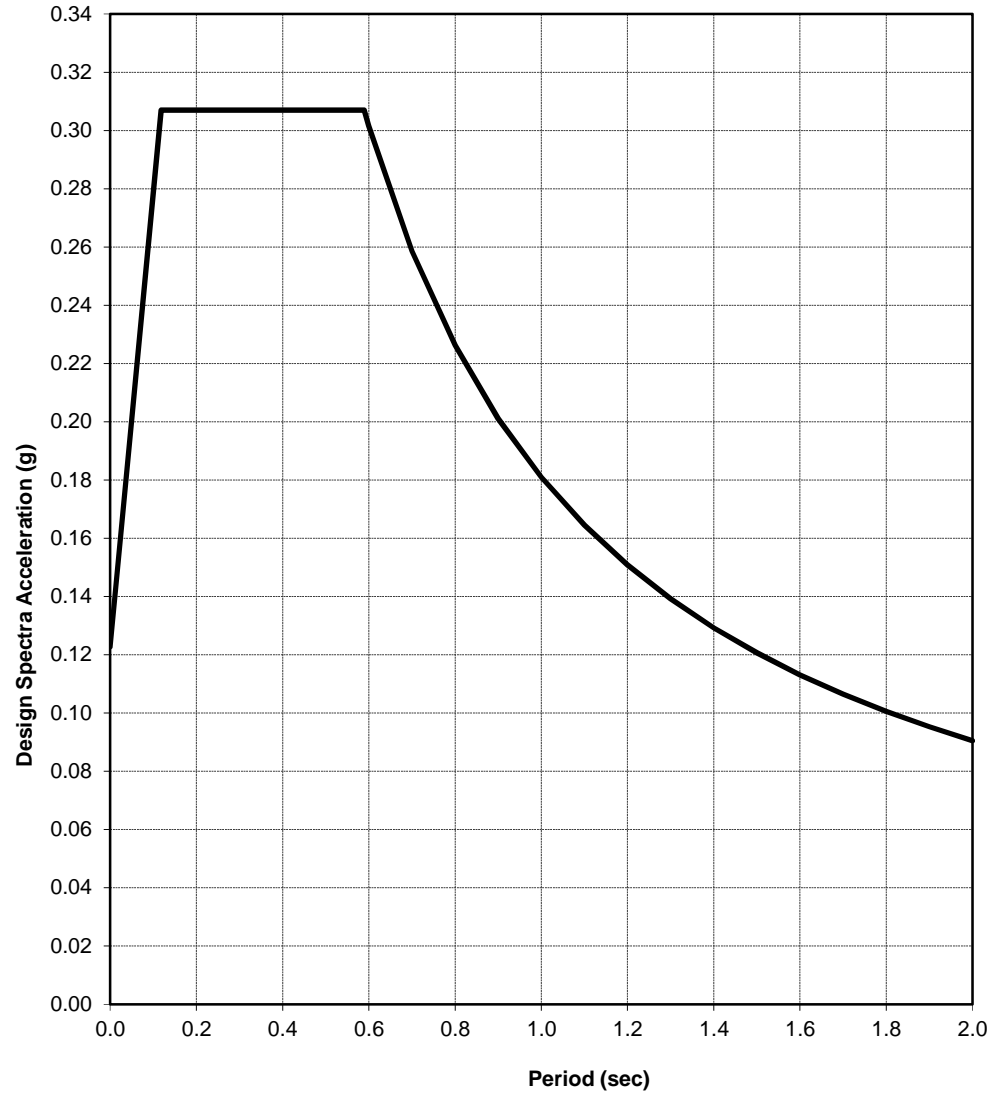
Site Location: Savannah, Chatham County, Georgia
 Latitude : 32.2449°
 Longitude : -81.4880°

Site Class: D

Design Response Spectrum for the Site Class












S_s 0.295	S_1 0.116
F_a 1.564	F_v 2.336
S_{MS} 0.461	S_{M1} 0.271
S_{DS} 0.307	S_{D1} 0.181

	<u>Period (sec)</u>	<u>Sa (g)</u>
	0.000	0.123
T_0	0.118	0.307
	0.200	0.307
T_s	0.590	0.307
T	0.600	0.302
	0.700	0.259
	0.800	0.226
	0.900	0.201
	1.000	0.181
	1.100	0.165
	1.200	0.151
	1.300	0.139
	1.400	0.129
	1.500	0.121
	1.600	0.113
	1.700	0.106
	1.800	0.101
	1.900	0.095
	2.000	0.091



GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING			GROUNDWATER		Groundwater Initially Encountered	FIELD TESTS	(HP) Hand Penetrometer	
	Auger	Split Spoon			Groundwater Level After a Specified Period of Time		(T) Torvane	
					Static Groundwater Level After a Specified Period of Time		(b/f) Standard Penetration Test (blows per foot)	
	Shelby Tube	Macro Core			No Groundwater Observed		(PID) Photo-Ionization Detector	
				Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.			(OVA) Organic Vapor Analyzer	
	No Recovery	Rock Core						
	Ring Sampler							

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS	RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
	Descriptive Term (Density)	Std. Penetration Resistance (blows per foot)	Descriptive Term (Consistency)	Undrained Shear Strength (kips per square foot)	Std. Penetration Resistance (blows per foot)
	Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
	Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
	Medium Dense	10 - 29	Medium-Stiff	0.50 to 1.00	5 - 7
	Dense	30 - 50	Stiff	1.00 to 2.00	8 - 14
	Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	above 4.00	> 30	

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

GRAIN SIZE TERMINOLOGY

Descriptive Term(s) of other constituents	Percent of Dry Weight
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 sieve (0.075mm)

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests^A

				Soil Classification		
				Group Symbol	Group Name ^B	
Coarse Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3^E$	GW	Well-graded gravel ^F	
			$Cu < 4$ and/or $1 > Cc > 3^E$	GP	Poorly graded gravel ^F	
	Sands 50% or more of coarse fraction passes No. 4 sieve	Gravels with Fines More than 12% fines ^C	Fines classify as ML or MH		GM	Silty gravel ^{F,G,H}
			Fines classify as CL or CH		GC	Clayey gravel ^{F,G,H}
		Clean Sands Less than 5% fines ^D	$Cu \geq 6$ and $1 \leq Cc \leq 3^E$		SW	Well-graded sand ^I
			$Cu < 6$ and/or $1 > Cc > 3^E$		SP	Poorly graded sand ^I
Sands with Fines More than 12% fines ^D	Fines classify as ML or MH		SM	Silty sand ^{G,H,I}		
	Fines Classify as CL or CH		SC	Clayey sand ^{G,H,I}		
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	$PI > 7$ and plots on or above "A" line ^J	CL	Lean clay ^{K,L,M}	
			$PI < 4$ or plots below "A" line ^J	ML	Silt ^{K,L,M}	
		organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OL	Organic clay ^{K,L,M,N}	
					Organic silt ^{K,L,M,O}	
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay ^{K,L,M}	
			PI plots below "A" line	MH	Elastic Silt ^{K,L,M}	
		organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OH	Organic clay ^{K,L,M,P}	
					Organic silt ^{K,L,M,O}	
Highly organic soils	Primarily organic matter, dark in color, and organic odor			PT	Peat	

^ABased on the material passing the 3-in. (75-mm) sieve

^BIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^CGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^DSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

$$^E Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^FIf soil contains $\geq 15\%$ sand, add "with sand" to group name.

^GIf fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^HIf fines are organic, add "with organic fines" to group name.

^IIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^JIf Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^KIf soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^LIf soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

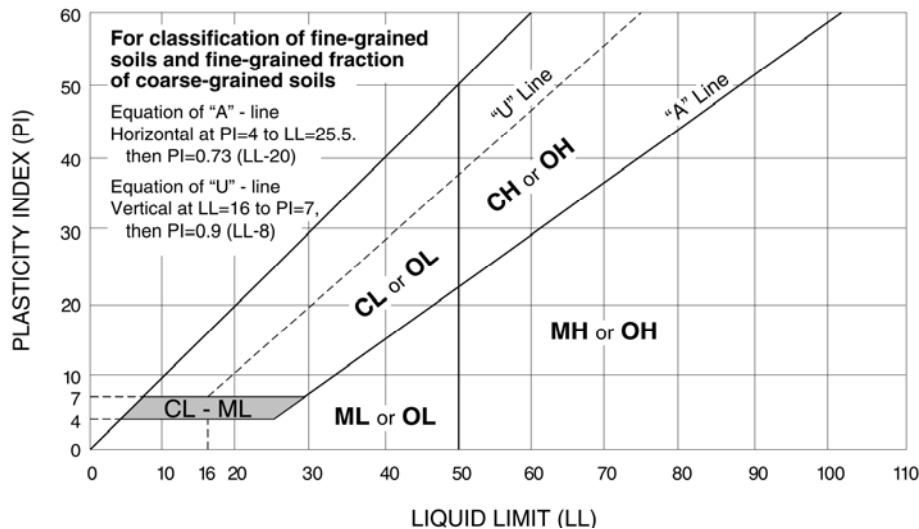
^MIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



Terracon

Exhibit C-3

**2016 SPLOST NORTH MAINLAND PH III FORCEMAIN IMPROVEMENTS
BRUNSWICK, GLYNN COUNTY, GEORGIA**

ATTACHMENT B

US Army Corps of Engineers Wetland Delineation Evaluation Letter (June 1, 2018): Regulatory Branch #SAS-2017-00989, Wetlands Exhibit – Sanitary Sewer Force Main Improvements Harry Driggers Boulevard (SPLOST III) 1356th GMD, Glynn County, Georgia.



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SAVANNAH DISTRICT
100 W OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401-3604

June 1, 2018

Regulatory Branch
SAS-2017-00989

Mr. Jimmy Junkin
Brunswick Glynn Joint Water Sewer Commission
1703 Gloucester Street
Brunswick, Georgia 31520

Dear Mr. Junkin:

I refer to a letter dated December 4, 2017, submitted on your behalf by Mr. Michael DeMell of Environmental Services, Inc., requesting a delineation of aquatic resources within a 44 acre project area that encompasses a 2.7 mile corridor adjacent to Harry Driggers Boulevard in Glynn County, Georgia (Latitude 31.2629, Longitude - 81.4914). This project has been assigned number SAS-2017-00989 and it is important that you refer to this number in all communication concerning this matter.

The enclosed survey entitled "Wetlands Exhibit: Sanitary Sewer Force Main Improvements Harry Driggers Boulevard (SPLOST III) 1356th GMD, Glynn County, Georgia", dated October 16, 2017, and signed by Registered Land Surveyor Thomas W. Hurley, identifies the delineation limits of all aquatic resources within the review area. The wetlands were delineated in accordance with criteria contained in the 1987 "Corps of Engineers Wetland Delineation Manual," as amended by the most recent regional supplements to the manual. This delineation will remain valid for a period of 5-years unless new information warrants revision prior to that date.

If you intend to sell property that is part of a project that requires Department of the Army Authorization, it may be subject to the Interstate Land Sales Full Disclosure Act. The Property Report required by Housing and Urban Development Regulation must state whether, or not a permit for the development has been applied for, issued or denied by the U.S. Army Corps of Engineers (Part 320.3(h) of Title 33 of the Code of Federal Regulations).

