

**Final Report of Geotechnical Exploration
For**

**JEA Yellow Bluff Road Water Main
Marshland Drive to Tisons Bluff Road
Jacksonville, Florida**

***MAE Project No. 0106-0002A
January 23, 2017***

Prepared for:



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Attention: Mr. Wade Olszewski, P.E.
Reference: Draft Report of Geotechnical Exploration
Yellow Bluff Road 16-Inch Water Main
Marshland Dr. to Tisons Bluff Rd.
Jacksonville, Florida
MAE Project No. 0106-0002A

Dear Mr. Olszewski:

Meskel & Associates Engineering, PLLC has completed a geotechnical exploration for the subject project. Our work was authorized through your Subconsultant Agreement dated August 19, 2016 (your project number J6605) and was performed in general accordance with our proposal dated May 17, 2016. The geotechnical exploration was performed to evaluate the encountered subsurface conditions along the proposed pipeline route and to provide recommendations to support design of the proposed pipeline construction. A summary of our findings is presented below for your convenience; however, we recommend that this report be considered in its entirety. This report has been updated from the draft report dated November 1, 2016, to include comments from JEA and CPH. This report supersedes our draft report in its entirety.

The soil borings encountered a relatively uniform subsurface soil profile throughout the project site, consisting of a topsoil layer that ranged from 2 to 5 inches in thickness, underlain by very loose to medium dense fine sands to fine sands with silt (A-3) containing trace amounts of organic fines and root fragments. These soils continued to the boring termination depths, or approximately 10 feet below existing grade. The exception is at boring B-28 where slightly organic soils were encountered at depths between approximately 4 and 8 feet below existing grade. Provided site preparation is performed in accordance with the recommendations presented in this report, it is our opinion that the soils encountered at the boring locations are suitable for support of the proposed pipeline construction.

We appreciate this opportunity to be of service as your geotechnical consultant on this phase of the project. If you have any questions, or if we may be of any further service, please contact us.

Sincerely,
MESKEL & ASSOCIATES ENGINEERING, PLLC
MAE FL Certificate of Authorization No. 28142

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Distribution: Mr. Wade Olszewski, P.E. – CPH, Inc.

2 copies; 1 pdf

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1.0 PROJECT INFORMATION

1.1 General

Project information was provided to us by Mr. Wade P. Olszewski, P.E. and Ms. Natalie Urick, P.E., both with CPH, Inc. This information included an undated Project Summary document that described the scope of services requested, and a PowerPoint document prepared by CPH that showed the proposed soil boring and pavement core locations.

1.2 Project Description

The site for the subject project is located along Yellow Bluff Road between Marshland Drive and Tisons Bluff Road in Jacksonville, Florida. The general site topography and location are shown on the *Site Topographic Map*, Figure 1, and *Site Location Map*, Figure 2, respectively.

Based on the provided information and our discussions with Mr. Olszewski and Ms. Urick, it is our understanding that the project includes the construction of approximately 16,200 linear feet of 16-inch diameter ductile iron pipe water main. The proposed route is along the eastern side of the ROW of Yellow Bluff Road. It is also understood that roadway crossings are anticipated at five intersections along the proposed pipeline route: Mahou Road, Lake Road, Jake Road, Ed Johnson Drive, and Eagle Bend Boulevard.

2.0 FIELD EXPLORATION

A field exploration was performed during the period of September 9 through 14, 2016. The requested boring and pavement core locations were provided to us by CPH in a Power Point document dated August 26, 2016. The borings were shown to be located at approximate intervals of 500 feet, and the pavement cores to be located on side streets that will be crossed by the pipeline excavation. The approximate pavement core and boring locations were determined in the field by our personnel using the provided document and taped measurements from the existing roadways. The crew collected GPS coordinates at each of the drilled boring locations. These coordinates are shown on the *Generalized Soil Profiles*, Figures 3 through 11, and on the soil boring logs located in Appendix A.

2.1 Pavement Cores

Six core samples of the existing pavement structure (asphalt surface, base course) were obtained. Five of the samples were obtained from side streets where the proposed pipeline will cross. The sixth sample was obtained at the center of Yellow Bluff Road and its intersection with Tisons Bluff Road; just east of the existing road patch.

Each core location was drilled using a 4-inch diameter diamond coated core barrel connected to free standing mechanical drill equipment. Water was used during core sampling to cool the core barrel and to limit dust and debris generated from the coring process. The core samples were measured in the field by the field crew and transported to our laboratory. Once the core was complete, the hole was backfilled with an asphalt cold-patch material in compacted lifts. Photographs of the recovered core samples are included in Appendix C.

2.2 SPT Borings

To explore the subsurface conditions along the proposed pipeline alignment, we located and performed 34 Standard Penetration Test (SPT) borings, drilled to depths of approximately 10 feet below the existing ground surface, in general accordance with the methodology outlined in ASTM D 1586. Split-spoon soil samples recovered during performance of the borings were visually described in the field and representative portions of the samples were transported to our laboratory for further evaluation. Each borehole was backfilled with soil at the completion of the boring.

3.0 LABORATORY TESTING

3.1 Visual Classification

Representative soil samples obtained during our field exploration were visually classified by a geotechnical engineer using the AASHTO Soil Classification System in general accordance with ASTM D 3282. A Key to the Soil Classification System is included in Appendix A.

3.2 Soil Index Tests

Quantitative laboratory testing was performed on selected samples of the soils encountered during the field exploration to better define the composition of the soils encountered and to provide data for correlation to their anticipated strength and compressibility characteristics. The laboratory testing determined the percent fines, natural moisture and organic content of selected soil samples. The results of the laboratory testing are shown in the *Summary of Laboratory Test Data* included in Appendix B. Also, these results are shown on the *Generalized Soil Profiles* (Figures 3-11) and on the Log of Boring records at the respective depths from which the tested samples were recovered.

3.3 Corrosion Series Tests

Nine soil samples were selected for corrosion potential testing. The samples were obtained from borings located at approximately 2,000-foot intervals along the pipeline alignment. The testing included pH, resistivity, and chloride and sulfate contents. The soil corrosion potential is discussed in Section 4.6 below. A summary of the laboratory test results and the environmental classifications is presented in Appendix B.

4.0 GENERAL PAVEMENT & SUBSURFACE CONDITIONS

4.1 Pavement Core Samples

The pavement layers (asphalt and base) were measured in the field. The asphalt core samples were returned to our laboratory to verify the thickness of the asphalt layer as measured in the field, and to observe the overall condition of the asphalt sample. The measured asphalt and base thicknesses are shown in the table below:

Core No.	Street Name	Asphalt Thickness (in.)	Limerock Base Thickness (in.)
C-1	Mahou Road	2-3/4	5-1/4
C-2	Lake Road	1-3/8	6-1/8
C-3	Jake Road	3	4

C-4	Ed Johnson Drive	3-1/2	2-1/2
C-5	Eagle Bend Boulevard	4-1/2	(1)
C-6	Yellow Bluff Road Near Tisons Bluff Rd	2-1/4	3-3/8 (2)
(1) Sand soil encountered below asphalt layer			
(2) Dark brown sand layer similar in appearance to hardpan soil below asphalt layer			

Based on our observations, descriptions of the obtained asphalt layer core samples are as follows:

- C-1, sampled at the intersection with Mahou Road, appears to have two distinct layers consistent with a milled and resurfaced addition of one inch of asphalt.
- C-2, sampled at the intersection with Lake Road, appears to have only one layer.
- C-3, sampled at the intersection with Jake Road, appears to have two distinct layers consistent with a milled and resurfaced addition of one inch of asphalt.
- C-4, sampled at the intersection with Ed Johnson Drive, appears to have three distinct layers consistent with two milled and resurfaced additions of one inch of asphalt each.
- C-5, sampled at the intersection of Eagle Bend Boulevard, appears to have two distinct layers consistent with a milled and resurfaced addition of one inch of asphalt.
- C-6, sampled at the center of Yellow Bluff Road and its intersection with Tisons Bluff Road (just east of the existing road patch). Sample appears to have two distinct layers consistent with a milled and resurfaced addition of one inch of asphalt.

A typical, commercially produced limerock material was encountered below the asphalt surface layer as the pavement base material at all core locations except C-5 and C-6. The core at location C-5 encountered sandy soils below the asphalt layer, while core C-6 encountered a dark brown sandy soil similar to hardpan. The limerock material appeared to be relatively dry at the time of our exploration.

4.2 General Soil Profile

The generalized subsurface conditions are presented on the *Generalized Soil Profiles*, Figures 3-11. Detailed boring logs are included in Appendix A. Ground surface elevations at each boring location were not measured. When reviewing the profiles and boring logs, it should be understood that the subsurface soil conditions will vary between the boring locations.

Generally, the soil borings encountered a relatively uniform soil profile throughout the project site, consisting of a topsoil layer that ranged from 2 to 5 inches in thickness, underlain by very loose to medium dense fine sands to fine sands with silt (A-3), some containing trace amounts of organic fines and root fragments to boring termination depth of 10 feet below existing ground surface. The exception is at boring B-28 where slightly organic soils were located at depths between 4 and 8 feet below existing grade.

4.3 Groundwater Level

The groundwater level was encountered at each of the boring locations and recorded at the time of drilling at depths varying from approximately 2 to 10 feet below the existing ground surface. The exception was at boring locations B-27, B-28, and B-29, where the groundwater level was not encountered within the depths explored. However, that does not mean that groundwater does not exist at these locations, nor that groundwater may not be encountered within the vertical reaches of these borings at a later date.

It should be anticipated that groundwater levels will fluctuate seasonally and with changes in climate. As such, we recommend that the water table be re-measured prior to construction. Measured groundwater levels are shown the *Generalized Soil Profiles* (Figures 3 through 11) and on the boring logs.

4.4 Web Soil Survey Data USDA

The results of a review of the USDA Soil Survey Conservation Service (SCS) Web Soil Survey of Duval County are shown in the table below. The soil drainage class, hydrological group, and estimated seasonal high groundwater levels reported in the Soil Survey are as follows:

Soil No.	Soil Type	Drainage Class	Hydrologic Group	Depth to the Water Table ⁽¹⁾ (inches)
14	Boulogne fine sand, 0 to 2 percent slopes	Poorly Drained	C/D	6 to 18
22	Evergreen-Wesconnett complex ⁽²⁾ , depressional, 0 to 2 percent slopes	Very Poorly Drained	A/D	0
24	Hurricane and Ridgewood soils, 0 to 5 percent slopes	Somewhat Poorly Drained	A	24 to 42
32	Leon fine sand, 0 to 2 percent slopes	Poorly Drained	A/D	6 to 18
35	Lynn Haven fine sand, 0 to 2 percent slopes	Poorly Drained	A/D	0 to 6
46	Ortega fine sand, 0 to 5 percent slopes	Moderately Well Drained	A	42 to 72
58	Pottsburg fine sand, high, 0 to 3 percent slopes	Somewhat Poorly Drained	A/D	12 to 24
67	Surrency loamy fine sand, 0 to 2 percent slopes, frequently flooded	Very Poorly Drained	B/D	0 to 6

⁽¹⁾ The "Water table" above refers to a saturated zone in the soil which occurs during specified months, typically the summer wet season. Estimates of the upper limit shown in the Web Soil Survey are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

⁽²⁾ The term "complex", as defined by the USDA, refers to a map unit consisting of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the map.

4.5 Seasonal High Groundwater Level

In estimating the seasonal high groundwater level, a number of factors are taken into consideration including antecedent rainfall, soil redoximorphic features (i.e., soil mottling), stratigraphy (including

presence of hydraulically restrictive layers), vegetative indicators, effects of development, and relief points such as drainage ditches, low-lying areas, etc.

Based on our interpretation of the current site conditions, including the boring logs and review of published data, we estimate that the seasonal high groundwater level at the site to be generally 1.5 to 2 feet higher than the groundwater levels encountered at the boring locations. For a more precise estimate of seasonal high groundwater level, we recommend that piezometers be installed along the pipeline route, particularly near the boring locations where the groundwater level was not encountered, to measure the groundwater level fluctuations over time.

It is possible that groundwater levels may exceed the estimated seasonal high groundwater level as a result of significant or prolonged rains. Therefore, we recommend that design drawings and specifications account for the possibility of groundwater level variations, and construction planning should assume that such variations will occur.

4.6 Soil Corrosion Potential

As discussed in Section 3.3 above, nine soil samples were selected for testing of corrosion potential. The tests included soil pH, resistivity, and soil sulfate and chloride contents. The test results are shown in Appendix B. Table 1.3.2-1 *Criteria for Substructure Environmental Classifications* from the FDOT's *Structures Design Guidelines* (January 2016 edition) was used to determine the soil corrosion potential for steel and concrete substructures. In summary, the soils are classified as Extremely Aggressive for steel substructures due to the low pH levels (i.e. $\text{pH} < 6.0$). For concrete substructures, the soils are classified as Moderately Aggressive for all samples except those from boring locations B-9, B-29 and B-32. These samples were classified as Extremely Aggressive due to their low pH levels (i.e. $\text{pH} < 5.0$).

The January 1, 2017 edition of the JEA *Water & Wastewater Standards Manual* was also referenced for the corrosion potential of the tested soils on ductile iron pipe. This Manual references AWWA-C105 Appendix A for soil corrosion potential on this pipe material. Based on our interpretation of the AWWA standard, the soils generally appear to be corrosive to this pipe material.

