June 5, 2018

BOARD OF COUNTY COMMISSIONERS
ORANGE COUNTY, FLORIDA

Y18-765-EB / ADDENDUM # 1
LAKE JENNIE JEWEL BAFFLE BOX PROJECT

Bid Opening Date: June 19, 2018

This addendum is hereby incorporated into the bid documents of the project referenced above. The following items are clarifications, corrections, additions, deletions and/or revisions to and shall take precedence over the original documents. Underlining indicates additions, deletions are indicated by ~~strikethrough.~~

A. The following information is provided to answer questions from prospective bidders:

1. **Question:** Is there a pay item that covers the cost for the stormwater bypass or can a pay item be added for bypass? **Answer:** Cost is included in Pay Item 104-14. Please refer to the pay item note on Sheet No. 3 of the drawings.

2. **Question:** Does the County know if the overhead lines can be de-energized in this location? **Answer:** The Contractor shall coordinate with the power company based on the type and height of equipment the Contractor will be using for the installation of the box.

3. **Question:** Will the County be performing densities? **Answer:** Yes, the County will be providing geotechnical services and information. See attached geotechnical report, dated February 6, 2017 prepared by Nadic Engineering.

4. **Question:** Will the County allow for alternate suppliers for the baffle box? **Answer:** Plan notes include "OR EQUIVALENT" for the baffle box manufacturer.

5. **Question:** Is a project sign required? **Answer:** None required.

B. The attached Geotechnical Report dated February 6, 2017 prepared by Nadic Engineering is hereby made a part of the solicitation.

C. All other terms and conditions of the IFB remain the same.

D. The Proposer shall acknowledge receipt of this addendum by completing the applicable section in the solicitation or by completion of the acknowledgement information on the addendum. Either form of acknowledgement must be completed and returned not later than the date and time for receipt of the proposal.

Receipt acknowledged by:

_____ _____
Authorized Signature Date Signed

_____
Title

_____
Name of Firm

Nadic Engineering Services, Inc.

Final Geotechnical Engineering Report
Lake Jennie Jewel Nutrient Removal
Summerlin Avenue Baffle Box
Orange County, Florida
Contract No. Y12-905C
NES Project No.: R15021.1

Prepared for:

Pegasus Engineering LLC,
301 West State Road 434,
Suite 309
Winter Springs, FL 32708

Prepared by:

Nadic Engineering Services, Inc.
601 N. Hart Blvd
Orlando, Florida 32818
407-521-4771

Consultants in: Civil · Environmental · Geotechnical Engineering
Offices in: Orlando · Miami

NADIC ENGINEERING SERVICES, INC.
Civil, Environmental, and Geotechnical Consultants

February 6, 2017

Pegasus Engineering LLC
301 West State Road 434, Suite 309
Winter Springs, Florida 32708

Attention: Mr. David W. Hamstra, P.E.
Principal/ Project Manager

RE: Final Geotechnical Engineering Report
Lake Jennie Jewel Nutrient Removal
Summerlin Avenue Baffle Box
Orange County, Florida
Contract No. Y12-905C
NES Project No. R15021.1

Dear Mr. Hamstra:

Nadic Engineering Services, Inc. (**NES**) is pleased to submit this geotechnical subsurface exploration and evaluation at the site of the proposed Nutrient Separating Baffle Box installation along Summerlin Avenue to reduce pollutant load to Lake Jennie Jewel in Orange County, Florida. This report presents our field exploration and testing methods, and our recommendations based on the data collected during the geotechnical exploration. This geotechnical exploration was authorized through a sub-consultant agreement between Pegasus Engineering LLC and **NES**.

NES appreciates the opportunity to be of service to Pegasus Engineering LLC and Orange County Public Works Department on this project. We look forward to a continued association. Please contact us if you have any questions, or if we may be of further assistance to you as this project proceeds.