This communication does not convey any property rights, either in real estate or material, or any exclusive privileges. It does not authorize any injury to property, invasion of rights, or any infringement of federal, state or local laws, or regulations. It does not obviate your requirement to obtain state or local assent required by law for the development of this property. If the information you have submitted, and on which the U.S. Army Corps of Engineers has based its determination is later found to be in error, this decision may be revoked.

A copy of this letter is being provided to the following party: Mr. Michael DeMell, Environmental Services, Inc., 101 B Estus Drive, Savannah, Georgia 31404.

Thank you in advance for completing our on-line Customer Survey Form located at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey. We value your comments and appreciate your taking the time to complete a survey each time you have interaction with our office.

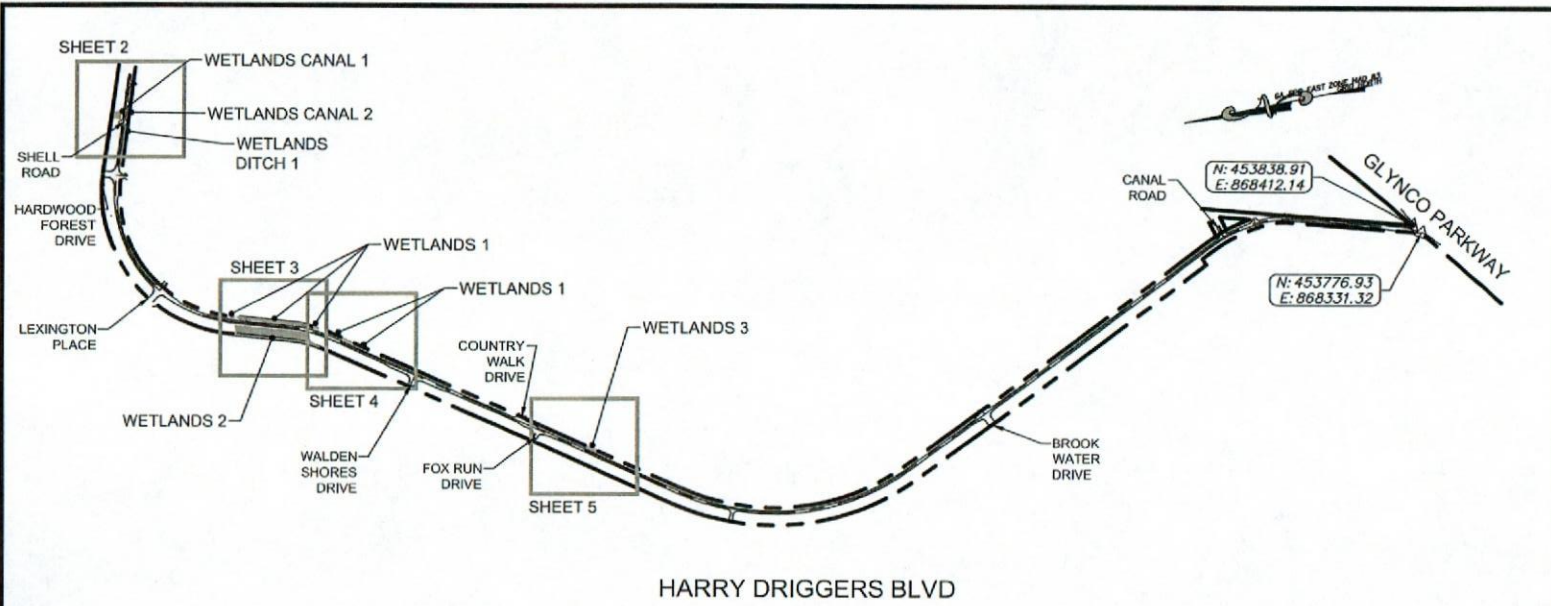
If you have any questions, please call me at (912) 652-5690.

Sincerely,



Skye H. Stockel
Regulatory Specialist, Coastal Section

Enclosures



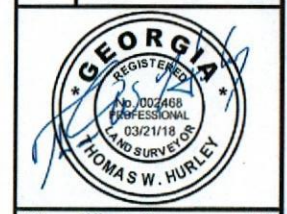
EMC ENGINEERING SERVICES, INC.
 504 Gloucester Street
 Brunswick, GA 31520
 Ph: (912) 265-7636
 Fax: (912) 233-4580
 CIVIL: brunswick@emc-eng.com
 SURVEY: www.emc-eng.com
 ENVIRONMENTAL

ALBANY, ATLANTA, AUGUSTA, BRUNSWICK, COLUMBUS, STATESBORO, AND VALDOSTA

WETLANDS EXHIBIT

SANITARY SEWER FORCE MAIN IMPROVEMENTS
 HARRY DRIGGERS BOULEVARD (SPLOST III)
 1356TH GMD, GLYNN COUNTY, GEORGIA

Prepared for:
 BRUNSWICK-GLYNN JOINT WATER & SEWER COMMISSION



1000' 500' 0' 1000'
 GRAPHIC SCALE: 1" = 1000'

PROJECT NO.: 17-5040
 DRAWN BY: REB
 DESIGNED BY: REB
 SURVEYED BY: JH
 SURVEY DATE: 10-16-2017
 CHECKED BY: TWH
 SCALE: 1" = 1000'
 DATE: 03-14-18

SHEET
1
 OF 5

NOTES:

1. ALL WETLANDS ARE UNDER THE JURISDICTION OF THE U.S. ARMY CORPS OF ENGINEERS. PROPERTY OWNERS ARE SUBJECT TO PENALTY BY LAW FOR DISTURBANCE OF THESE PROTECTED AREAS WITHOUT PROPER PERMIT APPLICATION AND APPROVAL.
2. HORIZONTAL DATUM IS GEORGIA STATE PLANE COORDINATE SYSTEM, EAST ZONE (NAD 83).
3. WETLANDS FIELD DELINEATION WAS VERIFIED BY THE U.S. ARMY CORPS OF ENGINEERS ON JANUARY 16, 2018.
4. LINES ARE LABELED IN CONSECUTIVE ORDER. SEE EACH SHEET FOR CORRESPONDING TABLES.
5. THE LIMITS OF INVESTIGATION IS WITHIN THE HARRY DRIGGERS BLVD. RIGHT OF WAY BETWEEN GLYNCO PARKWAY AND JUST EAST OF SHELL ROAD. THE AREA WITHIN THE LIMITS OF INVESTIGATION IS APPROXIMATELY 44.36 ACRES.

SURVEYOR'S CERTIFICATION:

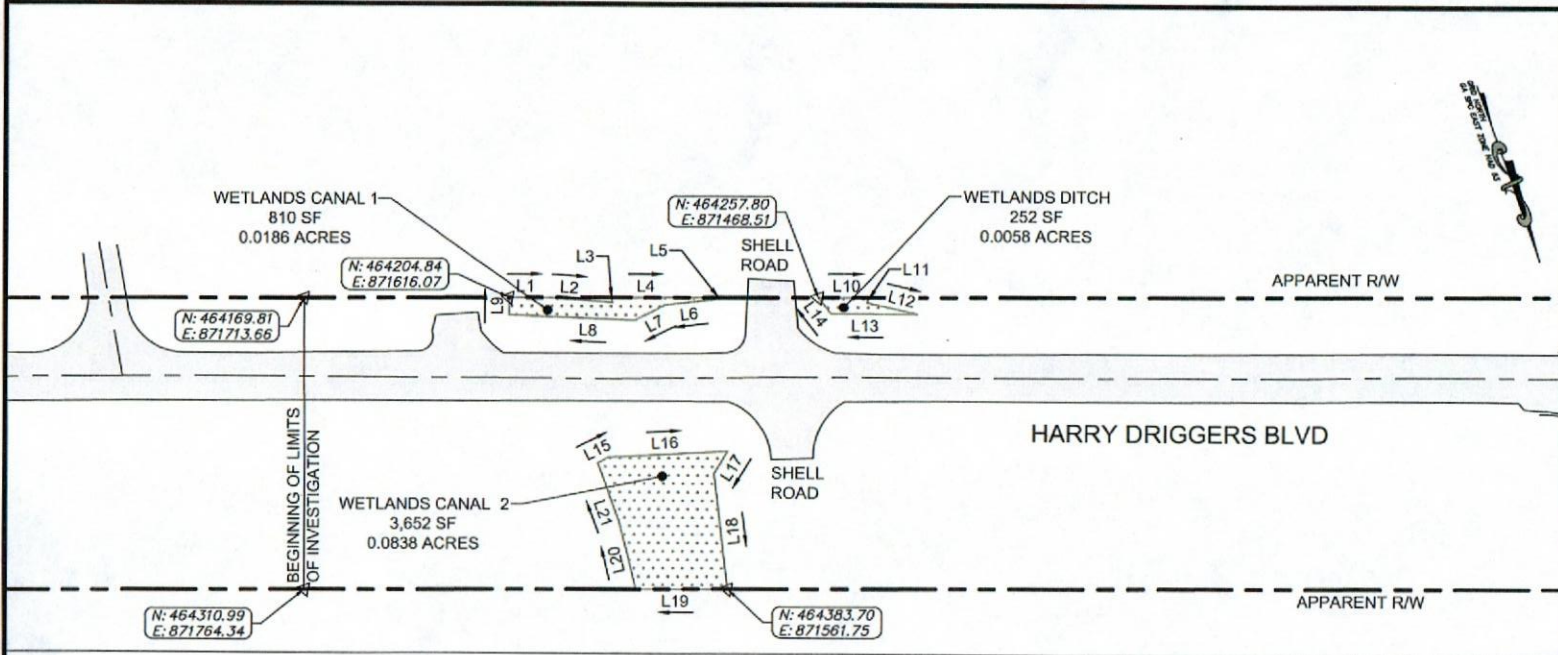
TO THE BEST OF MY KNOWLEDGE AND BELIEF, THIS EXHIBIT WAS PREPARED IN CONFORMITY WITH THE TECHNICAL STANDARDS FOR SPECIAL USE SURVEYS IN GEORGIA AS SET FORTH IN CHAPTER 180-07-.07 OF THE RULES AND REGULATIONS OF GEORGIA STATE BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS AND LAND SURVEYORS. THIS SURVEY DOES NOT CONSTITUTE A BOUNDARY SURVEY AND IS NOT TO BE RECORDED OR USED TO CONVEY TITLE IN PROPERTY AUTHORITY O.C.G.A. SECS. 15-6-67, 43-15-4, 43-15-6, 43-15-19, 43-15-22. THIS CERTIFICATION EXTENDS ONLY TO THE WETLANDS ASPECTS SHOWN HEREON.