5.0 DESIGN RECOMMENDATIONS

5.1 General

The following evaluation and recommendations are based on the provided project information as presented in this report, results of the field exploration and laboratory testing performed, and the construction techniques recommended in Section 6.0 below. If the described project conditions are incorrect or changed after this report, or subsurface conditions encountered during construction are different from those reported, MAE should be notified so these recommendations can be re-evaluated and revised, if necessary. We recommend that MAE review the plans and earthwork specifications to verify that the recommendations contained in this report have been properly interpreted and implemented.

5.2 Pipeline Support Recommendations

It is our understanding that the 16-inch diameter pipeline will have an invert elevation that is about 5 feet or less below the existing ground surface to allow for the minimum cover requirement of 30 to 36 inches. Based on the results of the subsurface exploration and laboratory testing as discussed in

this report, we consider the subsurface conditions at the site adaptable for supporting the proposed pipeline when constructed upon properly prepared subgrade soils.

As discussed earlier in the report, very loose to medium dense fine sands to fine sands with silt (A-3), some containing trace amounts of organic fines and root fragments, were encountered throughout the project site to the boring termination depth of approximately 10 feet below existing grade. These soils are considered suitable for support of the pipe as well as for pipe backfill. These soils should be placed and compacted as discussed in Section 6.0 below.

However, at boring B-28, slightly organic soils were encountered between depths of 4 to 8 feet below ground surface. It should be expected that these soils will be encountered during excavation for the pipeline as well as at or near the planned pipe invert elevation at this location. These soils are not considered suitable for support of the pipeline at the invert elevation (pipe bedding) or at the structure bottom elevation, respectively, nor as backfill of the pipe excavation. Organic soils as encountered at this boring location that are within 12 inches of the pipe invert should be removed to a depth of at least 12 inches below the pipe invert elevation, and should be replaced with suitable structural fill soil as described in Section 6.0 below.

Organic soils should not be used as pipe backfill. These soils should be separated from the other soils during excavation and stockpiled for removal from the site.

Assuming the project information as understood at the beginning of this report is correct, and provided the site preparation and earthwork construction recommendations outlined in Section 6.0 of this report are performed, the following parameters may be used for design.

5.2.1 Lateral Pressure Design Parameters

Underground walls for the manhole structures that are backfilled on one side and restrained against rotation at the top, should be designed to resist lateral pressures from soil and groundwater based on the following equivalent fluid unit weights:

- Above Water Table - Equivalent Fluid Density 60 lb/ ft³
- Below Water Table - Equivalent Fluid Density 90 lb/ ft³

For the design of lateral loads on underground walls, we recommend that the groundwater level be assumed to be at the ground surface. Lateral pressure distributions in accordance with the above do not take into account forces from construction equipment, wheel loads or other surcharge loads. To account for this loading, a pressure equal to 0.5 times the anticipated surface surcharge should be applied over the full height of all walls.

5.2.2 Resisting Lateral Forces

Horizontal forces that act on pipeline structures such as thrust and anchor blocks can be resisted to some extent by the earth pressures that develop in contact with the buried perpendicular face of the block structure, and by shearing resistance mobilized along the block structures base and subgrade interface. Allowable passive earth pressure resistance may be determined using the following equivalent fluid densities:

- Above Water Table - Equivalent Fluid Density 100 lb/ft³
- Below Water Table - Equivalent Fluid Density 60 lb/ft³

A factor of safety of 3 was used for the above values. It is assumed the block structures are surrounded by well compacted structural backfill, as described in Section 6.6 below, extending at

least 5 feet horizontally beyond the vertical bearing face. In addition, it is presumed that the block structures can withstand horizontal movements on the order of 0.5-inch before mobilizing full passive resistance.

The allowable sliding shearing resistance mobilized along the base of the block structure may be determined by the following formula:

$$P = \frac{1}{3}V \tan \left(\frac{2}{3} \phi \right)$$

Where: P = Allowable shearing resistance force
V = Net vertical force (total weight of block and soil overlying the structure minus hydrostatic uplift forces)
 ϕ = Angle of internal friction = 30°

The following unit weights can be used to calculate the weight of the overburden soil:

- | | |
|------------------------|-------------------------|
| ▪ Compacted Moist Soil | 110 lb/ ft ³ |
| ▪ Saturated Soil | 120 lb/ ft ³ |

5.2.3 Hydrostatic Uplift Resistance

It is anticipated that the buried structures will exert little or no net downward pressure on the soils; rather, the structures may be subject to hydrostatic uplift pressure when empty. Underground structures should be designed to resist hydrostatic uplift pressures appropriate for their depth below final grade and the seasonal high groundwater table. Hydrostatic uplift forces can be resisted by:

- Addition of dead weight to the structure.
- Mobilizing the dead weight of the soil surrounding the structure through extension of footings outside the perimeter of the structure.

A moist compacted soil unit weight of 110 lb/ft³ may be used in designing structures to resist buoyancy.

5.2.4 Thrust Block Soil Bearing Pressure

The maximum allowable net soil bearing pressure for use in design of thrust blocks should not exceed 2,000 psf. Net bearing pressure is defined as the soil bearing pressure at the foundation bearing level in excess of the natural overburden pressure at that level. The structure should be designed based on the maximum load that could be imposed by all loading conditions.

The structure should bear in either compacted suitable natural soils or compacted structural fill. The bearing level soils, after compaction, should exhibit densities equivalent to 95 percent of the modified Proctor Maximum Dry Density (ASTM D 1557, AASHTO T-180), to a depth of at least one foot below the bearing level.

6.0 SITE PREPARATION AND EARTHWORK RECOMMENDATIONS

Site preparation as outlined in this section should be performed to provide more uniform pipe bearing conditions, and to reduce the potential for post-construction settlements of the planned pipelines and associated structures.

6.1 Clearing

Prior to construction, the location of existing underground utility lines within the construction area should be established. Provisions should then be made to relocate interfering utilities to appropriate locations. It should be noted that if underground pipes are not properly removed or plugged, they may serve as conduits for subsurface erosion which may subsequently lead to excessive settlement of overlying structures.

The soil borings encountered a topsoil layer that ranged in thickness from 2 to 5 inches along the pipeline route. Therefore, it should be anticipated that up to about 5 inches of topsoil and soils containing significant amounts of organic materials may be encountered along the planned pipeline route. The actual depths of topsoil should be determined by MAE using visual observation and judgment during earthwork operations. These unsuitable materials should not be reused as backfill material within the pipeline or structure excavations. However, topsoil may be stockpiled and used subsequently in areas to be grassed.

6.2 Temporary Groundwater Control

The groundwater level was encountered at most of the boring locations at depths varying from 2 to 10 feet below the existing ground surface at the time of our exploration. Groundwater was not encountered at boring locations B-27, B-28, and B-29 within the depths explored at the time of our exploration. Because of the need for excavation to the pipeline invert and manhole bottom elevations, followed by compaction of the bedding and backfill soils, it may be necessary to install temporary groundwater control measures to dewater the area to facilitate the excavation and compaction processes.

The groundwater control measures should be determined by the contractor but can consist of sumps or wellpoints (or a combination of these or other methods) capable of lowering the groundwater level to at least 3 feet below the required depth of excavation. The dewatering system should not be decommissioned until excavation, compaction, and fill placement is complete, and sufficient deadweight exists on the pipe and associated structures to prevent uplift.

6.3 Preparation of Pipe Bedding Soils

As discussed earlier in the report, very loose to medium dense fine sands to fine sands with silt (A-3), some containing trace amounts of organic fines and root fragments, were encountered throughout the project site to the boring termination depths of 10 feet below existing grade. These soils are considered suitable for use as pipe bedding and backfill for the proposed pipeline. These soils should be placed and compacted as discussed in the sections below.

However, at boring B-28, slightly organic soils were encountered between depths of 4 to 8 feet below ground surface. Therefore, it should be expected that these soils will be encountered during excavation for the pipeline, as well as at or near the planned pipe invert elevation, near this boring location. These soils are not considered suitable for support of the pipeline at the invert elevation (pipe bedding) or at the structure bottom elevation, respectively, nor as pipe or structure backfill. Organic soils as encountered at this boring that are within 12 inches of the pipe invert should be removed to a depth of at least 12 inches below the pipe invert elevation, and should be replaced with suitable structural fill soil as described in Section 6.6 below. The purpose of this is to provide more uniform bearing conditions, and to reduce the potential for post construction settlements of the pipeline.

6.4 Compaction of Pipe Bedding Soil

After installing the temporary groundwater control measures, and achieving the required depth of excavation, the exposed sandy soil surface should be compacted using hand-operated equipment. Typically, the material should exhibit moisture contents within ± 2 percent of the modified Proctor optimum moisture content (AASHTO T-180) during the compaction operations. Compaction should continue until densities of at least 98 percent of the modified Proctor maximum dry density (AASHTO T-180) have been achieved within the upper one foot below the exposed surface within the pipeline excavation.

Should the bearing level soils experience pumping and soil strength loss during the compaction operations, compaction work should be immediately terminated and (1) the disturbed soils removed and backfilled with dry structural fill soils that are then compacted, or (2) the excess moisture content within the disturbed soils allowed to dissipate before recompacting.

Care should be exercised to avoid damaging any nearby structures while the compaction operations are underway. Compaction should cease if deemed detrimental to adjacent structures.

6.5 Excavation Protection

Excavation work for the water main construction will be required to meet OSHA Excavation Standard Subpart P regulations for Type C Soils. The use of excavation support systems will be necessary where there is not sufficient space to allow the side slopes of the excavation to be laidback to at least 2H:1V (2 horizontal to 1 vertical) to provide a safe and stable working area and to facilitate adequate compaction along the sides of the excavation. In addition, it should be anticipated that an excavation support system may be necessary to protect adjacent existing structures, pavement and/or utilities that are located along the proposed pipeline alignment.

The method of excavation support should be determined by the contractor but can consist of a trench box, drilled-in soldier piles with lagging, interlocking steel sheeting or other methods. The support structure should be designed according to OSHA sheeting and bracing requirements by a Florida licensed Professional Engineer. Where pipeline excavations and the construction of excavation support systems are within 50 feet of existing structures, the existing structures should be monitored for adverse reactions to construction vibrations and dewatering activities.

6.6 Pipe Backfill Placement and Compaction

Structural backfill placed within the pipeline excavation, and in areas in which over-excavation of unsuitable soils is required below the pipeline invert elevation, should be placed in loose lifts not exceeding six inches in thickness and compacted using hand-operated compaction equipment. This procedure should continue until the backfill elevation is 12 inches above the top of the pipe. At elevations greater than 12 inches above the top of pipe, structural backfill may be placed in loose lifts not exceeding 12 inches in thickness and compacted by hand-operated compaction equipment.

Structural backfill is defined as a non-plastic, granular soil having less than 10 percent material passing the No. 200 mesh sieve and containing less than 4 percent organic material. The sandy soils (A-3) meeting the properties given above, as encountered in the borings, may be used as backfill. Typically, the backfill material should exhibit moisture contents within ± 2 percent of the modified Proctor optimum moisture content (AASHTO T-180) during the compaction operations. Compaction should continue until densities of at least 98 percent of the modified Proctor maximum dry density (AASHTO T-180) have been achieved within each lift of compacted structural backfill.

We recommend that soil excavated from the pipeline trenches that will be reused as backfill be stockpiled a safe distance from the excavations and in such a manner that promotes runoff away from the open trenches and limits saturation of the excavated soil.

7.0 QUALITY CONTROL TESTING

A representative number of field in-place density tests should be made in the upper 2 feet of compacted pipe or structure bedding soils, and in each lift of compacted backfill. The density tests are considered necessary to verify that satisfactory compaction operations have been performed. We recommend density testing be performed at a minimum of one location for every 300 feet of pipeline.