Sincerely,
NADIC ENGINEERING SERVICES, INC.
Engineering Business No. 8214

Mustafa Syed, B.S.
Staff Engineer

GODWIN N. NNADI LICENSE No. 50637 STATE OF FLORIDA PROFESSIONAL ENGINEER

Godwin N. Nnadi, Ph.D., P.E.
Principal Engineer 12/19/2017
FL Registration No. 50637

Civil: GNnadi\Orange County\Summerlin\Working folder\Report\R15021_Geotech Eng Report

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APPENDICIES

1.0 PROJECT LOCATION AND DESCRIPTION

The proposed baffle box is planned to be located on East of Summerlin Avenue …..…… intersection with Appleton Avenue ……. with Summer Winds Court in Orange County, Florida. The dimensions …… 184 inches long, 112 inches wide and 120 inches in height.

We understand that the Orange County Public Works Department is planning to improve stormwater discharge into Lake Jennie Jewel with the installation of a baffle box for nutrient removal. The proposed baffle box is planned to be located on East of Summerlin Avenue, approximately 250 feet south from the intersection with Appleton Avenue and about 300 feet north from the intersection with Summer Winds Court in Orange County, Florida. The dimension of the proposed baffle box is about 184 inches long, 112 inches wide and 120 inches in height. The baffle box is planned to be equipped with two (2) inflow pipes, screen system, three (3) sediment chambers and a skimmer.

The project site is located within Section 12, Township 23 South and Range 29 East in Orange County, Florida. The project location and approximate boring locations are shown in **Figure 1** in **Appendix A**.

2.0 PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to obtain information on the general subsurface conditions including soil and groundwater conditions in order to make geotechnical engineering assessments and recommendations to guide the design and construction of the proposed baffle box. The following services were provided in order to achieve the preceding objectives.

1. Reviewed readily available published geologic and topographic information. This published information was obtained from the appropriate Quadrangle Maps published by the United States Geological Survey (USGS) and "Soil Survey of Orange County, Florida" published by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS).

2. Visited site to evaluate existing conditions and drilling accessibility.

3. Performed one (1) Standard Penetration Test borings to a depth of 15 below existing grade at a proposed baffle box location along summerlin Avenue.

4. Visually classified and stratified representative soil samples in the laboratory using the Unified Soil Classification System. Performed laboratory testing of selected soil samples to evaluate the basic index and engineering properties of the encountered soils.

5. Prepared this formal engineering report summarizing the field exploration, laboratory tests, engineering analyses, evaluations and recommendations.

3.0 REVIEW OF AVAILABLE DATA

3.1 USGS Topographic Map

The Topographic Survey Map published by the USGS entitled "Pine Castle" dated 1953 (Photo revised 1980) was reviewed for ground surface features at or near the project site. Based on this review, the natural ground surface elevation appears to be about +100 feet National Geodetic Vertical Datum (NGVD). A reproduction of the USGS topography map is provided in **Figure 2** in the **Appendix A**.

3.2 USDA, NRCS Soil Survey

The "Soil Survey of Orange County, Florida" published by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) was reviewed from general near-surface soil information within the general project vicinity. A reproduction of the USDA/NRCS map for the project is presented in **Figure 3** in the **Appendix A.** The primary Soil mapping unit within the project vicinity is "Candler -Urban Land complex" the typical soil profile is presented in **Table 1**:

Table 1
Orange County Soils Survey Summary

Soil Unit	Depth (in.)	Soil Description	USCS*	AASHTO**	USDA SHGWT*** (ft.)
Candler -Urban Land Complex (8)	0-5	Fine sand	SP, SP-SM	A-3	>6.0
	5-52	Sand, fine sand	SP, SP-SM	A-3	
	52-80	Sand, fine sand	SP-SM	A-3, A-2-4	

*USCS: Unified Soil Classification System
**AASHTO: American Association of State Highway and Transportation Officials
***SHGWT: Seasonal High Groundwater Table

Information contained in the USDA/NRCS Soil Survey is very general and may be outdated due to recent development in the site vicinity. Therefore, it may not reflect the actual soil and ground water conditions, particularly if developments may have modified the natural soil conditions or surface/subsurface drainage.