Thomas W. Hurley 3-14-2018
 THOMAS W. HURLEY, R.L.S.
 GA LICENSE No. 2468

WETLANDS CANAL 1:	810 SF
WETLANDS CANAL 2:	252 SF
WETLANDS DITCH:	3,652 SF
WETLANDS 1:	197 SF
	5,457 SF
	59 SF
	1,328 SF
WETLANDS 2:	46,830 SF
WETLANDS 3:	1,628 SF
TOTAL	60,213 SF

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WETLANDS CANAL 1
WETLANDS LINE TABLE

LINE#	DIRECTION	LENGTH
L1	N70° 15' 20"W	20.30
L2	N65° 56' 12"W	32.08
L3	S07° 43' 43"W	2.47
L4	N70° 15' 20"W	55.21
L5	N06° 38' 26"E	0.71
L6	S76° 44' 47"E	27.59
L7	N83° 18' 32"E	17.87
L8	S67° 45' 04"E	63.81
L9	S19° 49' 20"W	8.98

WETLANDS DITCH
WETLANDS LINE TABLE

LINE#	DIRECTION	LENGTH
L10	N70° 15' 20"W	25.08
L11	N36° 16' 36"E	2.87
L12	N57° 04' 20"W	26.27
L13	S69° 42' 50"E	43.62
L14	S17° 02' 25"E	10.40

WETLANDS CANAL 2
WETLANDS LINE TABLE

LINE#	DIRECTION	LENGTH
L15	S82° 07' 09"W	6.10
L16	N73° 03' 49"W	61.28
L17	N51° 30' 15"E	13.26
L18	N13° 01' 17"E	59.89
L19	S70° 15' 20"E	47.08
L20	S05° 58' 32"W	36.31
L21	S00° 29' 17"E	31.60

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 504 Gloucester Street
 Brunswick, GA 31520
 Ph: (912) 265-7636
 Fax: (912) 233-4580
 brunswick@emc-eng.com
 www.emc-eng.com
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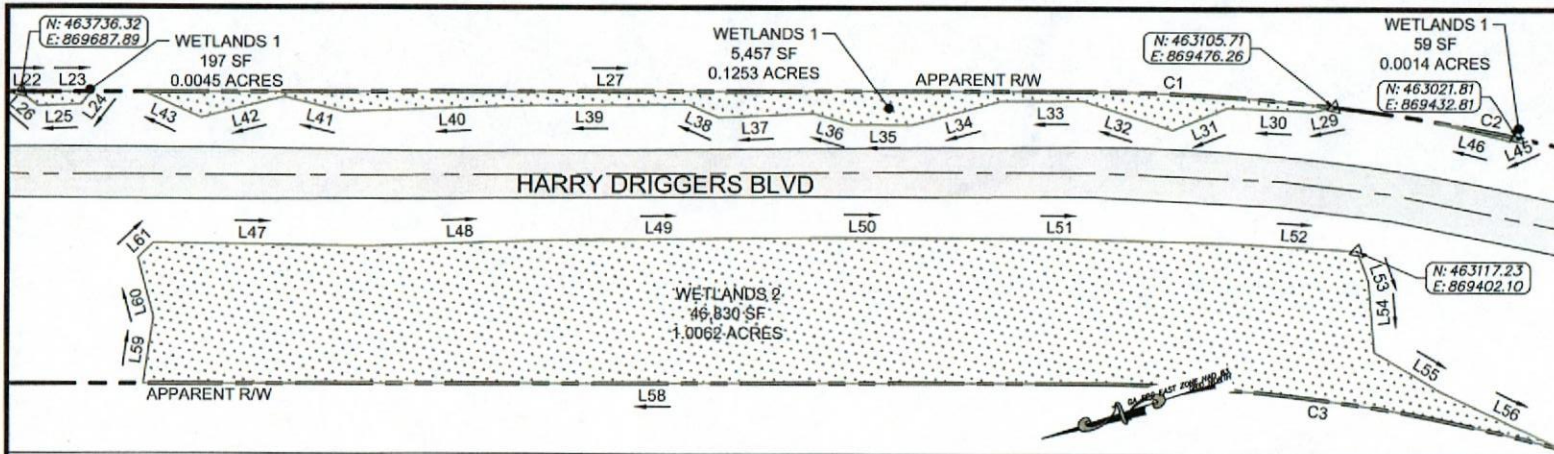
WETLANDS EXHIBIT 2
 SANITARY SEWER FORCE MAIN IMPROVEMENTS
 HARRY DRIGGERS BOULEVARD (SPLOST III)
 1356TH GMD, GLYNN COUNTY, GEORGIA
 Prepared for:
 BRUNSWICK-GLYNN JOINT WATER & SEWER COMMISSION

REGISTERED PROFESSIONAL LAND SURVEYOR
 NO. 007655
 03/21/18
 THOMAS W. HURLEY

60' 30' 0' 60'
 GRAPHIC SCALE: 1" = 60'

PROJECT NO.: 17-5040
 DRAWN BY: REB
 DESIGNED BY: REB
 SURVEYED BY: JH
 SURVEY DATE: 10-16-2017
 CHECKED BY: TWH
 SCALE: 1" = 60'
 DATE: 03-14-18

SHEET
2
 OF 5



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 EMC ENGINEERING SERVICES, INC.
 504 Gloucester Street
 Brunswick, GA 31520
 Ph: (912) 235-7938
 Fax: (912) 233-4580
 brunswick@emc-eng.com
 www.emc-eng.com

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WETLANDS EXHIBIT 3
 SANITARY SEWER FORCE MAIN IMPROVEMENTS
 HARRY DRIGGERS BOULEVARD (SPLOST III)
 1356TH GMD, GLYNN COUNTY, GEORGIA
 Prepared for:
 BRUNSWICK-GLYNN JOINT WATER & SEWER COMMISSION



60' 30' 0' 60'
 GRAPHIC SCALE: 1" = 60'

PROJECT NO.: 17-5040
 DRAWN BY: REB
 DESIGNED BY: REB
 SURVEYED BY: JH
 SURVEY DATE: 10-16-2017
 CHECKED BY: TWH
 SCALE: 1" = 60'
 DATE: 03-14-18

SHEET
3
 OF 5

WETLANDS 1
 WETLANDS LINE TABLE

LINE#	DIRECTION	LENGTH
L22	S18° 03' 52"W	7.61
L23	S17° 51' 35"W	27.46
L24	N35° 48' 43"W	8.08
L25	N16° 00' 15"E	22.27
L26	N59° 59' 04"E	10.82

WETLANDS 2
 WETLANDS LINE TABLE

LINE#	DIRECTION	LENGTH
L27	S17° 51' 35"W	472.10
L29	N06° 11' 39"E	11.01
L30	N20° 15' 51"E	43.42
L31	N04° 24' 09"W	30.02
L32	N36° 11' 06"E	47.85
L33	N17° 25' 35"E	42.54
L34	N02° 18' 15"E	45.51
L35	N18° 18' 33"E	31.70
L36	N34° 38' 00"E	19.75
L37	N15° 22' 52"E	48.22
L38	N41° 44' 18"E	16.57
L39	N17° 26' 11"E	93.39
L40	N15° 43' 52"E	80.67
L41	N32° 15' 01"E	31.49
L42	N03° 23' 47"E	42.88
L43	N42° 10' 57"E	32.20

WETLANDS 1
 WETLANDS LINE TABLE

LINE#	DIRECTION	LENGTH
L47	S18° 45' 34"W	108.24
L48	S16° 05' 41"W	96.84
L49	S17° 25' 30"W	137.27
L50	S18° 03' 30"W	118.41
L51	S18° 03' 30"W	118.41
L52	S21° 24' 40"W	63.75
L53	S87° 47' 46"W	16.57
L54	N77° 02' 30"W	36.48
L55	S48° 40' 14"W	38.55
L56	S43° 16' 19"W	70.08
L58	N17° 51' 35"E	472.64
L59	S63° 03' 55"E	34.65
L60	S87° 10' 00"E	31.40
L61	S25° 08' 56"E	11.25

WETLANDS 1
 WETLANDS LINE TABLE

LINE#	DIRECTION	LENGTH
L45	N06° 28' 26"W	4.12
L46	N32° 04' 37"E	40.05

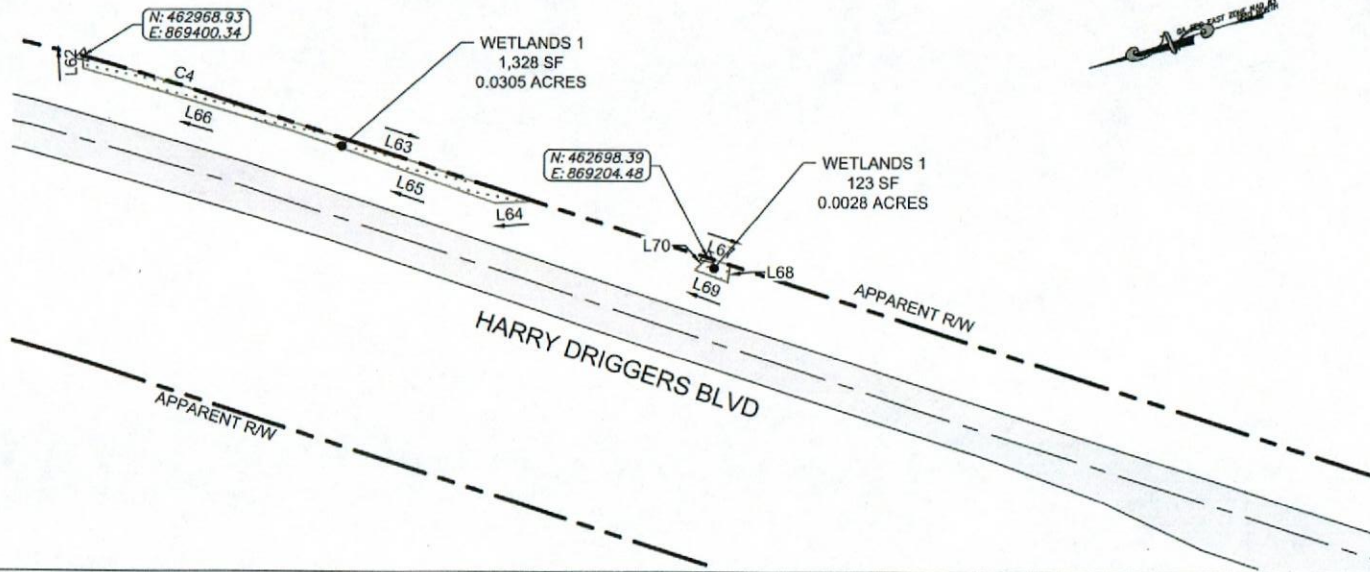
CURVE TABLE

CURVE #	BEARING	CHORD	RADIUS	ARC
C1	S21° 21' 30"W	131.20	1075.00	131.28
C2	S28° 44' 16"W	43.40	1075.00	43.40
C3	N25° 38' 03"E	250.26	925.00	251.03

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Land Surveying Firm No. 000051

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WETLANDS 1

WETLANDS LINE TABLE

LINE#	DIRECTION	LENGTH
L62	S74° 53' 25"E	6.37
L63	S36° 08' 50"W	185.51
L64	N14° 33' 57"E	19.71
L65	N37° 42' 12"E	108.48
L66	N34° 34' 48"E	111.73

CURVE TABLE

CURVE #	BEARING	CHORD	RADIUS	ARC
C4	S34° 40' 28"W	55.24	1075.00	55.25

WETLANDS 1

WETLANDS LINE TABLE

LINE#	DIRECTION	LENGTH
L67	S36° 08' 50"W	11.98
L68	S63° 25' 11"E	8.84
L69	N38° 42' 24"E	17.53
L70	N26° 43' 55"W	8.91

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WETLANDS EXHIBIT 4

SANITARY SEWER FORCE MAIN IMPROVEMENTS
 HARRY DRIGGERS BOULEVARD (SPLOST III)
 1356TH GMD, GLYNN COUNTY, GEORGIA

Prepared for:
 BRUNSWICK-GLYNN JOINT WATER & SEWER COMMISSION



60' 30' 0' 60'
 GRAPHIC SCALE: 1" = 60'