8.0 REPORT LIMITATIONS

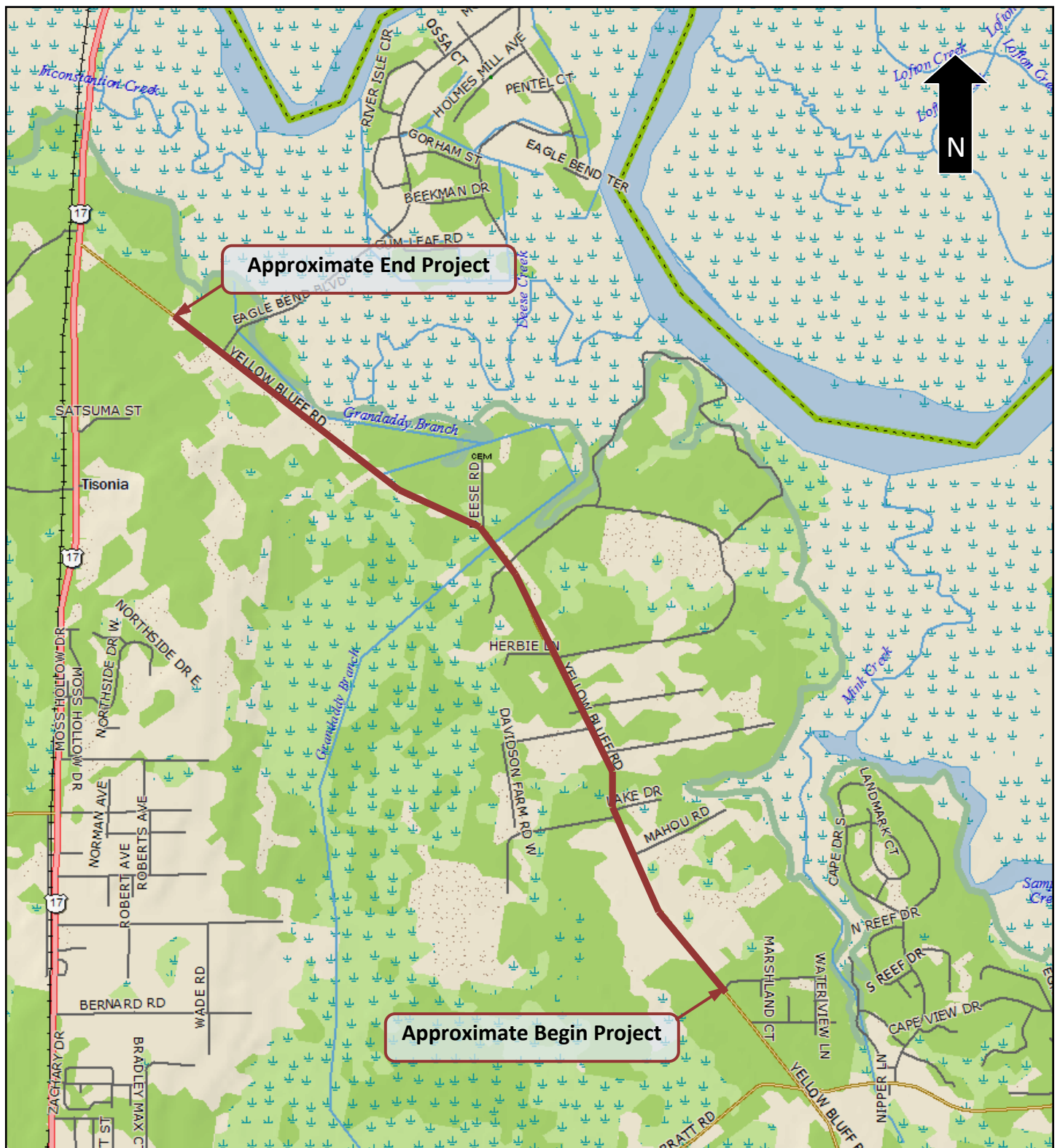
This report has been prepared for the exclusive use of CPH, Inc. and the JEA for specific application to the design and construction of the JEA Yellow Bluff Road 16-inch Water Main project as described in this report. A version of our report that is signed and sealed in blue ink may be considered an original of the report. Copies of an original should not be relied on unless specifically allowed by MAE in writing. Our work for this project was performed in accordance with generally accepted geotechnical engineering practice. No warranty, expressed or implied, is made.

The analyses and recommendations contained in this report are based on the data obtained from the borings performed for the proposed water main. This testing indicates subsurface conditions only at the specific locations and times, and only to the depths explored. These results do not reflect subsurface variations that may exist away from the boring locations and/or at depths below the boring termination depths. Subsurface conditions and water levels at other locations may differ from conditions occurring at the tested locations. In addition, it should be understood that the passage of time may result in a change in the conditions at the tested locations. If variations in subsurface conditions from those described in this report are observed during construction, the recommendations in this report must be re-evaluated.

The scope of our services did not include any environmental assessment or testing for the presence or absence of hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the subject site. Any statements made in this report, and/or notations made on the generalized soil profiles or boring logs, regarding odors or other potential environmental concerns are based on observations made during execution of our scope of services and as such are strictly for the information of our client. No opinion of any environmental concern of such observations is made or implied. Unless complete environmental information regarding the site is already available, an environmental assessment is recommended.

If changes in the design or location of the structure occur, the conclusions and recommendations contained in this report may need to be modified. We recommend that these changes be provided to us for our consideration. MAE is not responsible for conclusions, interpretations, opinions or recommendations made by others based on the data contained in this report.

Figures



Site Topographic Map

PREPARED BY



PREPARED FOR

CPH, Inc.

PROJECT NAME

**Yellow Bluff Road - Marshland Dr to Tisons
Bluff Rd-16" Water Main
Jacksonville, Florida**

REFERENCE

Delorme XMap 7.0

MAE PROJECT NO.

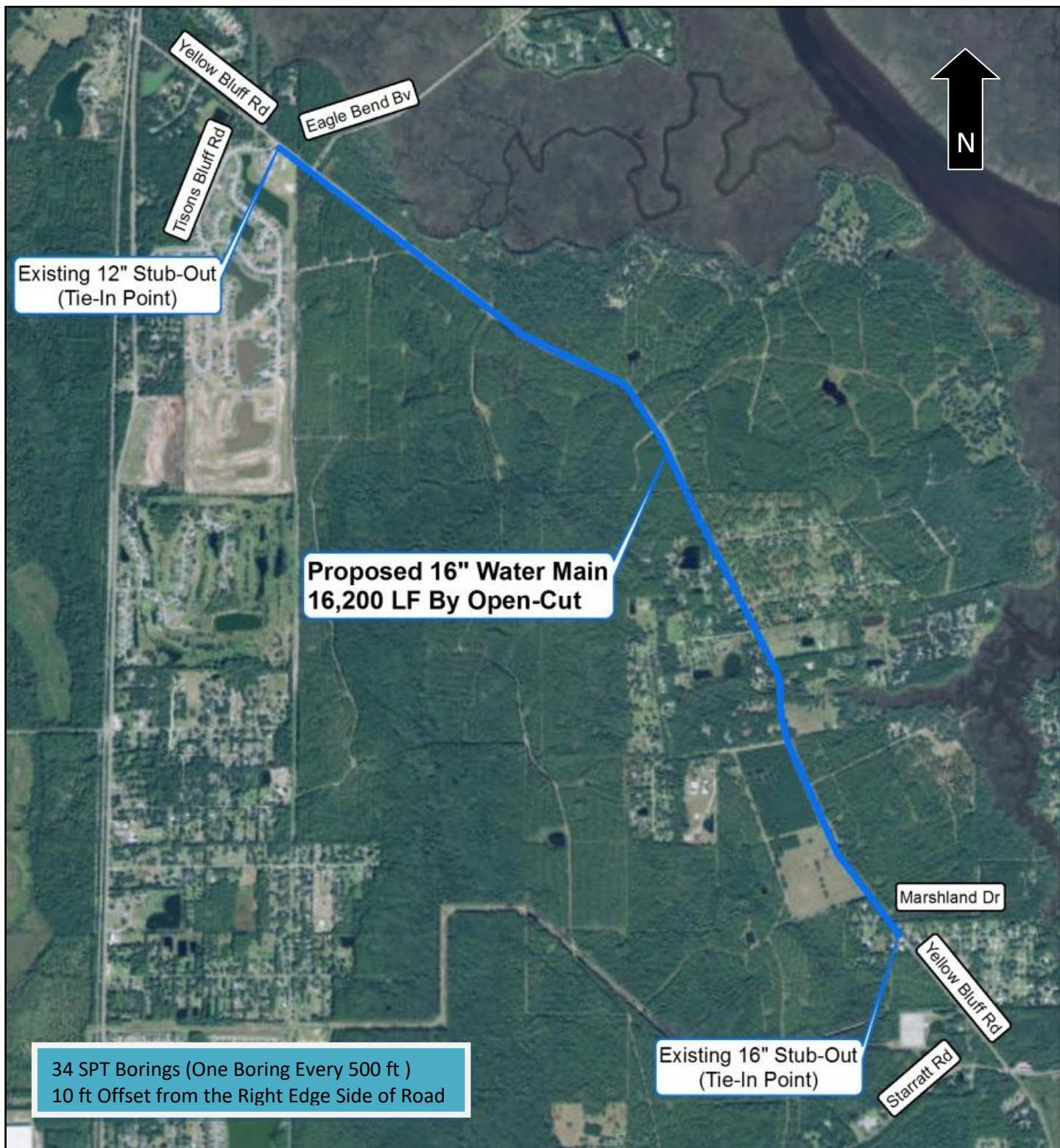
0106-0002A

SCALE

NTS

FIGURE NO.

1



Site Location Map

PREPARED BY



PREPARED FOR

CPH, Inc.

PROJECT NAME

**Yellow Bluff Road - Marshland Dr to Tisons
Bluff Rd-16" Water Main
Jacksonville, Florida**

REFERENCE

Google Earth

MAE PROJECT NO.

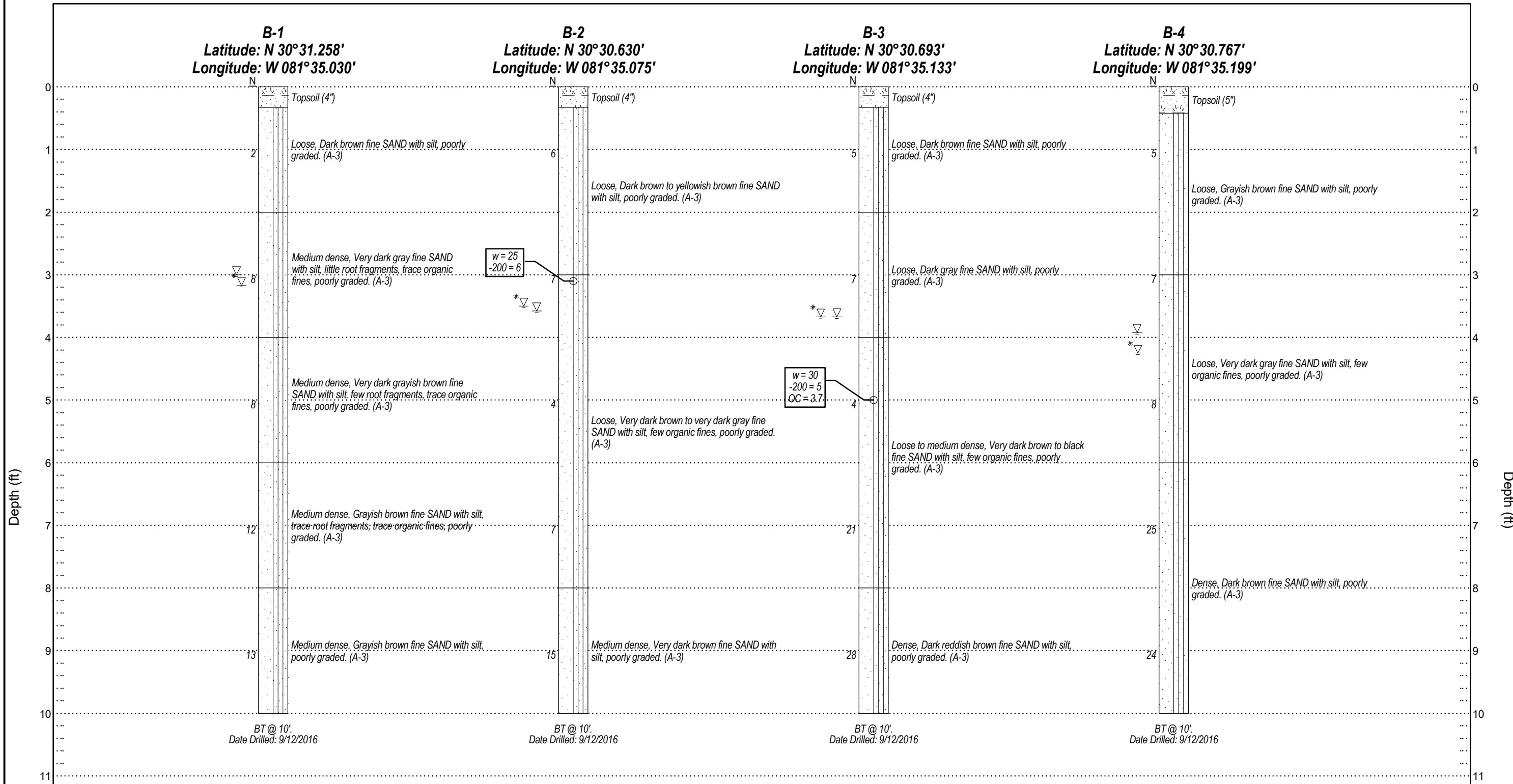
0106-0002A

SCALE

NTS

FIGURE NO.