3.3 Potentiometric Surface Map

The "Potentiometer Surface of the Upper Floridian Aquifer in the St. Johns River Water Management District and Vicinity, Florida, May 2009" by the USGS was reviewed for the project site vicinity. The potentiometer surface elevation of the vicinity of the proposed project area is approximately +45 feet NAVD-88. A reproduction of the potentiometer map is included in **Figure 4** in the **Appendix A.**

4.0 FIELD EXPLORATION PROGRAM AND METHODS

4.1 Field Exploration Program

To evaluate the subsurface condition at the proposed improvement area, One (1) Standard Penetration test (SPT) boring was drilled to a depth ranging from of 15 feet below the existing grade to evaluate the subsurface conditions at the proposed improvement area. This boring was designated as "BB-1".

The boring location was staked in the field by **NES** based on location provided to us by Pegasus Engineering, LLC via an email dated October 10, 2016. The boring location was not established by survey but rather by taping the distance from the edge of existing pavement and landmarks and with the aid of Global Positioning system (GPS) device. Although the locations are given only approximately, the methods used to locate the boring is, in **NES's** opinion, sufficient to meet the intent of our study. At the completion of drilling and after groundwater depth measurement, the SPT boring was grouted. The approximate boring location is shown in Report of SPT boring on **Sheet 1** in **Appendix B**.

4.2 Field Exploration Methods

4.2.1 Standard Penetration Test Borings

The SPT boring procedure was conducted in general conformance with American Society for Testing of Materials (ASTM) test designation D-1586. The boring was advanced by the rotary wash method with bentonite based mud as the circulation fluid to stabilize the borehole. The SPT boring was performed continuously from the ground surface to 10.5 feet and at 5-foot depth interval thereafter. After seating the sampler 6 inches, the number of successive blows required to drive the sampler 12 inches into the soil constitutes the test result commonly referred to as the "N" value. The "N" value has been empirically correlated with various soil properties and is considered indicative of the relative density of cohesionless soils and the consistency of cohesive soils. Adjacent to the SPT boring profile on **Sheet 1** in **Appendix B** are the "N" values.

The recovered split-barrel samples were visually classified in the field with representative portions of the samples placed in airtight containers and transported to our Orlando office for review by a geotechnical engineer and confirmation of the field classification.

Soil test boring was performed with the use of a truck-mounted drill rig. At the completion of drilling and after measuring the encountered groundwater table, the SPT boring was backfilled to the surface for safety.

5.0 SUBSURFACE CONDITIONS

5.1 General

Stratification lines represent the approximate boundaries between soil types. Actual transition between soils may be gradual.

The result of the SPT boring is presented in the form of soil profiles on the attached **Sheet 1** in **Appendix B**. The encountered soils was visually classified in accordance with the Unified Soil Classification System USCS (e.g. SP, SP-SM, etc.), and interpretation of the boring profiles by a geotechnical engineer and the results of laboratory testing on selected soil samples. Stratification lines represent the approximate boundaries between soil types. Actual transition between soils may be gradual.

The boring profiles indicate subsurface conditions only at the specific boring location at the time of our field exploration. Subsurface conditions, including groundwater conditions may differ from the conditions we encountered at the boring location at other locations within the project site. In addition, subsurface conditions at the boring location can change over time.

The following generalized soil descriptions are intended to provide a brief summary of the observed subsoil conditions at the proposed baffle box locations. A specific description of the soil conditions and relative density is provided by the soil profiles.

5.2 Baffle Box Boring Results

The SPT Boring BB-1 generally encountered light brown fine sand to brown fine sand with varying amount of fines to boring termination depth of 15 feet below existing grade.

The SPT N-values in the sandy soils ranged from three (3) to 13 blows per foot indicating loose to medium density relative density.

The subsurface conditions are only general descriptions, for details at boring location including test results; refer to the Report of SPT Borings profiles (**Sheet 1** in **Appendix B**).

5.3 Groundwater

Groundwater was encountered at Boring BB-1 at a depth of about 9.5 feet below the existing grade at the time of our field exploration (October 2016). Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences, such as swales, drainage ponds, underdrains, and areas of covered soil (roadways, sidewalks, etc.).