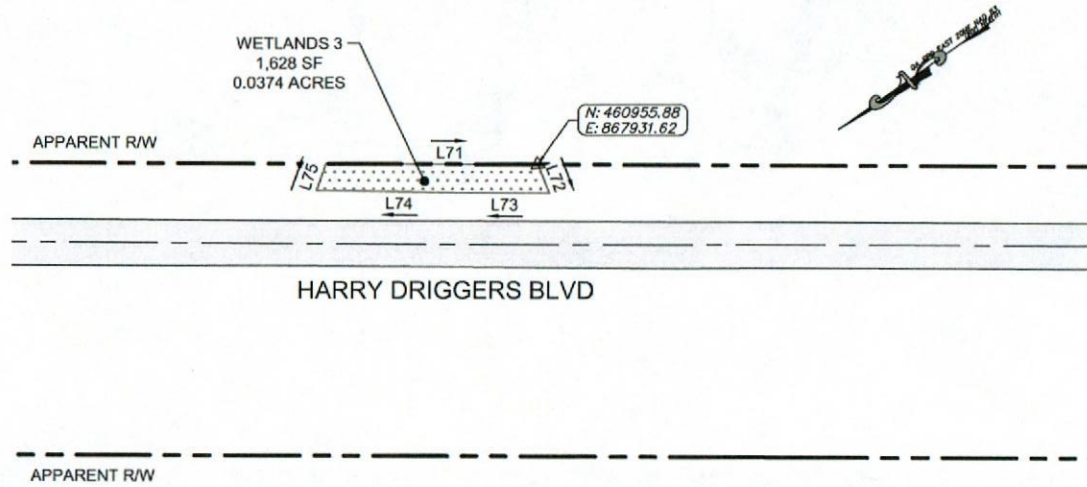
PROJECT NO.: 17-5040
 DRAWN BY: REB
 DESIGNED BY: REB
 SURVEYED BY: JH
 SURVEY DATE: 10-18-2017
 CHECKED BY: TWH
 SCALE: 1" = 60'
 DATE: 03-14-18

SHEET

4

OF 5

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WETLANDS 3

WETLANDS LINE TABLE		
LINE#	DIRECTION	LENGTH
L71	S36° 08' 49"W	108.06
L72	N75° 18' 22"W	15.87
L73	N36° 20' 39"E	48.85
L74	N36° 52' 20"E	69.50
L75	S35° 47' 58"E	14.43

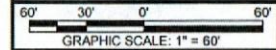
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WETLANDS EXHIBIT 5

SANITARY SEWER FORCE MAIN IMPROVEMENTS
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 BRUNSWICK-GLYNN JOINT WATER & SEWER COMMISSION



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SHEET
5
 OF 5

**2016 SPLOST NORTH MAINLAND PH III FORCEMAIN IMPROVEMENTS
BRUNSWICK, GLYNN COUNTY, GEORGIA**

ATTACHMENT C

**Georgia Environmental Protection Division NPDES Permit – Wastewater PS and
Forcemain EPD#2019-200 (Not selected for review by EPD)**



ENVIRONMENTAL PROTECTION DIVISION

Richard E. Dunn, Director

Watershed Protection Branch
2 Martin Luther King, Jr. Drive
Suite 1152, East Tower
Atlanta, Georgia 30334
404-463-1511

Mr. Todd Kline, Director of Engineering
Brunswick-Glynn Joint Water & Sewer Commission
1703 Gloucester Street
Brunswick, Georgia 31520

DEC 16 2019

RE: Plans and Specifications
North Mainland Phase II & III Sewer Extension
Academy Creek Water Pollution Control Plant
NPDES Permit No. GA0025313
EPD #2019-200
Glynn County

Dear Mr. Kline:

The Georgia Environmental Protection Division (EPD) has received the plans and specifications for the above-referenced project, which consists of installing approximately 20 LF of 30" PVC gravity sewer line, 6,260 linear feet (LF) of 18" PVC force main, 13,960 LF of 20" force main, 10 LF of 8" force main, and upgrading existing pump stations with capacities of 4,500 GPM, 5,000 GPM and 2,500 GPM. This project has not been selected for review.

If you have any questions, please feel free to contact me at (404) 656-3229 or chetan.sulane@dnr.ga.gov.

Sincerely,

A handwritten signature in blue ink that reads "Chetan".

Chetan Sulane
Municipal Permitting Unit
Wastewater Regulatory Program

Cc: Angela Bryan, Four Waters Engineering, Inc. (abryan@4WEng.com)
Fred Sororian, Thomas & Hutton (sororian.f@thomasandhutton.com)

**2016 SPLOST NORTH MAINLAND PH III FORCEMAIN IMPROVEMENTS
BRUNSWICK, GLYNN COUNTY, GEORGIA**

ATTACHMENT D

**Georgia Environmental Protection Division, GAR248C3C-V1, Notice of Intent to
Discharge Storm Water Associated with Construction Activity
(will be transferred to Contractor)**

NOTICE OF INTENT

VERSION September 24, 2018

State of Georgia
Department of Natural Resources
Environmental Protection Division

GAR248C3C-V1

Permittee NOI Number

12/4/2019

Application Submittal Date

**For Coverage Under the 2018 Re-Issuance of the NPDES General Permits
To Discharge Storm Water Associated With Construction Activity**

THESE PERMITS EXPIRE JULY 31, 2023

Facility Information

Facility Name: 2016 SPLOST North Mainland PH-II & III Forcemain
and Pump Station Improvements

Mailing Address 1: 1703 Gloucester St Mailing Address 2: _____

County: Glynn City: Brunswick State: GA Zip Code: 31520

Facility/Property Address 1: Harry Driggers Blvd and Canal Road; Old Jesup Rd
and B&W Grade Rd; 1253 B and W Grade Rd #17000,
Brunswick, GA 3120; 3850 Ross Rd #17000,
Brunswick, GA 31520 Address 2: _____

County: Glynn City: Brunswick State: GA Zip Code: 31525

Latitude: 31.245706 Longitude: -81.487755

PRIMARY PERMITTEE

NOTICE OF INTENT:

Initial Notification Re-Issuance Notification Change of Information

Change of Owner/Operator: Formerly Known As: _____

I. SITE/OWNER/OPERATOR INFORMATION

Facility Ownership Type: Municipal or Water District

B. GPS Locations of the Beginning and End of the Infrastructure Project:

Beginning Latitude: 31.2745 Beginning Longitude: -81.4767

End Latitude: 31.2187 End Longitude: -81.5076

Owner's Name: BGJWSC - Harry Patel Phone: 9122617100

Email Address: hpatel@bgjwsc.org Address: 1703 Gloucester Street

City: Brunswick State: GA Zip Code: 31520

Duly Authorized Representative(s): _____ Phone: _____

Email Address: _____

Operator's Name: BGJWSC - Harry Patel Phone: 9122617100

Email Address: hpatel@bgjwsc.org Address: 1703 Gloucester Street

City: Brunswick State: GA Zip Code: 31520

Facility/Construction Site Contact: Andrew Burroughs Phone: 9122617108

Email Address: aburroughs@bgjwsc.org

II. CONSTRUCTION SITE ACTIVITY INFORMATION AND FEE CALCULATONS

Start Date: 02/01/2020 Completion Date: 12/31/2020

Regulated by a certified Local Issuing Authority (LIA): Yes No

Name of Local Issuing Authority: Glynn County

Is this an Agricultural Building? (ex.chicken house): Yes No

Is this a public water system reservoir?: Yes No

Is this project regulated by the Public Service Commission (PSC)? (ex. Electricity, natural gas, telecom, pipeline): Yes No

Is this project under the direct supervision of the Natural Resource Conservation Service (NRCS)?: Yes No

Is this a construction and/or maintenance project undertaken and/or financed in whole or in part by the Department of Transportation, The Georgia Highway Authority, or the State Road and Tollway Authority?: Yes No

Is this a road construction and/or road maintenance project (including sidewalks, bike routes, multi-use paths or trails)?: Yes No

Acres Disturbed (to the nearest tenth (1/10th) acre) 4.3 X \$40/acre = 172

Regulated by a certified Local Issuing Authority

TOTAL FEE SUBMITTED = 172

Does the Erosion, Sedimentation and Pollution Control Plan (Plan) provide for disturbing more than 50 acres at any one time for each individual permittee (i.e., primary, secondary or tertiary permittees), or more than 50 contiguous acres total at any one time ?

- YES - _____ Date of EPD Written Authorization
- NO
- N/A - if construction activities are covered under the General NPDES Permit No. GAR100002 for Infrastructure construction projects

Construction Activity Type:

- Commercial Industrial Municipal/Institutional Mixed Use
- Water Quality/Aquatic Habitat Restoration Linear Utility Residential
- Agricultural Buildings Other: _____

III. RECEIVING WATER INFORMATION

A. Name of Initial Receiving Water(s): Yellow Bluff Creek / Brunswick Altamaha Canal

- Trout Stream Water Supporting Warm Water Fisheries

B. Name of MS4 Receiving Waters: Yellow Bluff Creek / Brunswick Altamaha Canal

- N/A Trout Stream Water Supporting Warm Water Fisheries

Name of MS4 Owner/Operator: Glynn County

C. Sampling of Receiving Stream(s):

- Trout Stream (Δ 10 NTU) Water Supporting Warm Water Fisheries (Δ 25 NTU)

D. Sampling of Outfall(s):

- N/A
- Trout Stream
- Water Supporting Warm Water Fisheries

A summary chart (if applicable) delineating the following information for each outfall must be attached:

Number of Sampling Outfalls: _____ Construction Site Size (acres): _____

Appendix B NTU Value: _____ Surface Water Drainage Area (square miles): _____

E. Does the facility/construction site discharge storm water into an Impaired Stream Segment, or within one (1) linear mile upstream of and within the same watershed as, any portion of an Impaired Stream Segment identified as "not supporting" its designated use(s), as shown on Georgia's most current "305(b)/303(d) List Documents (Final)" listed for the criteria violated, "Bio F" (Impaired Fish Community) and/or "Bio M" (Impaired Macroinvertebrate Community), within Category 4a, 4b or 5, and the potential cause is either "NP" (nonpoint source) or "UR" (urban runoff) ?

- No Yes, Name of Impaired Stream Segment(s): _____

F. Does the facility/construction site discharge storm water into an Impaired Stream Segment where a Total Maximum Daily Load (TMDL) Implementation Plan for "sediment" was finalized at least six (6) months prior to the submittal of the Initial NOI ?

- No Yes, Name of Impaired Stream Segment(s): _____

IV. CERTIFICATIONS:

- I certify that to the best of my knowledge and belief, that the Erosion, Sedimentation and Pollution Control Plan (Plan) was prepared by a design professional, as defined by this permit, that has completed the appropriate certification course approved by the Georgia Soil and Water Conservation Commission in accordance with the provisions of O.C.G.A. 12-7-19 and that I will adhere to the Plan and comply with all applicable requirements of this permit.