1



Legend



Topsoil



Fine Sand with Silt

N

Standard Penetration Resistance,
Blows/Foot

BT

Boring Terminated at Depth Below Existing
Grade

(A-3) AASHTO Soil Classification System

▽ Depth to Groundwater at Time of Drilling

*▽ Depth to Groundwater 24 Hrs After Drilling

w Natural Moisture Content (%)

-200 % Passing No. 200 U.S. Standard Sieve

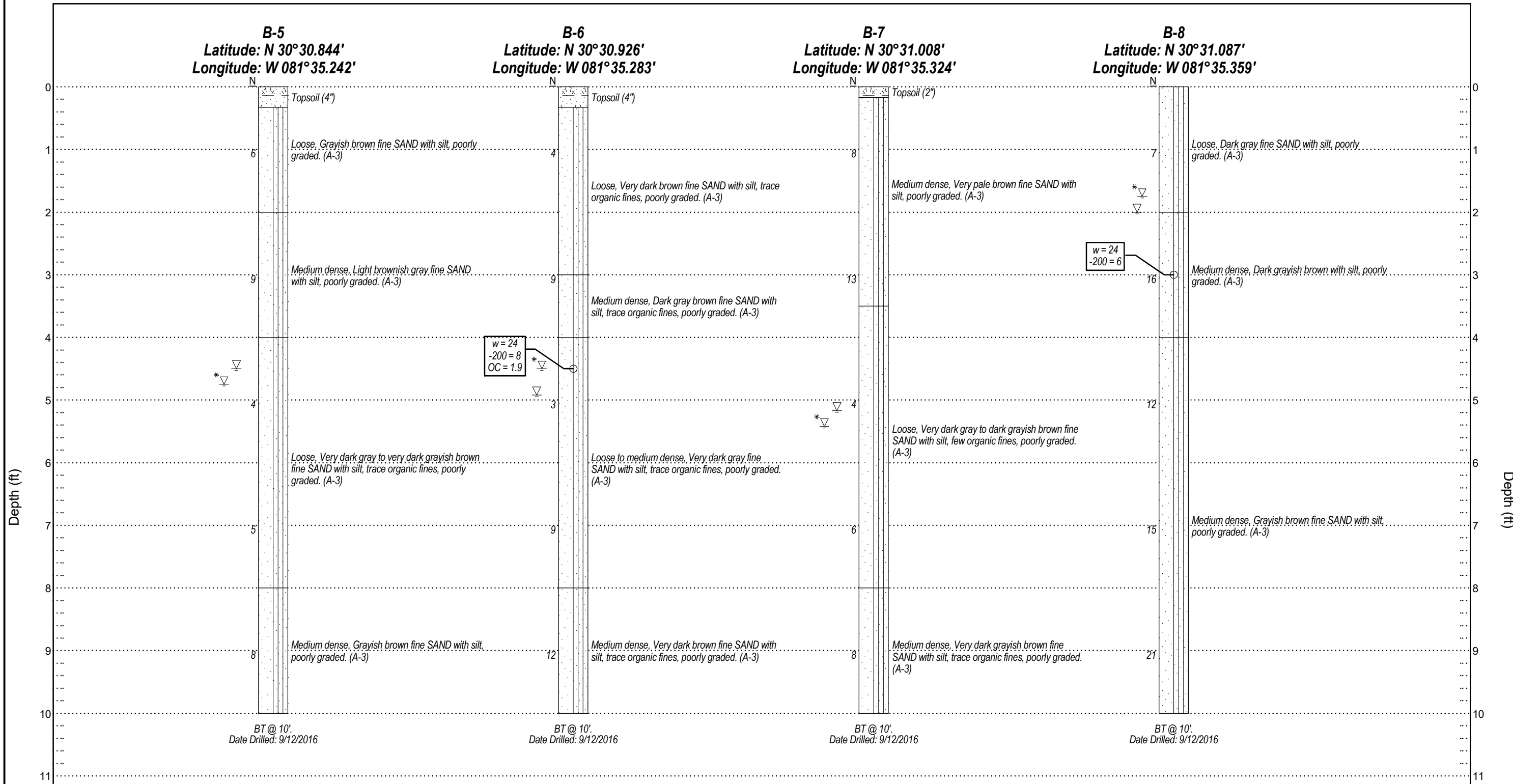
OC Organic Content (%)

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
10/14/16	MV	GPS COORDINATES ADDED.			



CPH, Inc.	
DATE:	MAE PROJECT NO.
1/23/2017	0106-0002A

SHEET TITLE:	
Generalized Soil Profiles	
PROJECT NAME:	FIGURE NO.
Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main Jacksonville, Florida	3



Legend



Topsoil



Fine Sand with Silt

N

Standard Penetration Resistance,
Blows/Foot

BT

Boring Terminated at Depth Below Existing
Grade

(A-3)

AASHTO Soil Classification System

▽

Depth to Groundwater at Time of Drilling

*▽

Depth to Groundwater 24 Hrs After Drilling

w

Natural Moisture Content (%)

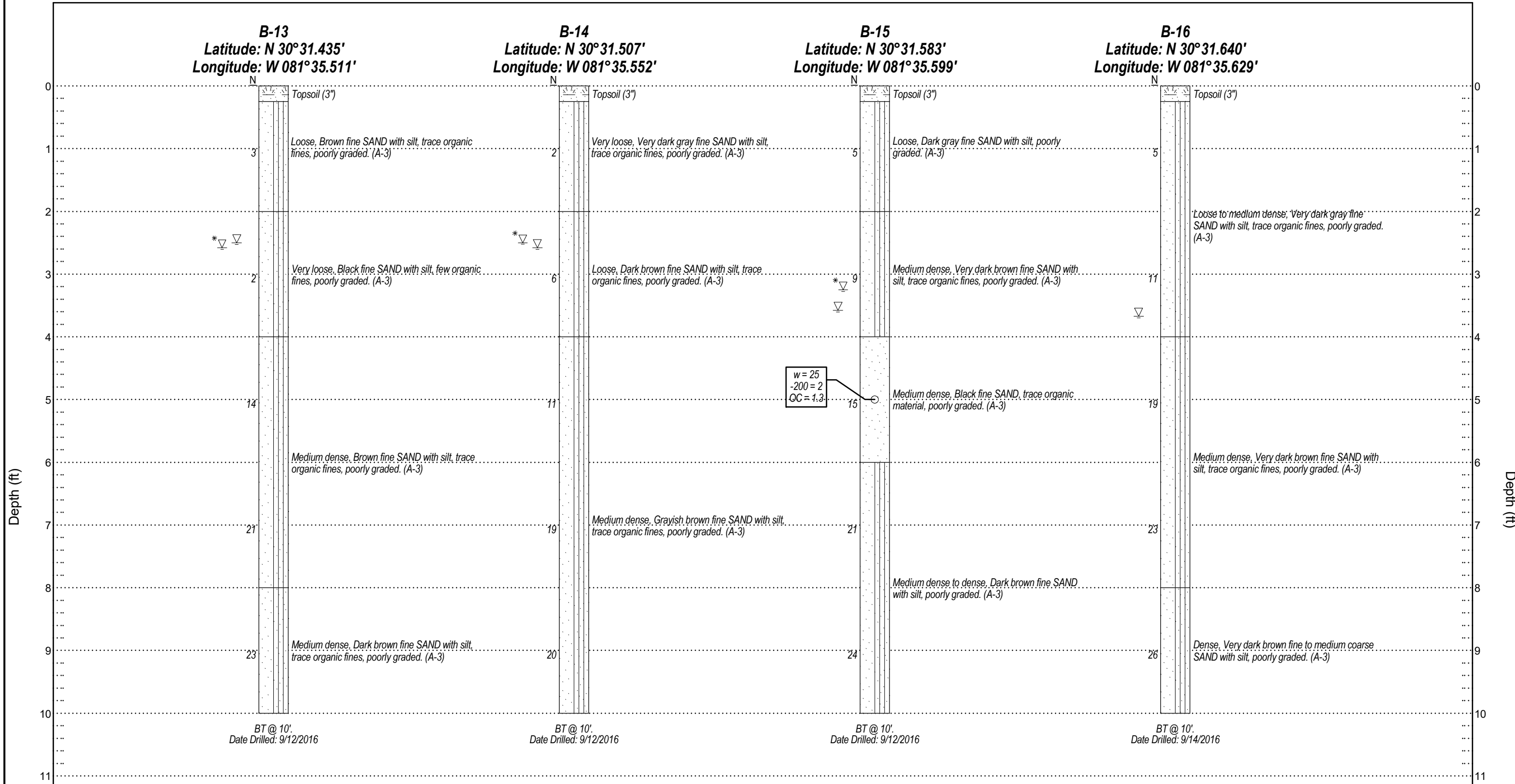
-200

% Passing No. 200 U.S. Standard Sieve

OC

Organic Content (%)

REVISIONS						P. RODNEY MANK, P.E. P.E. NO.: 41986		CPH, Inc.		SHEET TITLE:	
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	 Meskel & Associates Engineering FL Certificate of Authorization No. 28142 8936 Western Way, Suite 12, Jacksonville, FL 32256		DATE:	MAE PROJECT NO.	Generalized Soil Profiles	
10/14/16	MV	GPS COORDINATES ADDED.						1/23/2017	0106-0002A		
										PROJECT NAME:	Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main Jacksonville, Florida
										FIGURE NO.	4



Legend



Topsoil



Fine Sand with Silt



Fine Sand

N

Standard Penetration Resistance,
Blows/Foot

BT

Boring Terminated at Depth Below Existing
Grade

(A-3) AASHTO Soil Classification System

▽ Depth to Groundwater at Time of Drilling

*▽ Depth to Groundwater 24 Hrs After Drilling

w Natural Moisture Content (%)

-200 % Passing No. 200 U.S. Standard Sieve

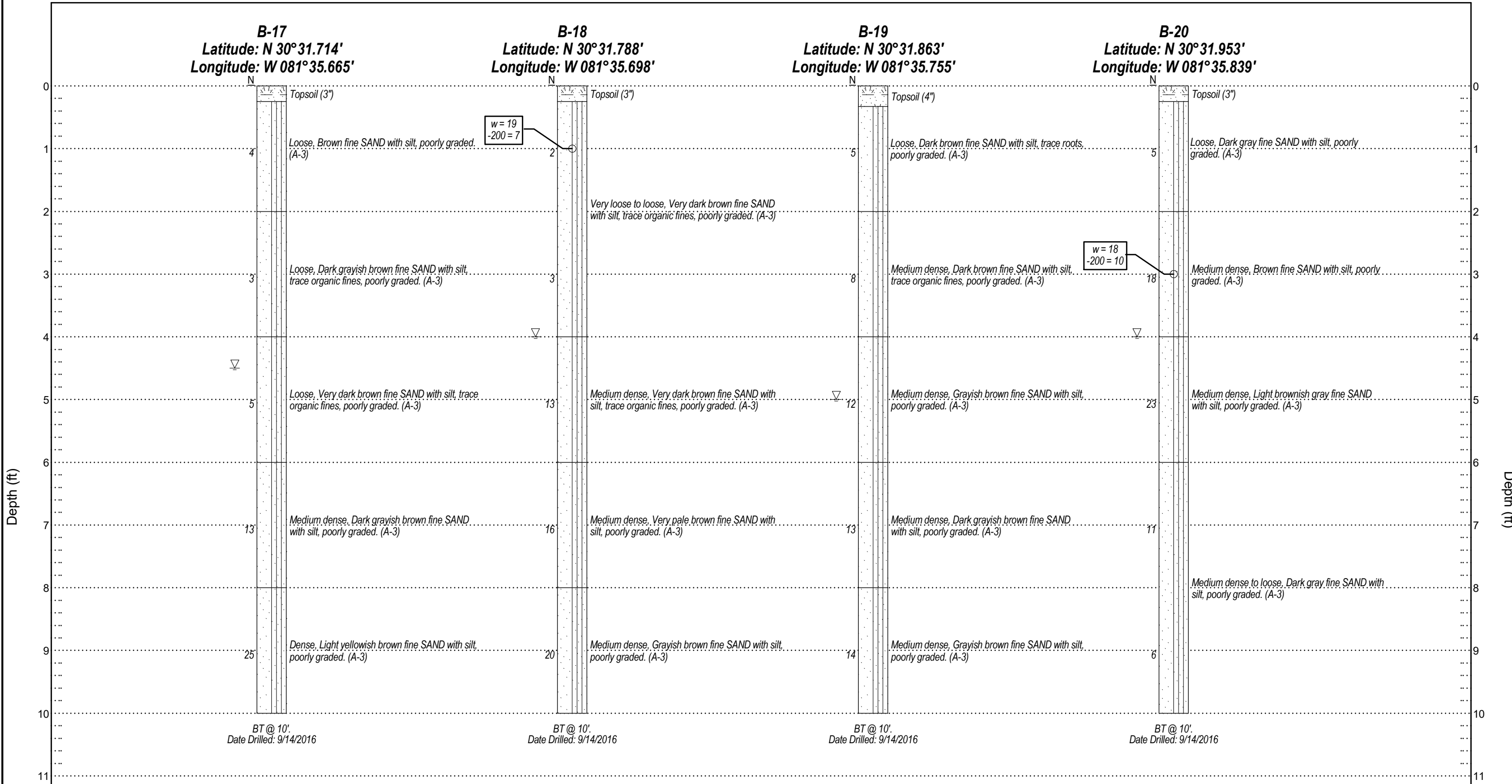
OC Organic Content (%)

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
10/14/16	MV	GPS COORDINATES ADDED.			