For the purposes of this report, estimated seasonal high groundwater levels are defined as groundwater levels that are anticipated at the end of the wet season of a “normal rainfall year” under current site conditions. “Normal rainfall year’ is defined as a year in which rainfall

quantity and distribution were at or near historical rainfall averages. The estimated seasonal high groundwater levels presented next to the boring profiles (**Sheets 1** in **Appendix B**) are based on the soil stratigraphy, measured groundwater levels, USDA/NRCS information, review of roadway plans, and past experience with similar soil conditions. In general, the estimated seasonal high groundwater level is not intended to define a limit or ensure future seasonal fluctuations in groundwater levels will not exceed the estimated levels. Post-development groundwater levels could exceed the seasonal high groundwater level estimates as a result of a series of rainfall events, changed conditions at the site which alter surface water drainage characteristics, or variations in the duration, intensity, or total volume of rainfall.

6.0 LABORATORY TESTING

Representative soil samples were retained from the soil strata encountered in the boring and returned to **NES's** laboratory for visual classification and stratification. The soil samples were classified using the Unified Soil Classification Systems (USCS) in general accordance with all ASTM D-2488, titled "Standard practice for description and identification of soils (Visual-Manual procedure) and ASTM D-2487 titled Standard Test for Classification of Soils in Engineering Purpose". Laboratory classification tests consisting of sieve analysis and natural moisture content were performed on selected soil samples. The results of our laboratory testing are presented on **Table 2** in **Appendix A** and on the Report of SPT Borings (**Sheet 1** in **Appendix B**). The types of tests performed with their associated test designations are presented below.

Laboratory Testing Performed

Test Type	FDOT	ASTM
Grain Size Analysis	FM 1-T 088	D-422
Moisture Content	FM 1-T 265	D-2216

7.0 EVALUATION AND RECOMMENDATIONS

7.1 General

The evaluation and recommendations contained in this report are based in part on the data obtained from a limited number of soil samples, our understanding of the proposed construction, and our experience with similar projects and subsurface conditions. The exploration methods used indicate subsurface conditions at specific boring locations only, at the time they were performed and to the depths penetrated. Boring data cannot be relied upon to accurately reflect the variations that usually exist outside the boring location and these variations may not become evident until construction. If variations from the conditions described in this report become evident during the course of construction, or project characteristics described in this report

change, **NES** should be retained to re-evaluate the conclusions and recommendations contained in this report in light of such changes.

The following design recommendations have been developed on the basis of the previously described project characteristics and subsurface conditions encountered to date. Design and construction of the proposed development should be cognizant of the groundwater table at the site. The evaluations and recommendations for the proposed baffle box, presented herein, are based on the borings drilled at the locations shown on **Sheet 1** in the **Appendix B**.

7.2 Groundwater Control

Groundwater table fluctuates seasonally depending upon intensity and duration of rainfall and presence and proximity of any artificial drainage facilities. Based on the encountered subsurface condition, the groundwater may be controlled by the existing drainage system consisting of swales, cross drains and storm trenchline sewers.

It is anticipated that groundwater level may affect the proposed construction; we recommend the contract documents should require the contractor to be responsible for all dewatering, regardless of the groundwater level. We recommend the groundwater table be maintained at least two feet below all earthwork and bearing level during construction. Control of groundwater should be completed in accordance with Orange County Public Works Design and Construction Specifications. Lack of proper controls could result in ponding surface water on compaction surfaces which will impede or prevent necessary soil compaction operations and make construction trafficability difficult.

7.3 Shallow Spread Foundations

We understand that the baffle box will be installed at the existing grade level. The dimension of the proposed baffle box is approximately 184 inches long, 112 inches wide and 120 inches high. The baffle box structure is proposed to be placed on gravel bedding with depths ranging from 6 to 12 inches.