- I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that certified personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

**2016 SPLOST NORTH MAINLAND PH III FORCEMAIN IMPROVEMENTS
BRUNSWICK, GLYNN COUNTY, GEORGIA**

ATTACHMENT E

**CSX Utility Encroachment Permit, CSX898886 / 1033416, Draft Agreement -
Pending**

FACILITY ENCROACHMENT AGREEMENT

THIS AGREEMENT, Made and effective as of December 20, 2019, by and between CSX TRANSPORTATION, INC., a Virginia corporation, whose mailing address is 500 Water Street, Jacksonville, Florida 32202, hereinafter called "Licensor," and BRUNSWICK GLYNN JOINT WATER AND SEWER COMMISSION, a municipal corporation, political subdivision or state agency, under the laws of the State of Georgia, whose mailing address is 1703 Gloucester Street, Brunswick, Georgia 31520, hereinafter called "Licensee," WITNESSETH:

WHEREAS, Licensee desires to construct (unless previously constructed and designated as existing herein), use and maintain the below described facility(ies), hereinafter called "Facilities," over, under or across property owned or controlled by Licensor, at the below described location(s):

1. One (1) twenty inch (20") diameter sub-grade pipeline crossing, solely for the conveyance of stormwater, located at or near Dock Junction, Glynn County, Georgia, Jacksonville Division, Brunswick Subdivision, Milepost AOB-540.14, Latitude N31:13:09., Longitude W81:30:24.;

hereinafter, called the "Encroachment," as shown on print(s) labeled Exhibit "A," attached hereto and made a part hereof;

NOW, THEREFORE, in consideration of the mutual covenants, conditions, terms and agreements herein contained, the parties hereto agree and covenant as follows:

1. LICENSE:

1.1 Subject to Article 17, Licensor, insofar as it has the legal right, power and authority to do so, and its present title permits, and subject to:

(A) Licensor's present and future right to occupy, possess and use its property within the area of the Encroachment for any and all purposes;

(B) All encumbrances, conditions, covenants, easements, and limitations applicable to Licensor's title to or rights in the subject property; and

(C) Compliance by Licensee and its agent or contractor ("Licensee's Contractor") with the terms and conditions herein contained;

does hereby license and permit Licensee to construct, maintain, repair, renew, operate, use, alter or change the Facilities at the Encroachment above for the term herein stated, and to remove same upon termination.

1.2 The term Facilities, as used herein, shall include only those structures and ancillary facilities devoted exclusively to the transmission usage above within the Encroachment, and as shown on attached Exhibit A.

1.3 No additional structures or other facilities shall be placed, allowed, or maintained by Licensee in, upon or on the Encroachment except upon prior separate written consent of Licensor.

2. ENCROACHMENT FEE; TERM:

2.1 Licensee shall pay Licensor a one-time nonrefundable Encroachment Fee of FIVE THOUSAND ONE HUNDRED AND 00/100 U.S. DOLLARS (\$5,100.00) upon execution of this Agreement. Licensee agrees that the Encroachment Fee applies only to the original Licensee under this Agreement. In the event of a successor (by merger, consolidation, reorganization and/or assignment) or if the original Licensee changes its name, then Licensee shall be subject to payment of Licensor's current administrative and document preparation fees for the cost incurred by Licensor in preparing and maintaining this Agreement on a current basis.

2.2 However, Licensee assumes sole responsibility for, and shall pay directly (or reimburse Licensor), any additional annual taxes and/or periodic assessments levied against Licensor or Licensor's property solely on account of said Facilities or Encroachment.

2.3 This Agreement shall terminate as herein provided, but shall also terminate upon: (a) Licensee's cessation of use of the Facilities or Encroachment for the purpose(s) above; (b) removal of the Facilities; (c) subsequent mutual consent; and/or (d) failure of Licensee to complete installation within five (5) years from the effective date of this Agreement.

2.4 In further consideration for the license or right hereby granted, Licensee hereby agrees that Licensor shall not be charged or assessed, directly or indirectly, with any part of the cost of the installation of said Facilities and appurtenances, and/or maintenance thereof, or for any public works project of which said Facilities is a part.

3. CONSTRUCTION, MAINTENANCE AND REPAIRS:

3.1 Licensee shall construct, maintain, relocate, repair, renew, alter, and/or remove the Facilities, in a prudent, workmanlike manner, using quality materials and complying with any applicable standard(s) or regulation(s) of Licensor (CSXT Specifications), or Licensee's particular industry, National Electrical Safety Code, or any governmental or regulatory body having jurisdiction over the Encroachment.

3.2 Location and construction of Facilities shall be made strictly in accordance with design(s) and specifications furnished to and approved by Licensor and of material(s) and size(s) appropriate for the purpose(s) above recited.

3.3 All of Licensee's work, and exercise of rights hereunder, shall be undertaken at time(s) satisfactory to Licensor, and so as to eliminate or minimize any impact on or interference with the safe use and operation of Licensor's property and appurtenances thereto.

3.4 In the installation, maintenance, repair and/or removal of said Facilities, Licensee shall not use explosives of any type or perform or cause any blasting without the

separate express written consent of Licensor. As a condition to such consent, a representative will be assigned by Licensor to monitor blasting, and Licensee shall reimburse Licensor for the entire cost and/or expense of furnishing said monitor.

3.5 Any repairs or maintenance to the Facilities, whether resulting from acts of Licensee, or natural or weather events, which are necessary to protect or facilitate Licensor's use of its property, shall be made by Licensee promptly, but in no event later than thirty (30) days after Licensee has notice as to the need for such repairs or maintenance.

3.6 Licensor, in order to protect or safeguard its property, rail operations, equipment and/or employees from damage or injury, may request immediate repair or renewal of the Facilities, and if the same is not performed, may make or contract to make such repairs or renewals, at the sole risk, cost and expense of Licensee.

3.7 Neither the failure of Licensor to object to any work done, material used, or method of construction or maintenance of said Encroachment, nor any approval given or supervision exercised by Licensor, shall be construed as an admission of liability or responsibility by Licensor, or as a waiver by Licensor of any of the obligations, liability and/or responsibility of Licensee under this Agreement.

3.8 All work on the Encroachment shall be conducted in accordance with Licensor's safety rules and regulations.

3.9 Licensee hereby agrees to reimburse Licensor any loss, cost or expense (including losses resulting from train delays and/or inability to meet train schedules) arising from any failure of Licensee to make repairs or conduct maintenance as required by Section 3.5 above or from improper or incomplete repairs or maintenance to the Facilities or Encroachment.

3.10 In the event it becomes necessary for the Licensee to deviate from the approved Exhibit, Licensee shall seek prior approval from Licensor, or when applicable, an official field representative of Licensor permitted to approve changes, authorizing the necessary field changes and Licensee shall provide Licensor with complete As-Built Drawings of the completed work. As-Built Drawings shall be submitted to Licensor in either electronic or hard copy form upon the substantial completion of the project and upon Licensor's request.

3.11 In the event of large scale maintenance/construction work to railroad bridges Licensee is required to protect power lines with insulated covers or comparable safety devices at their costs during construction/maintenance for safety of railroad employees.

4. PERMITS, LICENSES:

4.1 Before any work hereunder is performed, or before use of the Encroachment for the contracted purpose, Licensee, at its sole cost and expense, shall obtain all necessary permit(s) (including but not limited to zoning, building, construction, health, safety or environmental matters), letter(s) or certificate(s) of approval. Licensee expressly agrees and warrants that it shall conform and limit its activities to the terms of such permit(s), approval(s)

and authorization(s), and shall comply with all applicable ordinances, rules, regulations, requirements and laws of any governmental authority (State, Federal or Local) having jurisdiction over Licensee's activities, including the location, contact, excavation and protection regulations of the Occupational Safety and Health Act (OSHA) (29 CFR 1926.651(b)), et al., and State "One Call" - "Call Before You Dig" requirements.

4.2 Licensee assumes sole responsibility for failure to obtain such permit(s) or approval(s), for any violations thereof, or for costs or expenses of compliance or remedy.

5. MARKING AND SUPPORT:

5.1 With respect to any subsurface installation or maintenance upon Licensor's property, Licensee, at its sole cost and expense, shall:

- (A) support track(s) and roadbed in a manner satisfactory to Licensor;
- (B) backfill with satisfactory material and thoroughly tamp all trenches to prevent settling of surface of land and roadbed of Licensor; and
- (C) either remove any surplus earth or material from Licensor's property or cause said surplus earth or material to be placed and distributed at location(s) and in such manner Licensor may approve.

5.2 After construction or maintenance of the Facilities, Licensee shall:

- (A) Restore any track(s), roadbed and other disturbed property; and
- (B) Erect, maintain and periodically verify the accuracy of aboveground markers, in a form approved by Licensor, indicating the location, depth and ownership of any underground Facilities or related facilities.

5.3 Licensee shall be solely responsible for any subsidence or failure of lateral or subjacent support in the Encroachment area for a period of three (3) years after completion of installation.

6. TRACK CHANGES:

6.1 In the event that rail operations and/or track maintenance result in changes in grade or alignment of, additions to, or relocation of track(s) or other facilities, or in the event future use of Licensor's rail corridor or property necessitate any change of location, height or depth in the Facilities or Encroachment, Licensee, at its sole cost and expense and within thirty (30) days after notice in writing from Licensor, shall make changes in the Facilities or Encroachment to accommodate such track(s) or operations.

6.2 If Licensee fails to do so, Licensor may make or contract to make such changes at Licensee's cost.

7. FACILITY CHANGES:

7.1 Licensee shall periodically monitor and verify the depth or height of the Facilities or Encroachment in relation to the existing tracks and facilities, and shall relocate the Facilities or change the Encroachment, at Licensee's expense, should such relocation or change be necessary to comply with the minimum clearance requirements of Licensor.

7.2 If Licensee undertakes to revise, renew, relocate or change in any manner whatsoever all or any part of the Facilities (including any change in voltage or gauge of wire or any change in circumference, diameter or radius of pipe or change in materials transmitted in and through said pipe), or is required by any public agency or court order to do so, plans therefor shall be submitted to Licensor for approval before such change. After approval, the terms and conditions of this Agreement shall apply thereto.

8. INTERFERENCE WITH RAIL FACILITIES:

8.1 Although the Facilities/Encroachment herein permitted may not presently interfere with Licensor's railroad or facilities, in the event that the operation, existence or maintenance of said Facilities, in the sole judgment of Licensor, causes: (a) interference (including, but not limited to, physical or interference from an electromagnetic induction, or interference from stray or other currents) with Licensor's power lines, communication, signal or other wires, train control system, or electrical or electronic apparatus; or (b) interference in any manner, with the operation, maintenance or use of the rail corridor, track(s), structures, pole line(s), devices, other property, or any appurtenances thereto; then and in either event, Licensee, upon receipt of written notice from Licensor of any such interference, and at Licensee's sole risk, cost and expense, shall promptly make such changes in its Facilities or installation, as may be required in the reasonable judgment of the Licensor to eliminate all such interference. Upon Licensee's failure to remedy or change, Licensor may do so or contract to do so at Licensee's sole cost.