CPH, Inc.	
DATE:	MAE PROJECT NO.
1/23/2017	0106-0002A

SHEET TITLE:	
Generalized Soil Profiles	
PROJECT NAME:	FIGURE NO.
Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main Jacksonville, Florida	6



Topsoil

Fine Sand with Silt

N

Standard Penetration Resistance, Blows/Foot

(A-3)

AASHTO Soil Classification System

w

Natural Moisture Content (%)

BT

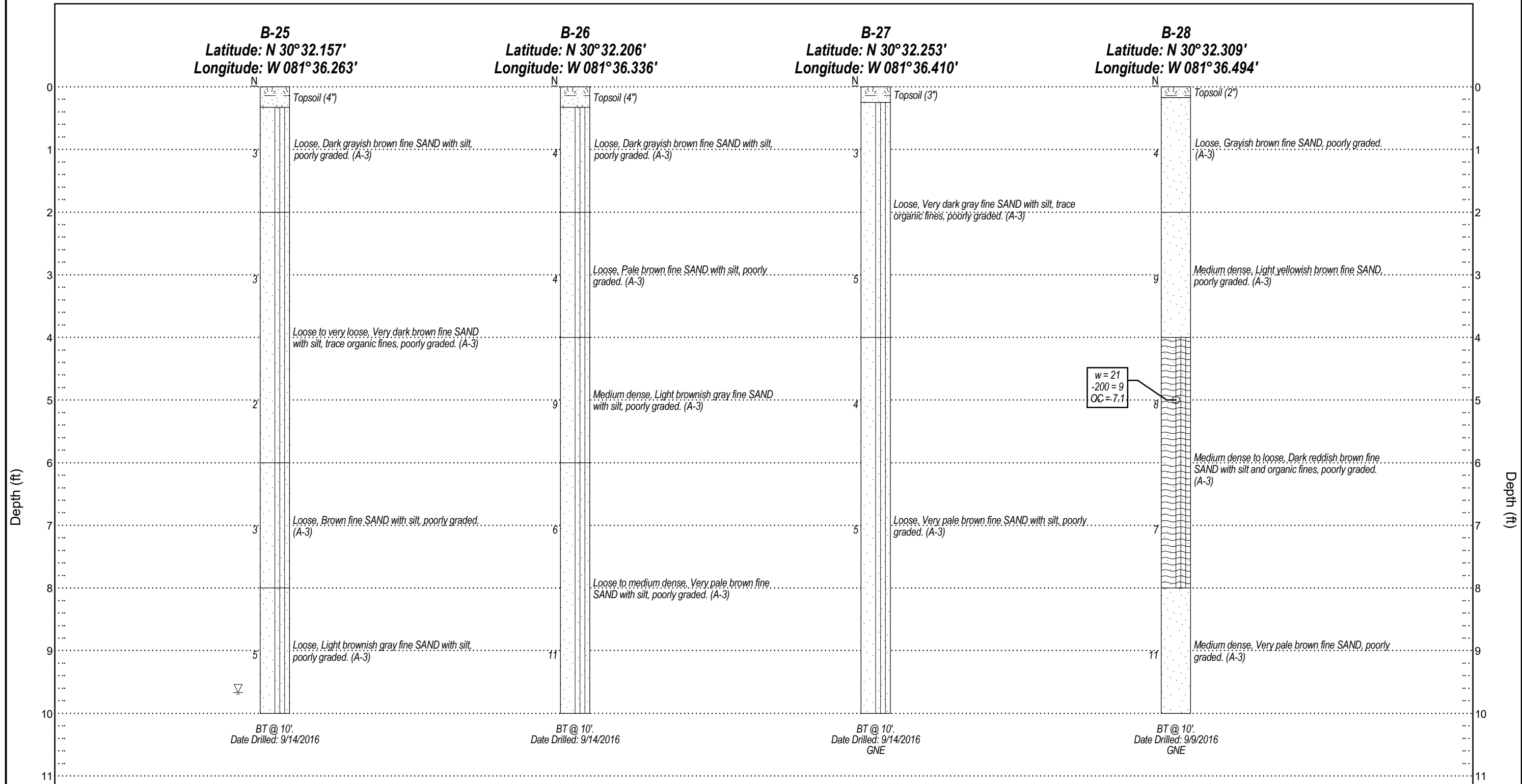
Boring Terminated at Depth Below Existing Grade


Depth to Groundwater at Time of Drilling

-200


% Passing No. 200 U.S. Standard Sieve

REVISIONS						 Meskel & Associates Engineering FL Certificate of Authorization No. 28142 8936 Western Way, Suite 12, Jacksonville, FL 32256	CPH, Inc.		SHEET TITLE:	
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION		DATE:	MAE PROJECT NO.	Generalized Soil Profiles	
10/14/16	MV	GPS COORDINATES ADDED.					1/23/2017	0106-0002A	PROJECT NAME:	FIGURE NO.
									Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main Jacksonville, Florida	







Topsoil




Fine Sand with Silt




Fine Sand




N Standard Penetration Resistance, Blows/Foot



BT Boring Terminated at Depth Below Existing Grade



▽ Depth to Groundwater at Time of Drilling



*▽ Depth to Groundwater 48 Hrs After Drilling


(A-3) AASHTO Soil Classification System

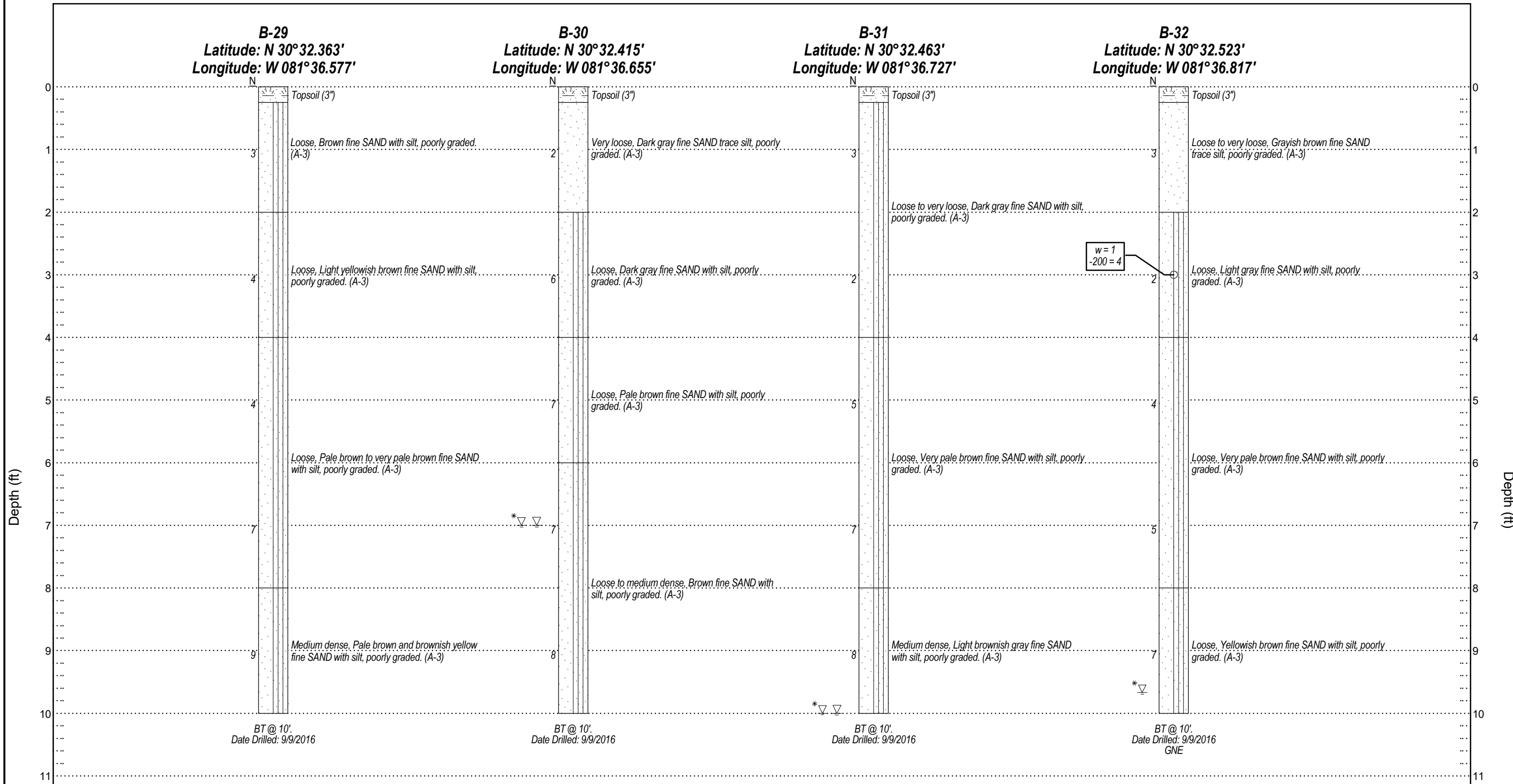
w Natural Moisture Content (%)

OC Organic Content (%)

-200 % Passing No. 200 U.S. Standard Sieve

GNE Groundwater Level Not Encountered at Time of Drilling

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DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	 Meskel & Associates Engineering FL Certificate of Authorization No. 28142 8936 Western Way, Suite 12, Jacksonville, FL 32256		DATE:	MAE PROJECT NO.	Generalized Soil Profiles	
10/14/16	MV	GPS COORDINATES ADDED.						1/23/2017	0106-0002A		
										PROJECT NAME:	Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main Jacksonville, Florida
										FIGURE NO.	9



Topsoil

Fine Sand with Silt

Fine Sand

N

Standard Penetration Resistance, Blows/Foot

BT

Boring Terminated at Depth Below Existing Grade

(A-3)

AASHTO Soil Classification System

▽

Depth to Groundwater at Time of Drilling

*▽

Depth to Groundwater 48 Hrs After Drilling

w

Natural Moisture Content (%)

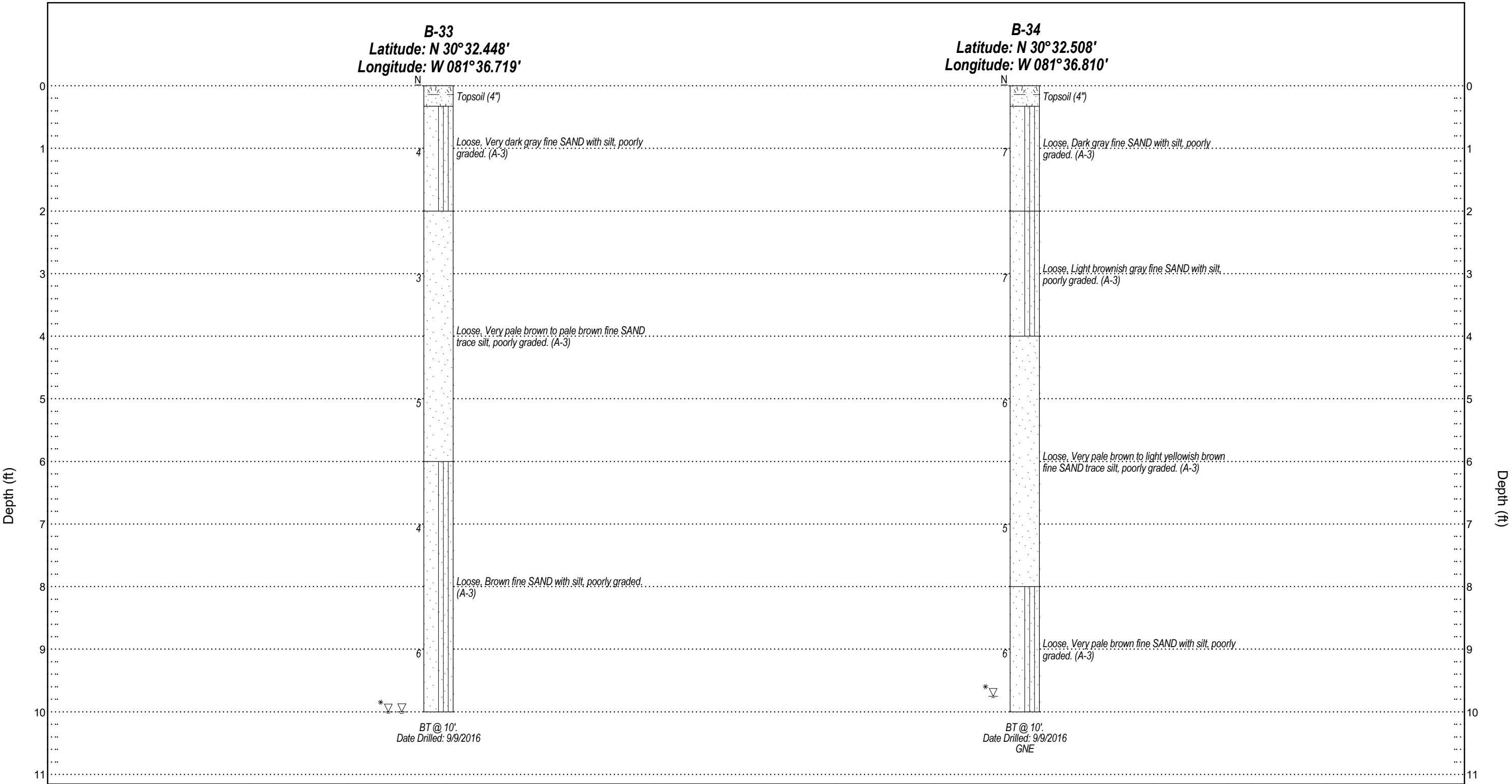
-200

% Passing No. 200 U.S. Standard Sieve

GNE

Groundwater Level Not Encountered at Time of Drilling

REVISIONS						P. RODNEY MANK, P.E. P.E. NO.: 41986		CPH, Inc.		SHEET TITLE:	
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	 Meskel & Associates Engineering FL Certificate of Authorization No. 28142 8936 Western Way, Suite 12, Jacksonville, FL 32256		DATE:	MAE PROJECT NO.	Generalized Soil Profiles	
10/14/16	MV	GPS COORDINATES ADDED.						1/23/2017	0106-0002A		
										PROJECT NAME:	FIGURE NO.
										Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main Jacksonville, Florida	10



Topsoil

Fine Sand with Silt

Fine Sand

N

Standard Penetration Resistance, Blows/Foot

BT

Boring Terminated at Depth Below Existing Grade

(A-3)

AASHTO Soil Classification System

Depth to Groundwater at Time of Drilling

Depth to Groundwater 48 Hrs After Drilling

w

Natural Moisture Content (%)

-200

% Passing No. 200 U.S. Standard Sieve

GNE

Groundwater Level Not Encountered at Time of Drilling

REVISIONS						<div><div>P. RODNEY MANK, P.E. P.E. NO.: 41986</div><div></div><div>Meskel & Associates Engineering</div><div>FL Certificate of Authorization No. 28142</div><div>8936 Western Way, Suite 12, Jacksonville, FL 32256</div></div>	CPH, Inc.		SHEET TITLE:	
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION		DATE:	MAE PROJECT NO.	PROJECT NAME:	Generalized Soil Profiles
10/14/16	MV	GPS COORDINATES ADDED.					1/23/2017	0106-0002A		
								Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main Jacksonville, Florida		11

Appendix A

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BORING B-1

PAGE 1 OF 1

PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/12/16 **COMPLETED** 9/12/16 **LATITUDE** N 30°30.581' **LONGITUDE** W 081°35.030'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

NEW MAE LOG AASTHO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (4")												
1.0	1	Loose, Dark brown fine SAND with silt, poorly graded.	A-3		1 1 2	2								
2.5	2	* ∇ Medium dense, Very dark gray fine SAND with silt, little root fragments, trace organic fines, poorly graded.	A-3		1 3 5 5	8								
5.0	3	Medium dense, Very dark grayish brown fine SAND with silt. few root fragments, trace organic fines, poorly graded.	A-3		2 3 5 6	8								
7.5	4	Medium dense, Grayish brown fine SAND with silt, trace root fragments, trace organic fines, poorly graded.	A-3		3 5 7 8	12								
10.0	5	Medium dense, Grayish brown fine SAND with silt, poorly graded.	A-3		3 5 8 8	13								
		Bottom of borehole at 10 feet.												