Based upon the information provided by Pegasus Engineering LLC and the results of our field exploration, it is **NES's** opinion that the encountered soil deposit within the limits of our study are generally suitable for the proposed construction provided the soil are prepared as recommended herein:

- Prepare foundation subgrade soil in accordance with the recommendations presented in the **Construction Considerations** section of this report.

- Use a maximum allowable bearing pressure of 2,800 pounds per square foot (psf) for foundation design. The allowable bearing pressure is a net pressure that will increase over and above that due to the overburdened soils.

- Baffle box foundation may be designed for their actual soil contact pressure.

- The subsoil should be firm and stable prior to placement of the baffle box.

- Over excavate any areas of soft yielding or unsuitable material encountered in the proposed baffle box elevation and replace with clean sands compacted in accordance with Orange County Utilities Standards and Construction Specifications Manual.

7.4 Settlement

The primary design concerns with baffle box installation are typically long-term differential settlement and the effective length for settlement. Since the foundation soils are primarily sand, short-term settlement is anticipated to occur rather quickly. Therefore, field control will contribute substantially in minimizing settlements which actually occur. Based on settlement analysis performed for the baffle box, we anticipate a total settlement of about 4 inches. The maximum differential settlement of ≤0.29 inch per foot should be anticipated. Based on the results of our field exploration and our understanding of design loads, we feel that settlement is not a concern provided the recommendations discussed below under **CONSTRUCTION CONSIDERATION** are followed.

7. 5 Earth Pressures

Any below ground structure including excavations to install the baffle box should be designed to resist pressures exerted by retained soils and hydrostatic head. Any foundation wall constructed below existing grade or which has adjacent compacted fill will be subjected to lateral at-rest or active earth pressure. The recommended equivalent fluid densities for each pressure condition are presented below.

- Active Pressure
  Above Water Table – 36 pcf
  Below Water Table – 77 pcf

- At-Rest Pressure
  Above Water Table – 54 pcf
  Below Water Table – 84 pcf

The above recommended densities do not include effects of surcharge loads such as traffic, construction equipment, etc. The above equivalent fluid densities do not include any factor of safety. If a uniform surcharge is applied behind the vertical walls it will produce an additional lateral pressure along the wall equal to about one-third the vertical contact pressure. The values presented herein presume that the walls will be backfilled with well compacted granular materials.

7.6 Uplift Resistance

The baffle box is expected to be founded at approximately 10 feet below ground surface and should be designed to resist uplift (buoyancy) forces exerted by hydrostatic head. The most critical uplift pressure will occur when the baffle box is empty and when the groundwater table is shallow. Uplift forces can generally be resisted by the weight of the baffle box. If the dead weight of the baffle box is inadequate to resist uplift forces, the foundation may be extended out to create toe extensions to provide sufficient weight of overburden soil to resist the uplift forces. In this case, only the weight of the soils directly above the toe extension and the dead weight of the baffle box should be considered when calculating uplift resistance. Increasing the concrete weight of the baffle box is an alternative to foundation toe extensions. **NES** recommends a factor of safety of 1.25 be used in uplift calculations.

7.7 Temporary Retaining System

It is anticipated that temporary retaining system such as cantilever steel sheet pile walls may be utilized because of the close proximity of the existing roadway to the proposed baffle box. **NES** recommends that predrilling should be considered prior to sheet pile installation. Predrilling, although will prevent refusal conditions and damages to sheet pile structural sections, will also help minimize vibration and noise to the nearby residences. Sheet pile installation will generally produce vibration and noise levels that will disturb people and/or may damage nearby structures. NES recommends that the following note be provided on the project plan:

> *"Temporary sheet piling shall remain the property of the contractor and shall be removed from the site upon completion of work. The contractor shall submit his method of sheet piling removal and soil treatment at the removal site to the Orange County Public Works Department for approval."*
>
> *"The Contractor shall provide survey and vibration monitoring of any structures within 150 feet of the baffle box that may be affected by vibration from sheet piling. Pre sheet piling survey for all structures shall be completed prior to the start of sheet pile installation. The survey and vibration monitoring procedures shall meet the requirements of Section 455-1.1 of the FDOT Standard Specifications. The Contractor shall monitor for settlement as required in Section 455-1.1 of the FDOT Standard Specifications."*

NES recommends the following geotechnical soil parameters for the sheet pile design. The soil parameters include unit weight, ultimate shear strength, and angle of wall friction for an idealized section representative of the subsoil conditions within the project location.