8.2 Without assuming any duty hereunder to inspect the Facilities, Licensor hereby reserves the right to inspect same and to require Licensee to undertake repairs, maintenance or adjustments to the Facilities, which Licensee hereby agrees to make promptly, at Licensee's sole cost and expense.

9. RISK, LIABILITY, INDEMNITY:

With respect to the relative risk and liabilities of the parties, it is hereby agreed that:

9.1 To the fullest extent permitted by State law (constitutional or statutory, as amended), Licensee hereby agrees to, defend, indemnify, and hold Licensor harmless from and against any and all liability, loss, claim, suit, damage, charge or expense which Licensor may suffer, sustain, incur or in any way be subjected to, on account of death of or injury to any person whomsoever (including officers, agents, employees or invitees of Licensor), and for damage to or loss of or destruction of any property whatsoever, arising out of, resulting from, or in any way connected with the construction, repair, maintenance, replacement, presence, existence,

operations, use or removal of the Facilities or any structure in connection therewith, or restoration of premises of Licensor to good order or condition after removal, EXCEPT when proven to have been caused solely by the willful misconduct or gross negligence of Licensor. HOWEVER, to the fullest extent permitted by State law, during any period of actual construction, repair, maintenance, replacement or removal of the Facilities, wherein agents, equipment or personnel of Licensee are on the railroad rail corridor, Licensee's liability hereunder shall be absolute, irrespective of any joint, sole or contributory fault or negligence of Licensor.

9.2 Licensee's Contractor shall hereby agree to, defend, indemnify, and hold Licensor harmless from and against any and all liability, loss, claim, suit, damage, charge or expense which Licensor may suffer, sustain, incur or in any way be subjected to, on account of death of or injury to any person whomsoever (including officers, agents, employees or invitees of Licensor), and for damage to or loss of or destruction of any property whosoever, arising out of resulting from, or in any way connected with the construction, repair, maintenance, replacement, presence, existence, operations, use or removal of the Facilities or any structure in connection therewith, or restoration of premises of Licensor to good order or condition after removal, EXCEPT when proven to have been caused solely by the willful misconduct or gross negligence of Licensor. HOWEVER, to the fullest extent permitted by State law, during any period of actual construction, repair, maintenance, replacement or removal of the Facilities, wherein agents, equipment or personnel of Licensee are on the railroad rail corridor, Licensee's liability hereunder shall be absolute, irrespective of any joint, sole or contributory fault or negligence of Licensor.

9.3 Use of Licensor's rail corridor involves certain risks of loss or damage as a result of the rail operations. Notwithstanding Section 9.1, Licensee expressly assumes all risk of loss and damage to Licensee's Property or the Facilities in, on, over or under the Encroachment, including loss of or any interference with use or service thereof, regardless of cause, including electrical field creation, fire or derailment resulting from rail operations. For this Section, the term "Licensee's Property" shall include property of third parties situated or placed upon Licensor's rail corridor by Licensee or by such third parties at request of or for benefit of Licensee.

9.4 To the fullest extent permitted by State law, as above, Licensee assumes all responsibility for, and agrees to defend, indemnify and hold Licensor harmless from: (a) all claims, costs and expenses, including reasonable attorneys' fees, as a consequence of any sudden or nonsudden pollution of air, water, land and/or ground water on or off the Encroachment area, arising from or in connection with the use of this Encroachment or resulting from leaking, bursting, spilling, or any escape of the material transmitted in or through the Facilities; (b) any claim or liability arising under federal or state law dealing with either such sudden or nonsudden pollution of air, water, land and/or ground water arising therefrom or the remedy thereof; and (c) any subsidence or failure of lateral or subjacent support of the tracks arising from such Facilities leakage.

9.5 Notwithstanding Section 9.1, Licensee also expressly assumes all risk of loss which in any way may result from Licensee's failure to maintain either required clearances for

any overhead Facilities or the required depth and encasement for any underground Facilities, whether or not such loss(es) result(s) in whole or part from Licensor's contributory negligence or joint fault.

9.6 Obligations of Licensee hereunder to release, indemnify and hold Licensor harmless shall also extend to companies and other legal entities that control, are controlled by, subsidiaries of, or are affiliated with Licensor, as well as any railroad that operates over the rail corridor on which the Encroachment is located, and the officers, employees and agents of each.

9.7 If a claim is made or action is brought against Licensor, and/or its operating lessee, for which Licensee may be responsible hereunder, in whole or in part, Licensee shall be notified to assume the handling or defense of such claim or action; but Licensor may participate in such handling or defense.

9.8 Notwithstanding anything contained in this Agreement, the limitation of liability contained in the state statutes, as amended from time to time, shall not limit Licensor's ability to collect under the insurance policies required to be maintained under this Agreement.

10. INSURANCE:

10.1 Prior to commencement of surveys, installation or occupation of premises pursuant to this Agreement, Licensee shall procure and shall maintain during the continuance of this Agreement, at its sole cost and expense, a policy of

- (i) Statutory Worker's Compensation and Employers Liability Insurance with available limits of not less than ONE MILLION AND 00/100 U.S. DOLLARS (\$1,000,000.00).
- (ii) Commercial General Liability coverage (inclusive of contractual liability) with available limits of not less than FIVE MILLION AND 00/100 U.S. DOLLARS (\$5,000,000.00) in combined single limits for bodily injury and property damage and covering the contractual liabilities assumed under this Agreement and naming Licensor, and/or its designee, as additional insured. The evidence of insurance coverage shall be endorsed to provide for thirty (30) days' notice to Licensor, or its designee, prior to cancellation or modification of any policy. Mail CGL certificate, along with agreement, to CSX Transportation, Inc., Speed Code J180, 500 Water Street, Jacksonville, FL 32202. On each successive year, send certificate to RenewalCOI@csx.com.
- (iii) Business automobile liability insurance with available limits of not less than ONE MILLION AND 00/100 U.S. DOLLARS (\$1,000,000.00) combined single limit for bodily injury and/or property damage per occurrence naming Licensor, and/or its designee, as additional insured.

- (iv) The insurance policies must contain a waiver of subrogation against CSXT and its Affiliates, except where prohibited by law. All insurance companies must be A. M. Best rated A- and Class VII or better.
- (v) Such other insurance as Licensor may reasonably require.
- (vi) Licensee shall require its contractors to meet minimum insurance requirements above when performing work in relation to this agreement. Licensee will procure and review contractor's insurance certificates to confirm requirements are met. Licensor may request a copy of the insurance certificate.

10.2 If Licensee's Contractor's existing CGL policy(ies) do(es) not automatically cover Licensee's contractual liability during periods of survey, installation, maintenance and continued occupation, a specific endorsement adding such coverage shall be purchased by Licensee's Contractor. If said CGL policy is written on a "claims made" basis instead of a "per occurrence" basis, Licensee shall arrange for adequate time for reporting losses. Failure to do so shall be at Licensee's sole risk.

10.3 Licensor, or its designee, may at any time request evidence of insurance purchased by Licensee to comply with this Agreement. Failure of Licensee to comply with Licensor's request shall be considered a default by Licensee.

10.4 To the extent permitted by law and without waiver of the sovereign immunity of Licensee, securing such insurance shall not limit Licensee's liability under this Agreement, but shall be security therefor.

10.5 (A) In the event Licensee finds it necessary to perform construction or demolition operations within fifty feet (50') of any operated railroad track(s) or affecting any railroad bridge, trestle, tunnel, track(s), roadbed, overpass or underpass, Licensee shall: (a) notify Licensor; and (b) require Licensee's Contractor(s) performing such operations to procure and maintain during the period of construction or demolition operations, at no cost to Licensor,

i) Railroad Protective Liability (RPL) Insurance, naming Licensor, and/or its designee, as Named Insured, written on the current ISO/RIMA Form (ISO Form No. CG 00 35 04 13) with limits of FIVE MILLION AND 00/100 U.S. DOLLARS (\$5,000,000.00) per occurrence for bodily injury and property damage, with at least TEN MILLION AND 00/100 U.S. DOLLARS (\$10,000,000.00) aggregate limit per annual policy period. The original of such RPL policy shall be sent to and approved by Licensor prior to commencement of such construction or demolition. Licensor reserves the right to demand higher limits.

OR

ii) The CGL policy shall include endorsement ISO CG 24 17 and the Auto Liability Policy shall include endorsement ISO CA 20 70 evidencing that coverage is provided for work within 50 feet of a railroad. If such endorsements are not included, RPL insurance must be provided.

(B) At Licensor's option, in lieu of purchasing RPL insurance or the 50 foot endorsements from an insurance company (but not CGL insurance), Licensee may pay Licensor, at Licensor's current rate at time of request, the cost of adding this Encroachment, or additional construction and/or demolition activities, to Licensor's Railroad Protective Liability (RPL) Policy for the period of actual construction. This coverage is offered at Licensor's discretion and may not be available under all circumstances.

10.6 Notwithstanding the provisions of Sections 10.1 and 10.2, Licensee, pursuant to State Statute(s), may self-insure or self-assume, in any amount(s), any contracted liability arising under this Agreement, under a funded program of self-insurance, which fund will respond to liability of Licensee imposed by and in accordance with the procedures established by law.

11. GRADE CROSSINGS; PROTECTION SERVICES:

11.1 Nothing herein contained shall be construed to permit Licensee or Licensee's contractor to move any vehicles or equipment over the track(s), except at public road crossing(s), without separate prior written approval of Licensor.

11.2 If Licensor deems it advisable, during any construction, maintenance, repair, renewal, alteration, change or removal of said Facilities, to place watchmen, flagmen, or field construction managers for protection of operations of Licensor or others on Licensor's rail corridor at the Encroachment, and to keep persons, equipment or materials away from the track(s), Licensor shall have the right to do so at the expense of Licensee, but Licensor shall not be liable for failure to do so.

12. LICENSOR'S COSTS:

12.1 Any additional or alternative costs or expenses incurred by Licensor to accommodate Licensee's continued use of Licensor's property as a result of track changes or wire changes shall also be paid by Licensee.

12.2 Licensor's expense for wages ("force account" charges) and materials for any work performed at the expense of Licensee pursuant hereto shall be paid by Licensee within thirty (30) days after receipt of Licensor's bill therefor. Licensor may, at its discretion, request an advance deposit for estimated Licensor costs and expenses.

12.3 Such expense shall include, but not be limited to, cost of railroad labor and supervision under "force account" rules, plus current applicable overhead percentages, the actual cost of materials, and insurance, freight and handling charges on all material used. Equipment rentals shall be in accordance with Licensor's applicable fixed rate. Licensor may, at its discretion, require advance deposits for estimated costs of such expenses and costs.

13. DEFAULT, BREACH, WAIVER:

13.1 The proper and complete performance of each covenant of this Agreement shall be deemed of the essence thereof, and in the event Licensee fails or refuses to fully and

completely perform any of said covenants or remedy any breach within thirty (30) days after receiving written notice from Licensor to do so (or within forty-eight (48) hours in the event of notice of a railroad emergency), Licensor shall have the option of immediately revoking this Agreement and the privileges and powers hereby conferred, regardless of encroachment fee(s) having been paid in advance for any annual or other period. Upon such revocation, Licensee shall make removal in accordance with Article 14.