NOTES _____

GROUND WATER LEVELS

∇ AT TIME OF DRILLING 3 ft 0 in * ∇ 24 HRS AFTER 3 ft 2 in

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BORING B-2

PAGE 1 OF 1

PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/12/16 **COMPLETED** 9/12/16 **LATITUDE** N 30°30.630' **LONGITUDE** W 081°35.075'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

NEW MAE LOG AASTHO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (4")												
1	1	Loose, Dark brown to yellowish brown fine SAND with silt, poorly graded.	A-3		1 3 3 4	6								
2.5	2	* ▽ ▽			2 3 4 4	7	25	6						
5.0	3	Loose, Very dark brown to very dark gray fine SAND with silt, few organic fines, poorly graded.	A-3		1 2 2 2	4								
7.5	4				1 3 4 7	7								
10.0	5	Medium dense, Very dark brown fine SAND with silt, poorly graded.	A-3		4 6 9 10	15								
		Bottom of borehole at 10 feet.												

NOTES _____

GROUND WATER LEVELS

▽ AT TIME OF DRILLING 3 ft 7 in *▽ 24 HRS AFTER 3 ft 6 in

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BORING B-3

PAGE 1 OF 1

PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/12/16 **COMPLETED** 9/12/16 **LATITUDE** N 30°30.693' **LONGITUDE** W 081°35.133'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (4")												
1.0	1	Loose, Dark brown fine SAND with silt, poorly graded.	A-3		1 2 3 3	5								
2.5	2	Loose, Dark gray fine SAND with silt, poorly graded. *▽▽	A-3		2 3 4 5	7								
5.0	3	Loose to medium dense, Very dark brown to black fine SAND with silt, few organic fines, poorly graded.	A-3		2 2 2 2	4	30	5	3.7					
7.5	4				3 8 13 17	21								
10.0	5	Dense, Dark reddish brown fine SAND with silt, poorly graded.	A-3		4 10 18 20	28								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					▽ AT TIME OF DRILLING 3 ft 8 in *▽ 24 HRS AFTER 3 ft 8 in									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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BORING B-4

PAGE 1 OF 1

PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/12/16 **COMPLETED** 9/12/16 **LATITUDE** N 30°30.767' **LONGITUDE** W 081°35.199'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (5")												
1.0	1	Loose, Grayish brown fine SAND with silt, poorly graded.	A-3		1 2 3 4	5								
2.5	2				5 3 4 2	7								
5.0	3	Loose, Very dark gray fine SAND with silt, few organic fines, poorly graded.	A-3		2 3 5 7	8								
7.5	4				4 10 15 20	25								
10.0	5	Dense, Dark brown fine SAND with silt, poorly graded.	A-3		6 9 15 17	24								
		Bottom of borehole at 10 feet.												
NOTES				GROUND WATER LEVELS										
				∇ AT TIME OF DRILLING 3 ft 11 in * ∇ 24 HRS AFTER 4 ft 3 in										

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:28 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ



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PROJECT NO. 0106-0002A

PROJECT LOCATION Jacksonville, Florida

CLIENT CPH, Inc.

DATE STARTED 9/12/16

COMPLETED 9/12/16

LATITUDE N 30°30.844'

LONGITUDE W 081°35.242'

DRILLING CONTRACTOR MAE, PLLC

DRILLING METHOD Standard Penetration Test

LOGGED BY P.R.Young

CHECKED BY W. Josh Mele

GROUND ELEVATION

HAMMER TYPE Automatic

[illegible]

NOTES

GROUND WATER LEVELS

▽ **AT TIME OF DRILLING** 4 ft 6 in *▽ **24 HRS AFTER** 4 ft 9 in

NEW MAE LOG AASTHO BORING LOCATION - NEW TEMPLATE 7-30-12.GDT - 9/21/16 10:28 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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BORING B-6

PAGE 1 OF 1

PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/12/16 **COMPLETED** 9/12/16 **LATITUDE** N 30°30.926' **LONGITUDE** W 081°35.283'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (4")												
1.0	1	Loose, Very dark brown fine SAND with silt, trace organic fines, poorly graded.	A-3		2 2 2 4	4								
2.5	2	Medium dense, Dark gray brown fine SAND with silt, trace organic fines, poorly graded.	A-3		3 4 5 4	9								
5.0	3	* ▽ Loose to medium dense, Very dark gray fine SAND with silt, trace organic fines, poorly graded.	A-3		1 2 1 3	3	24	8	1.9					
7.5	4				2 4 5 6	9								
10.0	5	Medium dense, Very dark brown fine SAND with silt, trace organic fines, poorly graded.	A-3		4 6 6 8	12								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					▽ AT TIME OF DRILLING 4 ft 11 in *▽ 24 HRS AFTER 4 ft 6 in									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:28 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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BORING B-7

PAGE 1 OF 1

PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/12/16 **COMPLETED** 9/12/16 **LATITUDE** N 30°31.008' **LONGITUDE** W 081°35.324'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (2")												
1.0	1	Medium dense, Very pale brown fine SAND with silt, poorly graded.	A-3		2 3 5 5	8								
2.5	2				5 7 6 6	13								
5.0	3				2 2 2 2	4								
7.5	4	Loose, Very dark gray to dark grayish brown fine SAND with silt, few organic fines, poorly graded.	A-3		1 2 4 4	6								
10.0	5				2 4 4 5	8								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					∇ AT TIME OF DRILLING 5 ft 2 in *∇ 24 HRS AFTER 5 ft 5 in									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:28 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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**BORING B-8**

PAGE 1 OF 1

PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main**PROJECT LOCATION** Jacksonville, Florida**CLIENT** CPH, Inc.**DATE STARTED** 9/12/16**COMPLETED** 9/12/16**LATITUDE** N 30°31.087'**LONGITUDE** W 081°35.359'**DRILLING CONTRACTOR** MAE, PLLC**DRILLING METHOD** Standard Penetration Test**LOGGED BY** P.R.Young**CHECKED BY** W. Josh Mele**GROUND ELEVATION** —**HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0	1	Loose, Dark gray fine SAND with silt, poorly graded.	A-3		1 2 5 5	7								
2.5	2	Medium dense, Dark grayish brown with silt, poorly graded.	A-3		5 9 7 5	16	24	6						
5.0	3				3 5 7 10	12								
7.5	4	Medium dense, Grayish brown fine SAND with silt, poorly graded.	A-3		5 7 8 12	15								
10.0	5				5 10 11 13	21								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					▽ AT TIME OF DRILLING 2 ft 0 in *▽ 24 HRS AFTER 1 ft 9 in									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12.GDT - 9/21/16 10:28 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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BORING B-9

PAGE 1 OF 1

PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/12/16 **COMPLETED** 9/12/16 **LATITUDE** N 30°31.184' **LONGITUDE** W 081°35.371'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (4")												
1	1	Loose, Light brownish gray fine SAND with silt, poorly graded.	A-3		1 1 2 4	3								
2.5	2	Medium dense, Grayish brown fine SAND with silt, poorly graded.	A-3		2 4 4 6	8								
5.0	3				3 5 6 8	11								
7.5	4				5 6 7 8	13								
10.0	5				4 6 9 10	15								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					∇ AT TIME OF DRILLING 3 ft 4 in *∇ 24 HRS AFTER 3 ft 9 in									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:28 - M:\GINT\GINT FILES\PROJECTS\0106-0002\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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BORING B-10

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/12/16 **COMPLETED** 9/12/16 **LATITUDE** N 30°31.249' **LONGITUDE** W 081°35.397'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (4")												
1.0	1				2 3 5 5	8								
2.5	2	Medium dense, Dark gray fine SAND with silt, poorly graded.	A-3		4 5 6 6	11								
5.0	3	Medium dense, Dark grayish brown to grayish brown fine SAND with silt, poorly graded.	A-3		3 4 5 6	9								
7.5	4				3 5 5 8	10								
10.0	5	Medium dense, Brown fine SAND with silt, poorly graded.	A-3		5 6 7 8	13								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					∇ AT TIME OF DRILLING 3 ft 10 in *∇ 24 HRS AFTER 4 ft 0 in									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12.GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/12/16 **COMPLETED** 9/12/16 **LATITUDE** N 30°31.299' **LONGITUDE** W 081°35.428'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

NEW MAE LOG AASTHO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (3")												
1.0	1	Loose, Brown fine SAND with silt, poorly graded.	A-3		1 3 4 5	7								
2.5	2	* ∇ Medium dense, Very dark brown fine SAND, trace organic fines, poorly graded.	A-3		2 3 5 6	8	30	2	0.7					
5.0	3				2 4 4 7	8								
7.5	4	Medium dense, Brown fine SAND with silt, poorly graded.	A-3		3 5 5 5	10								
10.0	5				4 6 7 11	13								
		Bottom of borehole at 10 feet.												

NOTES _____

GROUND WATER LEVELS

∇ AT TIME OF DRILLING 3 ft 2 in *∇ 24 HRS AFTER 3 ft 0 in

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main**PROJECT LOCATION** Jacksonville, Florida**CLIENT** CPH, Inc.**DATE STARTED** 9/12/16**COMPLETED** 9/12/16**LATITUDE** N 30°31.365'**LONGITUDE** W 081°35.470'**DRILLING CONTRACTOR** MAE, PLLC**DRILLING METHOD** Standard Penetration Test**LOGGED BY** P.R.Young**CHECKED BY** W. Josh Mele**GROUND ELEVATION** —**HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (3")												
1.0	1	Loose, Dark gray fine SAND with silt, poorly graded.	A-3		1 1 2 2	3								
2.5	2	Very loose, Black fine SAND, trace organic fines, poorly graded.	A-3		1 1 1 2	2	33	3	1.3					
5.0	3				1 2 4 6	6								
7.5	4	Loose to medium dense, Brown fine SAND with silt, poorly graded.	A-3		3 5 7 7	12								
10.0	5				5 7 10 12	17								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					▽ AT TIME OF DRILLING 2 ft 10 in *▽ 24 HRS AFTER 3 ft 5 in									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12.GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/12/16 **COMPLETED** 9/12/16 **LATITUDE** N 30°31.435' **LONGITUDE** W 081°35.511'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

NEW MAE LOG AASTHO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (3")												
1.0	1	Loose, Brown fine SAND with silt, trace organic fines, poorly graded.	A-3		1 1 2 2	3								
2.5	2	* Very loose, Black fine SAND with silt, trace organic fines, poorly graded.	A-3		1 1 1 3	2								
5.0	3	Medium dense, Brown fine SAND with silt, trace organic fines, poorly graded.	A-3		2 6 8 12	14								
7.5	4				5 8 13 19	21								
10.0	5	Medium dense, Dark brown fine SAND with silt, trace organic fines, poorly graded.	A-3		6 9 14 18	23								
		Bottom of borehole at 10 feet.												