13.2 No waiver by Licensor of its rights as to any breach of covenant or condition herein contained shall be construed as a permanent waiver of such covenant or condition, or any subsequent breach thereof, unless such covenant or condition is permanently waived in writing by Licensor.

13.3 Neither the failure of Licensor to object to any work done, material used, or method of construction or maintenance of said Encroachment, nor any approval given or supervision exercised by Licensor, shall be construed as an admission of liability or responsibility by Licensor, or as a waiver by Licensor of any of the obligations, liability and/or responsibility of Licensee under this Agreement.

14. TERMINATION, REMOVAL:

14.1 All rights which Licensee may have hereunder shall cease upon the date of (a) termination, (b) revocation, or (c) subsequent agreement, or (d) Licensee's removal of the Facility from the Encroachment. However, neither termination nor revocation of this Agreement shall affect any claims and liabilities which have arisen or accrued hereunder, and which at the time of termination or revocation have not been satisfied; neither party, however, waiving any third party defenses or actions.

14.2 Within thirty (30) days after revocation or termination, Licensee, at its sole risk and expense, shall (a) remove the Facilities from the rail corridor of Licensor, unless the parties hereto agree otherwise, (b) restore the rail corridor of Licensor in a manner satisfactory to Licensor, and (c) reimburse Licensor any loss, cost or expense of Licensor resulting from such removal.

15. NOTICE:

15.1 Licensee shall give Licensor at least thirty (30) days written notice before doing any work on Licensor's rail corridor, except that in cases of emergency shorter notice may be given. Licensee shall provide proper notification as follows:

a. For non-emergencies, Licensee shall submit online via the CSX Property Portal from Licensor's web site, via web link:
https://propertyportal.csx.com/pub_ps_res/ps_res/jsf/public/index.faces

b. For emergencies, Licensee shall complete all of the steps outlined in Section 15.1 a. above, and shall also include detailed information of the emergency. Licensee shall also call and report details of the emergency to Licensor's Rail Operations Emergency

Telephone Number: 1-800-232-0144. In the event Licensor needs to contact Licensee concerning an emergency involving Licensee's Facility(ies), the emergency phone number for Licensee is: 912-324-9905.

15.2 All other notices and communications concerning this Agreement shall be addressed to Licensee at the address above, and to Licensor at the address shown on Page 1, c/o CSXT Contract Management, J180; or at such other address as either party may designate in writing to the other.

15.3 Unless otherwise expressly stated herein, all such notices shall be in writing and sent via Certified or Registered Mail, Return Receipt Requested, or by courier, and shall be considered delivered upon: (a) actual receipt, or (b) date of refusal of such delivery.

16. ASSIGNMENT:

16.1 The rights herein conferred are the privileges of Licensee only, and Licensee shall obtain Licensor's prior written consent to any assignment of Licensee's interest herein; said consent shall not be unreasonably withheld.

16.2 Subject to Sections 2 and 16.1, this Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors or assigns.

16.3 Licensee shall give Licensor written notice of any legal succession (by merger, consolidation, reorganization, etc.) or other change of legal existence or status of Licensee, with a copy of all documents attesting to such change or legal succession, within thirty (30) days thereof.

16.4 Licensor expressly reserves the right to assign this Agreement, in whole or in part, to any grantee, lessee, or vendee of Licensor's underlying property interests in the Encroachment, upon written notice thereof to Licensee.

16.5 In the event of any unauthorized sale, transfer, assignment, sublicense or encumbrance of this Agreement, or any of the rights and privileges hereunder, Licensor, at its option, may revoke this Agreement by giving Licensee or any such assignee written notice of such revocation; and Licensee shall reimburse Licensor for any loss, cost or expense Licensor may incur as a result of Licensee's failure to obtain said consent.

17. TITLE:

17.1 Licensee understands that Licensor occupies, uses and possesses lands, rights-of-way and rail corridors under all forms and qualities of ownership rights or facts, from full fee simple absolute to bare occupation. Accordingly, nothing in this Agreement shall act as or be deemed to act as any warranty, guaranty or representation of the quality of Licensor's title for any particular Encroachment or segment of Rail Corridor occupied, used or enjoyed in any manner by Licensee under any rights created in this Agreement. It is expressly understood that Licensor does not warrant title to any Rail Corridor and Licensee will accept the grants and

privileges contained herein, subject to all lawful outstanding existing liens, mortgages and superior rights in and to the Rail Corridor, and all leases, licenses and easements or other interests previously granted to others therein.

17.2 The term "license," as used herein, shall mean with regard to any portion of the Rail Corridor which is owned by Licensor in fee simple absolute, or where the applicable law of the State where the Encroachment is located otherwise permits Licensor to make such grants to Licensee, a "permission to use" the Rail Corridor, with dominion and control over such portion of the Rail Corridor remaining with Licensor, and no interest in or exclusive right to possess being otherwise granted to Licensee. With regard to any other portion of Rail Corridor occupied, used or controlled by Licensor under any other facts or rights, Licensor merely waives its exclusive right to occupy the Rail Corridor and grants no other rights whatsoever under this Agreement, such waiver continuing only so long as Licensor continues its own occupation, use or control. Licensor does not warrant or guarantee that the license granted hereunder provides Licensee with all of the rights necessary to occupy any portion of the Rail Corridor. Licensee further acknowledges that it does not have the right to occupy any portion of the Rail Corridor held by Licensor in less than fee simple absolute without also receiving the consent of the owner(s) of the fee simple absolute estate. Further, Licensee shall not obtain, exercise or claim any interest in the Rail Corridor that would impair Licensor's existing rights therein.

17.3 Licensee agrees it shall not have nor shall it make, and hereby completely and absolutely waives its right to, any claim against Licensor for damages on account of any deficiencies in title to the Rail Corridor in the event of failure or insufficiency of Licensor's title to any portion thereof arising from Licensee's use or occupancy thereof.

17.4 Licensee agrees to fully and completely indemnify and defend all claims or litigation for slander of title, overburden of easement, or similar claims arising out of or based upon the Facilities placement, or the presence of the Facilities in, on or along any Encroachment(s), including claims for punitive or special damages.

17.5 Licensee shall not at any time own or claim any right, title or interest in or to Licensor's property occupied by the Encroachments, nor shall the exercise of this Agreement for any length of time give rise to any right, title or interest in Licensee to said property other than the license herein created.

17.6 Nothing in this Agreement shall be deemed to give, and Licensor hereby expressly waives, any claim of ownership in and to any part of the Facilities.

17.7 Licensee shall not create or permit any mortgage, pledge, security, interest, lien or encumbrances, including without limitation, tax liens and liens or encumbrances with respect to work performed or equipment furnished in connection with the construction, installation, repair, maintenance or operation of the Facilities in or on any portion of the Encroachment (collectively, "Liens or Encumbrances"), to be established or remain against the Encroachment or any portion thereof or any other Licensor property.

17.8 In the event that any property of Licensor becomes subject to such Liens or Encumbrances, Licensee agrees to pay, discharge or remove the same promptly upon Licensee's receipt of notice that such Liens or Encumbrances have been filed or docketed against the Encroachment or any other property of Licensor; however, Licensee reserves the right to challenge, at its sole expense, the validity and/or enforceability of any such Liens or Encumbrances.

18. GENERAL PROVISIONS:

18.1 This Agreement, and the attached specifications, contains the entire understanding between the parties hereto.

18.2 Neither this Agreement, any provision hereof, nor any agreement or provision included herein by reference, shall operate or be construed as being for the benefit of any third person.

18.3 Except as otherwise provided herein, or in any Rider attached hereto, neither the form of this Agreement, nor any language herein, shall be interpreted or construed in favor of or against either party hereto as the sole drafter thereof.

18.4 This Agreement is executed under current interpretation of applicable Federal, State, County, Municipal or other local statute, ordinance or law(s). However, each separate division (paragraph, clause, item, term, condition, covenant or agreement) herein shall have independent and severable status for the determination of legality, so that if any separate division is determined to be void or unenforceable for any reason, such determination shall have no effect upon the validity or enforceability of each other separate division, or any combination thereof.

18.5 This Agreement shall be construed and governed by the laws of the state in which the Facilities and Encroachment are located.

18.6 If any amount due pursuant to the terms of this Agreement is not paid by the due date, it will be subject to Licensor's standard late charge and will also accrue interest at eighteen percent (18%) per annum, unless limited by local law, and then at the highest rate so permitted.

18.7 Licensee agrees to reimburse Licensor for all reasonable costs (including attorney's fees) incurred by Licensor for collecting any amount due under the Agreement.

18.8 The provisions of this License are considered confidential and may not be disclosed to a third party without the consent of the other party(s), except: (a) as required by statute, regulation or court order, (b) to a parent, affiliate or subsidiary company, (c) to an auditing firm or legal counsel that are agreeable to the confidentiality provisions, or (d) to Lessees of Licensor's land and/or track who are affected by the terms and conditions of this Agreement and will maintain the confidentiality of this Agreement.

18.9 Within thirty (30) days of an overpayment in a cumulative total amount of One Hundred Dollars (\$100.00) or more by Licensee to Licensor, Licensee shall notify Licensor in writing with documentation evidencing such overpayment. Licensor shall refund the actual amount of Licensee's overpayment within 120 days of Licensor's verification of such overpayment.

19. CONTRACTOR'S ACCEPTANCE:

19.1 Licensee shall observe and abide by, and shall require Licensee's Contractors to observe and abide by the terms, conditions and provisions set forth in this Agreement. Prior to any commencement of work under this Agreement by Licensee's Contractor, Licensee shall require Licensee's Contractor to execute and deliver to Licensor the Contractor Acceptance form attached hereto as Schedule A to acknowledge Licensee's Contractor's agreement to observe and abide by terms and conditions of the Agreement.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the parties hereto have executed this Agreement in duplicate (each of which shall constitute an original) as of the effective date of this Agreement.

Witness for Licensor:

CSX TRANSPORTATION, INC.

_____ By: _____

Print/Type Name: _____

Print/Type Title: _____

Witness for Licensee:

**BRUNSWICK GLYNN JOINT WATER AND
SEWER COMMISSION**

_____ By: _____

Who, by the execution hereof, affirms that he/she has the authority to do so and to bind the Licensee to the terms and conditions of this Agreement.

Print/Type Name: _____

Print/Type Title: _____

Tax ID No.: _____

Authority under Ordinance or

Resolution No. _____,

Dated _____.

Schedule "A"

CONTRACTOR'S ACCEPTANCE

This Amendment is and shall be a part of Agreement No. CSX898886, and is incorporated therein.

To and for the benefit of CSX TRANSPORTATION, Inc. (Licensor") and to induce Licensor to permit Contractor on or about Licensor's property for the purposed of performing work in accordance with the Agreement dated December 20, 2019, between Licensee and Licensor, Contractor hereby agrees to abide by and perform all applicable terms of the Agreement, including, but not limited to Sections 3, 9, 10 of the Agreement.

Witness for Licensor:

CSX TRANSPORTATION INC.

By: _____

Print/Type Name: _____

Print/Type Title: _____

Witness for Licensee's Contractor

LICENSEE'S CONTRACTOR

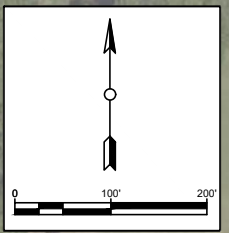
By: _____

Who, by the execution hereof, affirms that he/she has the authority to do so and to bind the Licensee has the authority to do so and to bind the Licensee to the terms and conditions of this Agreement

NAME: _____

TITLE: _____

DATE: _____



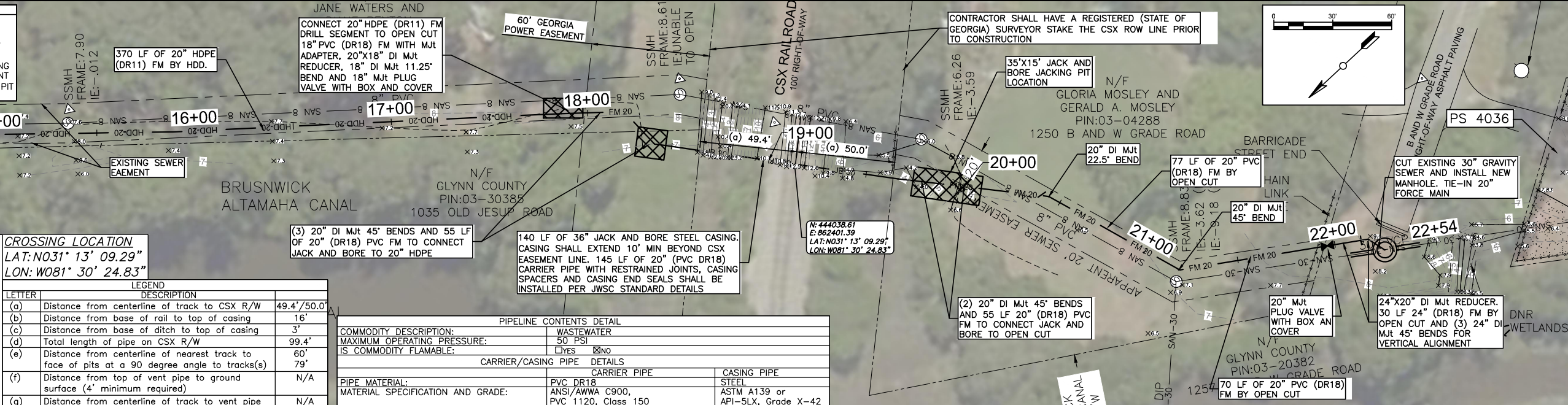
NO.	REVISIONS	BY	DATE
1	CSXT PERMIT SUBMITTAL	AW	1/11/19

JOB NO:	J-27784.0000
DATE:	8/21/19
DRAWN:	SLD
DESIGNED:	ABB
REVIEWED:	MRK
APPROVED:	ABB
SCALE:	AS NOTED

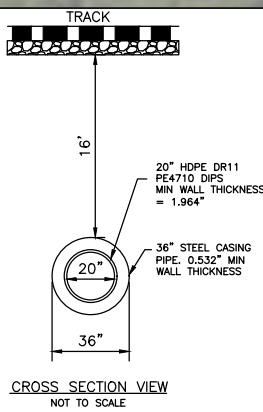
MATCHLINE - AT STATION 14+00

LEGEND FOR PROPOSED IMPROVEMENTS

	DENOTES OPEN CUT
	DENOTES HORIZONTAL DIRECTIONAL DRILL
	DENOTES HDD DRILLING OPERATIONS FOOTPRINT AND/OR PULL BACK PIT LOCATION



CROSSING LOCATION
 LAT: N031° 13' 09.29"
 LON: W081° 30' 24.83"



LEGEND

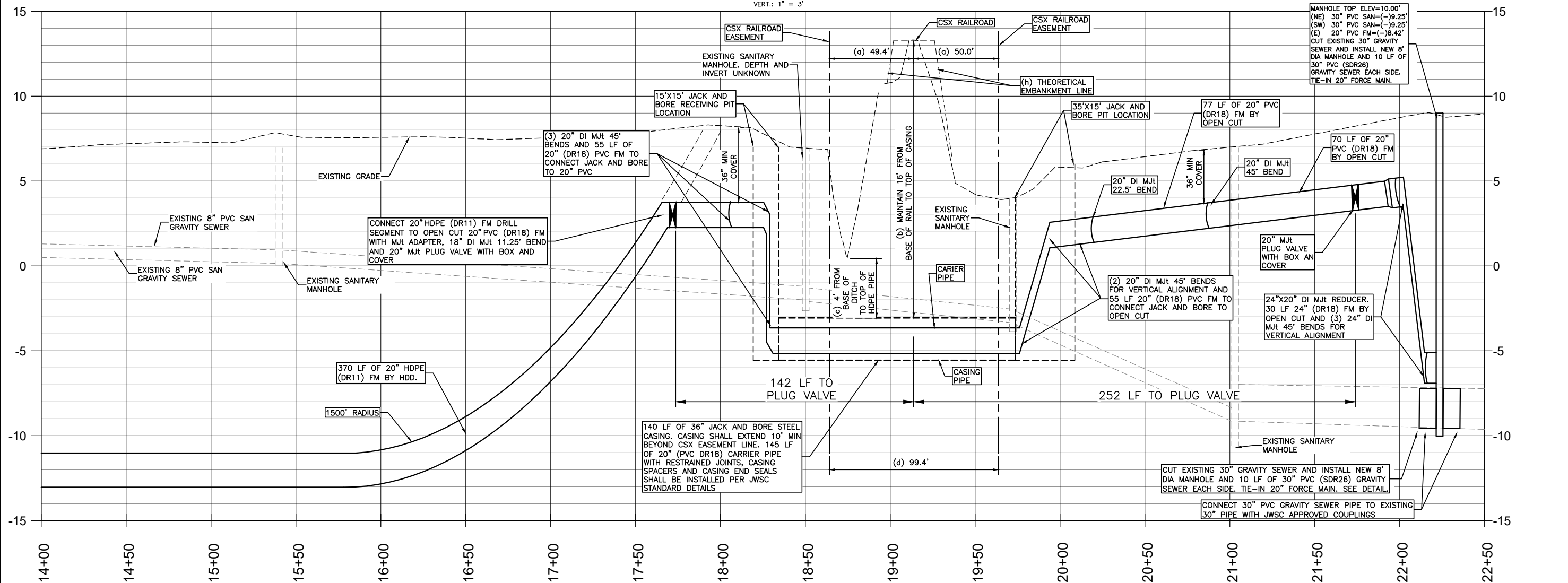
LETTER	DESCRIPTION	VALUE
(a)	Distance from centerline of track to CSX R/W	49.4'/50.0'
(b)	Distance from base of rail to top of casing	16'
(c)	Distance from base of ditch to top of casing	3'
(d)	Total length of pipe on CSX R/W	99.4'
(e)	Distance from centerline of nearest track to face of pits at a 90 degree angle to tracks(s)	60' 79'
(f)	Distance from top of vent pipe to ground surface (4' minimum required)	N/A
(g)	Distance from centerline of track to vent pipe at 90 degrees angle to track	N/A
(h)	Theoretical embankment line: starts 12' from centerline of track and extends away from track at a slope of 1.5' over and 1' down	N/A
(i)	Carrier pipe diameter	20"
(j)	Casing pipe diameter	36"
(k)	Depth of launching/Receiving pit	10'/13'

PIPELINE CONTENTS DETAIL

COMMODITY DESCRIPTION:	WASTEWATER
MAXIMUM OPERATING PRESSURE:	50 PSI
IS COMMODITY FLAMABLE:	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
CARRIER/CASING PIPE DETAILS	
PIPE MATERIAL:	PVC DR18
MATERIAL SPECIFICATION AND GRADE:	ANSI/AWWA C900, PVC 1120, Class 150
SPECIFIED MINIMUM YIELD STRENGTH:	21,600 INCH
NOMINAL SIZE OUTSIDE DIAMETER (INCHES):	20
WALL THICKNESS (INCHES):	1.200 INCH
TYPE OF SEAM:	NONE
TYPE OF JOINTS:	RESTRAINED PUSH-ON OR FUSIBLE
TUNNEL LINER PLATES REQUIRED:	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
CATHODIC PROTECTION:	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO TYPE: _____
PROTECTIVE COATING:	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO TYPE: _____
TEMP. TRACK SUPPORT OR RIP-RAP REQ:	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO MUST DESCRIBE & SHOW ON DRAWING

- CSX GENERAL NOTES**
- CASING/CARRIER PIPES PLACED UNDER CSXT TRACK(S) SHALL BE NOT LESS THAN 5.5 FEET FROM BASE OF RAIL TO TOP OF PIPE AT ITS SHALLOWEST POINT.
 - CONTRACTOR RESPONSIBLE FOR PROVIDING DESIGN PLANS AND COMPUTATIONS FOR THE JACKING AND RECEIVING PITS STABILIZATION. PLANS AND COMPUTATIONS SHALL BE SEALED BY A LICENSED PROFESSIONAL ENGINEER, REGISTERED IN THE STATE OF GEORGIA. MUST BE SUBMITTED TO CSXT PRIOR TO THE START OF CONSTRUCTION AND MUST OBTAIN APPROVAL FROM CSXT'S CHIEF ENGINEER, DESIGN AND CONSTRUCTION PRIOR TO BEGINNING ANY WORK ON OR WHICH MAY AFFECT CSXT PROPERTY. SHEETING SHALL BE DESIGN TO SUPPORT ALL LATERAL FORCES CAUSED BY THE EARTH, RAILROAD AND OTHER SURCHARGE LOADS.
 - CONTRACTOR RESPONSIBLE FOR PROVIDING ALL NECESSARY DEWATERING OPERATIONS FOR JACK AND BORE OPERATIONS. DEWATERING PLAN SHALL BE SEALED BY A LICENSED PROFESSIONAL ENGINEER, REGISTERED IN THE STATE OF GEORGIA.
 - CONTRACTOR SHALL HAVE A LICENSED LAND SURVEYOR, REGISTERED IN THE STATE OF GEORGIA STAKE THE CSXT ROW LINE PRIOR TO CONSTRUCTION.

ALIGNMENT - (36)
 STATIONS: 14+00 - 22+50
 SCALE: HORIZ.: 1" = 30'
 VERT.: 1" = 3'



FOUR WATERS ENGINEERING
 324 6th AVE N. JACKSONVILLE BEACH, FLORIDA 32250
 904-414-2400 PEF006711 WWW.4WENGINE.COM

NO.	REVISIONS	DATE
1	CSXT PERMIT SUBMITTAL	1/11/19

THOMAS & HUTTON
 50 Park of Commerce Way
 Savannah, GA 31405 • 912.234.5300
 www.thomasandhutton.com

BRUNSWICK-GLYNN COUNTY JOINT WATER & SEWER COMMISSION
 BRUNSWICK, GA
 BGJWSC NORTH MAINLAND PHASE II AND III IMPROVEMENTS
 DETAIL - CSX CORRIDOR CROSSING

JOB NO: J-27784.0000
 DATE: 8/21/19
 DRAWN: SLD
 DESIGNED: ABB
 REVIEWED: MRK
 APPROVED: ABB
 SCALE: AS NOTED

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