NOTES _____

GROUND WATER LEVELS

▽ AT TIME OF DRILLING 2 ft 6 in *▽ 24 HRS AFTER 2 ft 7 in

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/12/16 **COMPLETED** 9/12/16 **LATITUDE** N 30°31.507' **LONGITUDE** W 081°35.552'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (3")												
1.0	1	Very loose, Very dark gray fine SAND with silt, trace organic fines, poorly graded.	A-3		1 1 1 2	2								
2.5	2	* ▽ ▽ Loose, Dark brown fine SAND with silt, trace organic fines, poorly graded.	A-3		1 2 4 4	6								
5.0	3				3 5 6 8	11								
7.5	4	Medium dense, Grayish brown fine SAND with silt, trace organic fines, poorly graded.	A-3		5 8 11 12	19								
10.0	5				8 9 11 16	20								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					▽ AT TIME OF DRILLING 2 ft 7 in *▽ 24 HRS AFTER 2 ft 6 in									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/12/16 **COMPLETED** 9/12/16 **LATITUDE** N 30°31.583' **LONGITUDE** W 081°35.599'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

NEW MAE LOG AASTHO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (3")												
1.0	1	Loose, Dark gray fine SAND with silt, poorly graded.	A-3		1 2 3 4	5								
2.5	2	* ∇ Medium dense, Very dark brown fine SAND with silt, trace organic fines, poorly graded.	A-3		2 3 6 7	9								
5.0	3	Medium dense, Black fine SAND, trace organic material, poorly graded.	A-3		4 6 9 15	15	25	2	1.3					
7.5	4	Medium dense to dense, Dark brown fine SAND with silt, poorly graded.	A-3		6 9 12 16	21								
10.0	5				6 10 14 19	24								
		Bottom of borehole at 10 feet.												

NOTES _____

GROUND WATER LEVELS

∇ AT TIME OF DRILLING 3 ft 7 in *∇ 24 HRS AFTER 3 ft 3 in

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/14/16 **COMPLETED** 9/14/16 **LATITUDE** N 30°31.640' **LONGITUDE** W 081°35.629'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (3")												
1	1	Loose to medium dense, Very dark gray fine SAND with silt, trace organic fines, poorly graded.	A-3		1 2 3 5	5								
2.5	2				4 5 6 8	11								
5.0	3				5 8 11 16	19								
7.5	4				5 10 13 17	23								
10.0	5	Dense, Very dark brown fine to medium coarse SAND with silt, poorly graded.	A-3		6 11 15 19	26								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					∇ AT TIME OF DRILLING 3 ft 8 in *∇ AFTER DRILLING ---									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/14/16 **COMPLETED** 9/14/16 **LATITUDE** N 30°31.714' **LONGITUDE** W 081°35.665'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (3")												
1	1	Loose, Brown fine SAND with silt, poorly graded.	A-3		1 2 3	4								
2.5	2	Loose, Dark grayish brown fine SAND with silt, trace organic fines, poorly graded.	A-3		1 2 1 2	3								
5.0	3	Loose, Very dark brown fine SAND with silt, trace organic fines, poorly graded.	A-3		1 2 3 3	5								
7.5	4	Medium dense, Dark grayish brown fine SAND with silt, poorly graded.	A-3		3 5 8 12	13								
10.0	5	Dense, Light yellowish brown fine SAND with silt, poorly graded.	A-3		4 10 15 15	25								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					∇ AT TIME OF DRILLING 4 ft 6 in *∇ AFTER DRILLING ---									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/14/16 **COMPLETED** 9/14/16 **LATITUDE** N 30°31.788' **LONGITUDE** W 081°35.698'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (3")												
1	1	Very loose to loose, Very dark brown fine SAND with silt, trace organic fines, poorly graded.	A-3		1 1 1 1	2	19	7						
2.5	2				1 1 2 4	3								
5.0	3	Medium dense, Very dark brown fine SAND with silt, trace organic fines, poorly graded.	A-3		3 5 8 9	13								
7.5	4	Medium dense, Very pale brown fine SAND with silt, poorly graded.	A-3		5 8 8 10	16								
10.0	5	Medium dense, Grayish brown fine SAND with silt, poorly graded.	A-3		8 9 11 14	20								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					∇ AT TIME OF DRILLING 4 ft 0 in *∇ AFTER DRILLING ---									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/14/16 **COMPLETED** 9/14/16 **LATITUDE** N 30°31.863' **LONGITUDE** W 081°35.755'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

NEW MAE LOG AASTHO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (4")												
1.0	1	Loose, Dark brown fine SAND with silt, trace roots, poorly graded.	A-3		1 2 3 5	5								
2.5	2	Medium dense, Dark brown fine SAND with silt, trace organic fines, poorly graded.	A-3		3 4 4 6	8								
5.0	3	▽ Medium dense, Grayish brown fine SAND with silt, poorly graded.	A-3		3 5 7 8	12								
7.5	4	Medium dense, Dark grayish brown fine SAND with silt, poorly graded.	A-3		4 6 7 8	13								
10.0	5	Medium dense, Grayish brown fine SAND with silt, poorly graded.	A-3		5 7 7 10	14								
		Bottom of borehole at 10 feet.												

NOTES _____

GROUND WATER LEVELS

▽ AT TIME OF DRILLING 5 ft 0 in *▽ AFTER DRILLING ---

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/14/16 **COMPLETED** 9/14/16 **LATITUDE** N 30°31.953' **LONGITUDE** W 081°35.839'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (3")												
1	1	Loose, Dark gray fine SAND with silt, poorly graded.	A-3		1 2 3 4	5								
2.5	2	Medium dense, Brown fine SAND with silt, poorly graded.	A-3		5 8 10 12	18	18	10						
5.0	3	Medium dense, Light brownish gray fine SAND with silt, poorly graded.	A-3		6 10 13 17	23								
7.5	4	Medium dense to loose, Dark gray fine SAND with silt, poorly graded.	A-3		5 5 6 6	11								
10.0	5				3 3 3 4	6								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					∇ AT TIME OF DRILLING 4 ft 0 in *∇ AFTER DRILLING ---									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12.GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/14/16 **COMPLETED** 9/14/16 **LATITUDE** N 30°31.986' **LONGITUDE** W 081°35.927'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (4")												
1.0	1	Loose, Very dark gray fine SAND with silt, trace organic fines, poorly graded.	A-3		1 3 3 4	6								
2.5	2	Medium dense, Dark grayish brown fine SAND, trace silt, poorly graded.	A-3		3 5 10 13	15								
5.0	3	Medium dense, Very dark gray fine SAND with silt, trace organic fines, poorly graded.	A-3		5 10 12 14	22	21	6	0.8					
7.5	4	Medium dense, Brown fine SAND with silt, poorly graded.	A-3		5 7 6 8	13								
10.0	5				5 6 6 8	12								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					∇ AT TIME OF DRILLING 4 ft 1 in *∇ AFTER DRILLING ---									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12.GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/14/16 **COMPLETED** 9/14/16 **LATITUDE** N 30°32.022' **LONGITUDE** W 081°36.016'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (4")												
1.0	1	Loose, Dark gray fine SAND with silt, trace root fragments, poorly graded.	A-3		1 3 3 2	6								
2.5	2	Medium dense, Very dark brown fine SAND with silt, trace organic fines, poorly graded.	A-3		3 3 5 8	8								
5.0	3	Loose, Dark brown fine SAND with silt, poorly graded.	A-3		3 3 3 4	6								
7.5	4	Medium dense, Brown fine SAND with silt, poorly graded.	A-3		3 5 7 8	12								
10.0	5				5 9 10 14	19								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					∇ AT TIME OF DRILLING 5 ft 7 in *∇ AFTER DRILLING ---									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/14/16 **COMPLETED** 9/14/16 **LATITUDE** N 30°32.057' **LONGITUDE** W 081°36.107'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (4")												
1.0	1	Loose, Very dark gray fine SAND with silt, trace root fragments, trace organic fines, poorly graded.	A-3		1 1 3 3	4								
2.5	2	Medium dense, Very pale brown fine SAND, trace silt, poorly graded.	A-3		2 4 4 3	8								
5.0	3				3 5 6 8	11								
7.5	4				5 7 7 8	14								
10.0	5				5 6 7 8	13								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					∇ AT TIME OF DRILLING 7 ft 3 in * ∇ AFTER DRILLING ---									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/14/16 **COMPLETED** 9/14/16 **LATITUDE** N 30°32.107' **LONGITUDE** W 081°36.185'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (4")												
1.0	1	Loose, Very dark grayish brown fine SAND with silt, trace organic fines, poorly graded.	A-3		1 2 2 2	4								
2.5	2	Loose, Yellowish brown fine SAND with silt, poorly graded.	A-3		2 3 4 4	7								
5.0	3	Medium dense, Very pale brown fine SAND, trace silt, poorly graded.	A-3		2 3 5 6	8								
7.5	4	Medium dense, Brown fine SAND with silt, poorly graded.	A-3		5 6 8 10	14								
10.0	5				6 7 8 8	15								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					∇ AT TIME OF DRILLING 7 ft 3 in *∇ AFTER DRILLING ---									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/14/16 **COMPLETED** 9/14/16 **LATITUDE** N 30°32.157' **LONGITUDE** W 081°36.263'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (4")												
1.0	1	Loose, Dark grayish brown fine SAND with silt, poorly graded.	A-3		1 1 2 3	3								
2.5	2	Loose to very loose, Very dark brown fine SAND with silt, trace organic fines, poorly graded.	A-3		1 1 2 2	3								
5.0	3				1 1 1 1	2								
7.5	4	Loose, Brown fine SAND with silt, poorly graded.	A-3		1 1 2 4	3								
10.0	5	Loose, Light brownish gray fine SAND with silt, poorly graded.	A-3		2 2 3 4	5								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					∇ AT TIME OF DRILLING 9 ft 8 in *∇ AFTER DRILLING ---									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/14/16 **COMPLETED** 9/14/16 **LATITUDE** N 30°32.206' **LONGITUDE** W 081°36.336'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (4")												
1.0	1	Loose, Dark grayish brown fine SAND with silt, poorly graded.	A-3		1 2 2 3	4								
2.5	2	Loose, Pale brown fine SAND with silt, poorly graded.	A-3		2 2 2 2	4								
5.0	3	Medium dense, Light brownish gray fine SAND with silt, poorly graded.	A-3		2 7 2 3	9								
7.5	4	Loose to medium dense, Very pale brown fine SAND with silt, poorly graded.	A-3		2 3 3 3	6								
10.0	5				3 5 6 8	11								
		Bottom of borehole at 10 feet.												
NOTES GNE-Groundwater Level Not Encountered at Time of Drilling.					GROUND WATER LEVELS									
					AT TIME OF DRILLING GNE					AFTER DRILLING ---				

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/14/16 **COMPLETED** 9/14/16 **LATITUDE** N 30°32.253' **LONGITUDE** W 081°36.410'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12, GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002\YELLOW BLUFF 16-IN WATER MAIN.GPJ														
DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (3")												
2.5	1	Loose, Very dark gray fine SAND with silt, trace organic fines, poorly graded.	A-3		1 1 2 3	3								
	2				2 3 2 3	5								
5.0	3	Loose, Very pale brown fine SAND with silt, poorly graded.	A-3		2 2 2 2	4								
	4				2 2 3 4	5								
7.5														
	5													
10.0		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
GNE-Groundwater Level Not Encountered at Time of Drilling.					AT TIME OF DRILLING GNE AFTER DRILLING ---									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/9/16 **COMPLETED** 9/9/16 **LATITUDE** N 30°32.309' **LONGITUDE** W 081°36.494'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (2")												
1	1	Loose, Grayish brown fine SAND, poorly graded.	A-3		1 2 3	4								
2.5	2	Medium dense, Light yellowish brown fine SAND, poorly graded.	A-3		3 4 5 5	9								
5.0	3	Medium dense to loose, Dark reddish brown fine SAND with silt and organic fines, poorly graded.	A-3		2 3 5 5	8	21	9	7.1					
7.5	4				2 3 4 4	7								
10.0	5	Medium dense, Very pale brown fine SAND, poorly graded.	A-3		3 4 7 7	11								
		Bottom of borehole at 10 feet.												
NOTES GNE-Groundwater Level Not Encountered at Time of Drilling.					GROUND WATER LEVELS									
					AT TIME OF DRILLING GNE					48 HRS AFTER GNE				

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/9/16 **COMPLETED** 9/9/16 **LATITUDE** N 30°32.363' **LONGITUDE** W 081°36.577'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

NEW MAE LOG AASTHO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (3")												
1.0	1	Loose, Brown fine SAND with silt, poorly graded.	A-3		1 1 2 3	3								
2.5	2	Loose, Light yellowish brown fine SAND with silt, poorly graded.	A-3		1 2 2 2	4								
5.0	3	Loose, Pale brown to very pale brown fine SAND with silt, poorly graded.	A-3		2 2 2 2	4								
7.5	4				2 3 4 5	7								
10.0	5	Medium dense, Pale brown and brownish yellow fine SAND with silt, poorly graded.	A-3		3 4 5 7	9								
		Bottom of borehole at 10 feet.												

NOTES GNE-Groundwater Level Not Encountered at Time of Drilling.

GROUND WATER LEVELS

AT TIME OF DRILLING GNE 48 HRS AFTER GNE

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/9/16 **COMPLETED** 9/9/16 **LATITUDE** N 30°32.415' **LONGITUDE** W 081°36.655'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

NEW MAE LOG AASTHO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (3")												
1.0	1	Very loose, Dark gray fine SAND trace silt, poorly graded.	A-3		1 1 1 2	2								
2.5	2	Loose, Dark gray fine SAND with silt, poorly graded.	A-3		2 3 3 3	6								
5.0	3	Loose, Pale brown fine SAND with silt, poorly graded.	A-3		3 4 3 4	7								
7.5	4	* Loose to medium dense, Brown fine SAND with silt, poorly graded.	A-3		2 3 4 5	7								
10.0	5				3 4 4 7	8								
		Bottom of borehole at 10 feet.												

NOTES _____

GROUND WATER LEVELS

AT TIME OF DRILLING 7 ft 0 in * 48 HRS AFTER 7 ft 0 in

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/9/16 **COMPLETED** 9/9/16 **LATITUDE** N 30°32.463' **LONGITUDE** W 081°36.727'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (3")												
1	1	Loose to very loose, Dark gray fine SAND with silt, poorly graded.	A-3		1 1 2 2	3								
2.5	2				1 1 1 1	2								
5.0	3				1 2 3 4	5								
7.5	4	Loose, Very pale brown fine SAND with silt, poorly graded.	A-3		2 3 4 4	7								
10.0	5				2 4 4 6	8								
		Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					* AT TIME OF DRILLING 10 ft 0 in * 48 HRS AFTER 10 ft 0 in									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:27 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/9/16 **COMPLETED** 9/9/16 **LATITUDE** N 30°32.523' **LONGITUDE** W 081°36.817'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

NEW MAE LOG AASTHO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:28 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (3")												
1.0	1	Loose to very loose, Grayish brown fine SAND trace silt, poorly graded.	A-3		1 1 2 2	3								
2.5	2	Loose, Light gray fine SAND with silt, poorly graded.	A-3		1 1 1 2	2	1	4						
5.0	3	Loose, Very pale brown fine SAND with silt, poorly graded.	A-3		1 2 2 2	4								
7.5	4				2 2 3 3	5								
10.0	5	Loose, Yellowish brown fine SAND with silt, poorly graded.	A-3		2 3 4 5	7								
		Bottom of borehole at 10 feet.												

NOTES GNE-Groundwater Level Not Encountered at Time of Drilling.

GROUND WATER LEVELS

AT TIME OF DRILLING GNE *▽ 48 HRS AFTER 9 ft 8 in

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/9/16 **COMPLETED** 9/9/16 **LATITUDE** N 30°32.448' **LONGITUDE** W 081°36.719'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (4")												
1	1	Loose, Very dark gray fine SAND with silt, poorly graded.	A-3		1 2 3	4								
2.5	2	Loose, Very pale brown to pale brown fine SAND trace silt, poorly graded.	A-3		1 2 1 3	3								
5.0	3				1 2 3 3	5								
7.5	4	Loose, Brown fine SAND with silt, poorly graded.	A-3		2 2 2 3	4								
10.0	5				2 3 3 3	6								
		* ∇ ∇ Bottom of borehole at 10 feet.												
NOTES					GROUND WATER LEVELS									
					* ∇ AT TIME OF DRILLING 10 ft in * ∇ 48 HRS AFTER 10 ft 0 in									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:28 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

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PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Rd-Marshland Dr to Tisons Bluff Rd-16" Water Main
PROJECT LOCATION Jacksonville, Florida **CLIENT** CPH, Inc.
DATE STARTED 9/9/16 **COMPLETED** 9/9/16 **LATITUDE** N 30°32.508' **LONGITUDE** W 081°36.810'
DRILLING CONTRACTOR MAE, PLLC **DRILLING METHOD** Standard Penetration Test
LOGGED BY P.R.Young **CHECKED BY** W. Josh Mele **GROUND ELEVATION** — **HAMMER TYPE** Automatic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	AASHTO	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0.0		Topsoil (4")												
1.0	1	Loose, Dark gray fine SAND with silt, poorly graded.	A-3		1 3 4 6	7								
2.5	2	Loose, Light brownish gray fine SAND with silt, poorly graded.	A-3		2 3 4 4	7								
5.0	3	Loose, Very pale brown to light yellowish brown fine SAND trace silt, poorly graded.	A-3		2 3 3 3	6								
7.5	4				2 2 3 4	5								
10.0	5	Loose, Very pale brown fine SAND with silt, poorly graded.	A-3		2 3 3 5	6								
		Bottom of borehole at 10 feet.												
NOTES GNE-Groundwater Level Not Encountered at Time of Drilling.					GROUND WATER LEVELS AT TIME OF DRILLING GNE *▽ 48 HRS AFTER 9 ft 9 in									

NEW MAE LOG AASHTO BORING LOCATION - NEW TEMPLATE 7-30-12 GDT - 9/21/16 10:28 - M:\GINT\GINT FILES\PROJECTS\0106-0002A\YELLOW BLUFF 16-IN WATER MAIN.GPJ

FIELD EXPLORATION PROCEDURES

Standard Penetration Test (SPT) Borings

The Standard Penetration Test (SPT) boring(s) were performed in general accordance with the latest revision of ASTM D 1586, "Penetration Test and Split-Barrel Sampling of Soils." The borings were advanced by rotary drilling techniques. A split-barrel sampler was inserted to the borehole bottom and driven 18 to 24 inches into the soil using a 140 pound hammer falling an average of 30 inches per hammer blow. The number of hammer blows for the final 12 inches of penetration (18" sample) or for the sum of the middle 12 inches of penetration (24" sample) is termed the "penetration resistance, blow count, or N-value." This value is an index to several in-situ geotechnical properties of the material tested, such as relative density and Young's Modulus.

After driving the sampler, it was retrieved from the borehole and representative samples of the material within the split-barrel were containerized and sealed. After completing the drilling operations, the samples for each boring were transported to the laboratory where they were examined by our engineer in order to verify the field classification.

KEY TO BORING LOGS - USCS

Soil Classification

Soil classification of samples obtained at the boring locations is based on the Unified Soil Classification System (USCS). Coarse grained soils have more than 50% of their dry weight retained on a #200 sieve. Their principal descriptors are: sand, cobbles and boulders. 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 to 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.

BORING LOG LEGEND	
Symbol	Description
N	Standard Penetration Resistance, the number of blows required to advance a standard spoon sampler 12" when driven by a 140-lb hammer dropping 30".
WOR	Split Spoon sampler advanced under the weight of the drill rods
WOH	Split Spoon sampler advanced under the weight of the SPT hammer
50/2"	Indicates 50 hammer blows drove the split spoon 2 inches; 50 Hammer blows for less than 6-inches of split spoon driving is considered "Refusal".
(SP)	Unified Soil Classification System
-200	Fines content, % Passing No. 200 U.S. Standard Sieve
w	Natural Moisture Content (%)
OC	Organic Content (%)
LL	Liquid Limit
PI	Plasticity Index
NP	Non-Plastic
PP	Pocket Penetrometer in tons per square foot (tsf)

MODIFIERS	
SECONDARY CONSTITUENTS (Sand, Silt or Clay)	
Trace	Less than 5%
With	5% to 12%
Sandy, Silty or Clayey	12% to 35%
Very Sandy, Very Silty or Very Clayey	35% to 50%
ORGANIC CONTENT	
Trace	2% or less
With	3% to 5%
Organic Soils	5% to 20%
Highly Organic Soils (Muck)	20% to 75%
PEAT	Greater than 75%
MINOR COMPONENTS (Shell, Rock, Debris, Roots, etc.)	
Trace	Less than 5%
Few	5% to 10%
Little	15% to 25%
Some	30% to 45%

RELATIVE DENSITY (Coarse-Grained Soils)	
Relative Density	N-Value *
Very Loose	Less than 3
Loose	3 to 8
Medium Dense	8 to 24
Dense	24 to 40
Very Dense	Greater than 40
CONSISTENCY (Fine-Grained Soils)	
Consistency	N-Value *
Very Soft	Less than 1
Soft	1 to 3
Firm	3 to 6
Stiff	6 to 12
Very Stiff	12 to 24
Hard	Greater than 24
RELATIVE HARDNESS (Limestone)	
Relative Hardness	N-Value *
Soft	Less than 50
Hard	Greater than 50

* Using Automatic Hammer

Unified Soil Classification System (USCS)

(from ASTM D 2487)

Major Divisions			Group Symbol	Typical Names
Coarse-Grained Soils More than 50% retained on the 0.075 mm (No. 200) sieve	Gravels 50% or more of coarse fraction retained on the 4.75 mm (No. 4) sieve	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		Gravels with Fines	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sands 50% or more of coarse fraction passes the 4.75 (No. 4) sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly graded sands and gravelly sands, little or no fines
		Sands with Fines	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
Fine-Grained Soils More than 50% passes the 0.075 mm (No. 200) sieve	Silts and Clays Liquid Limit 50% or less		ML	Inorganic silts, very fine sands, rock four, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly/sandy/silty/lean clays
			OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays Liquid Limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
			CH	Inorganic clays or high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat, muck, and other highly organic soils

Prefix: G = Gravel, S = Sand, M = Silt, C = Clay, O = Organic

Suffix: W = Well Graded, P = Poorly Graded, M = Silty, L = Clay, LL < 50%, H = Clay, LL > 50%

Appendix B

Meskel & Associates Engineering, PLLC

FL Certificate of Authorization No. 28142

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**SUMMARY OF LABORATORY
TEST RESULTS**

PROJECT NO. 0106-0002A

PROJECT NAME Yellow Bluff Road-16" Water Main

DATE 9/20/2016

PROJECT LOCATION Jacksonville, Florida

CLIENT CPH, Inc.

Borehole	Sample No	Approx. Depth	%<#200 Sieve	Water Content (%)	Organic Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	AASHTO Classification	Comments
B-3	3	5	5	30	3.7	---	---	---	A-3	
B-2	2	3	6	25	---	---	---	---	A-3	
B-6	3	5	8	24	1.9	---	---	---	A-3	
B-8	2	3	6	24	---	---	---	---	A-3	
B-11	2	3	2	30	0.7	---	---	---	A-3	
B-12	2	3	3	33	1.3	---	---	---	A-3	
B-15	3	5	2	25	1.3	---	---	---	A-3	
B-18	1	1	7	19	---	---	---	---	A-3	
B-20	2	3	10	18	---	---	---	---	A-3	
B-21	3	5	6	21	0.8	---	---	---	A-3	
B-28	3	5	9	21	7.1	---	---	---	A-3	
B-32	2	3	4	1	---	---	---	---	A-3	

Note: "---" Untested Parameter

Summary of Corrosion Series Test Results
JEA Yellow Bluff Road 16-inch Water Main
MAE Project No.: 0106-0002A

Boring No.	Coordinates ⁽¹⁾		Offset ⁽²⁾ (ft)	Approximate Test Depth ⁽³⁾ (ft)	USCS Soil Classification	pH	Resistivity (ohm-cm)	Chlorides (ppm) ⁽⁴⁾	Sulfates (ppm) ⁽⁵⁾	DIP ⁽⁶⁾ Soil Classification	Environmental Classification ⁽⁷⁾	
	Longitude	Latitude									Steel Substructure	Concrete Substructure
B-1	N 30°30.581'	W 081°35.030'	10	2 to 6	SP-SM	5.0	9000	60	63.6	Corrosive	Extremely Aggressive	Moderately Aggressive
B-5	N 30°30.844'	W 081°35.242'	10	2 to 6	SP-SM	5.0	30000	60	2.4	Corrosive	Extremely Aggressive	Moderately Aggressive
B-9	N 30°31.184'	W 081°35.371'	10	2 to 6	SP-SM	4.9	10000	60	77.1	Corrosive	Extremely Aggressive	Extremely Aggressive
B-13	N 30°31.435'	W 081°35.511'	10	2 to 6	SP-SM	5.0	27000	60	49.5	Corrosive	Extremely Aggressive	Moderately Aggressive
B-17	N 30°31.714'	W 081°35.665'	10	2 to 6	SP-SM	5.0	25000	60	2.4	Corrosive	Extremely Aggressive	Moderately Aggressive
B-21	N 30°31.986'	W 081°35.927'	10	0 to 4	SP-SM	5.0	19000	60	63.6	Corrosive	Extremely Aggressive	Moderately Aggressive
B-25	N 30°32.157'	W 081°36.263'	10	2 to 6	SP-SM	5.0	11000	60	54.6	Corrosive	Extremely Aggressive	Moderately Aggressive
B-29	N 30°32.363'	W 081°36.577'	10	2 to 6	SP-SM	4.5	9200	120	2.4	Corrosive	Extremely Aggressive	Extremely Aggressive
B-32	N 30°32.523'	W 081°36.817'	10	4 to 8	SP-SM	4.8	54000	60	2.4	Corrosive	Extremely Aggressive	Extremely Aggressive

(1) Coordinates were recorded using a hand-held GPS reciever.

(2) Offset is approximate distance measured from the east edge of existing roadway pavement.

(3) Feet below existing ground surface.

(4) 60 ppm is the lower limit of detection for the chlorida test method

(5) 2.4 ppm is the lower limit of detection for the sulfapte test method

(6) DIP=Ductile Iron Pipe, soil classification per JEA *Water & Wastewater Standards Manual* (January 1, 2017) & AWWA-C105

(7) Environmental Classification oer Table 1.3.2-1 *Criteria for Substructure Environmental Classifications*, FDOT Structures Design Guide (2016)

LABORATORY TEST PROCEDURES

Percent Fines Content

The percent fines or material passing the No. 200 mesh sieve of the sample tested was determined in general accordance with the latest revision of ASTM D 1140. The percent fines are the soil particles in the silt and clay size range.

Natural Moisture Content

The water content of the tested sample was determined in general accordance with the latest revision of ASTM D 2216. The water content is defined as the ratio of “pore” or “free” water in a given mass of material to the mass of solid material particles.

Organic Loss on Ignition (Percent Organics)

The organic loss on ignition or percent organic material in the sample tested was determined in general accordance with ASTM D 2974. The percent organics is the material, expressed as a percentage, which is burned off in a muffle furnace at 455 ± 10 degrees Celsius.

Appendix C