Table 5
Generalized Geotechnical Parameters for Sheet Piles

Depth (ft)	Soil Description	Ave. "N" Value	Unit Weight (pcf)			Soil Friction Angle (deg)	Steel Wall Friction Angle (deg)	Cohesion (psf)	Earth Pressure Coefficients	
			Saturated	Moist	Effective				Passive (Kp)	Active (Ka)
0-15	Fine sand to fine sand with silt	7	105	100	42.6	29	11	--	2.88	0.35

8.0 CONSTRUCTION CONSIDERATIONS

8.1 Site Preparation

Site preparation and construction should be in accordance with the Orange County Public Works Design and Construction Specifications. The Contractor shall perform all clearing necessary for the proper installation of all piping and appurtenances in the locations shown in the drawings in accordance with the Orange County requirements. Where required, all existing shrubbery, trees, grass, sprinklers, signs, fences, etc. should be transplanted, relocated, braced, shored, or otherwise protected and preserved.

8.2 Excavations

All excavations shall be executed in accordance with the Central Florida Building Codes, the State of Florida Trench Safety Act (TSA), Occupational Safety and Health Administration (OSHA) requirements and all applicable requirements of Orange County.

All unsuitable materials encountered during the excavation (old pipes, drainage systems, etc) should be removed... If the excavation of unsuitable materials extends below the planned baffle

All unsuitable materials encountered during the excavation (old pipes, drainage systems, etc) should be removed along the pipe alignment. If the excavation of unsuitable materials extends below the planned baffle box elevation, select backfill should be used to fill the excavation and should be compacted in 6-inch layers up to the bottom of the proposed 6 to 12 inches of gravel bedding.

Based on the results of our exploration, any unsupported excavation to install the baffle box is considered unstable or unsafe during construction. An unsupported vertical cut may cause distress on the roadway due to the angle of repose of the granular material may be exceeded and tension cracks will develop behind the vertical face of the excavation. During construction, excavated materials should not be stockpiled at the top of the slope within a horizontal distance equal to the excavation depth to minimize an excavation slope failure.

8.3 Structural Filling and Backfilling

All trenching and backfilling for the baffle box structure shall be executed in accordance with Orange County Public Works Design and Construction Specifications.

The Baffle Box excavation should be to a level, at least 12-inch below the outside bottom of the proposed baffle box. The resulting excavation should be backfilled with approved structural bedding material, up to the level of the outside bottom of the proposed baffle box structure. This material should be tamped and compacted to provide a proper bedding for the structure and should then be shaped to receive the baffle box. After baffle box placement, the structural fill should be placed. Select backfill material should be placed under and around the baffle box to one foot above the vault in 6-inch layers. Each layer should be thoroughly compacted with vibratory tamper until densities equivalent to at least 98 percent of the Modified Proctor maximum dry density in general accordance with ASTM D-1557 (AASHTO T-180) are uniformly obtained.

Suitable structural/backfill material should consist of an inorganic, non-plastic, granular soil containing less than 10 percent material passing the No. 200 mesh sieve (relatively clean sand with limerock or a crushed limerock with a two-inch maximum particle size) with a Unified Soil Classification of GP, GW, SP, or SW.

Prior to compaction operations, representative samples of the structural fill material should be tested to determine if the materials are acceptable and for compaction control. Testing should consist of maximum dry density, optimum moisture content, gradation, and plasticity characteristics of these materials. A representative number of in-place field density tests should be performed in each lift of structural fill to ensure that the required degree of compaction has been achieved. We recommend that at least one density test be performed for every 200 linear feet per lift of compacted fill.

9.0 REPORT LIMITATIONS

Our professional services have been performed, our findings obtained and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. We are not responsible for the conclusions, opinions or recommendations made by others based on the data presented herein.

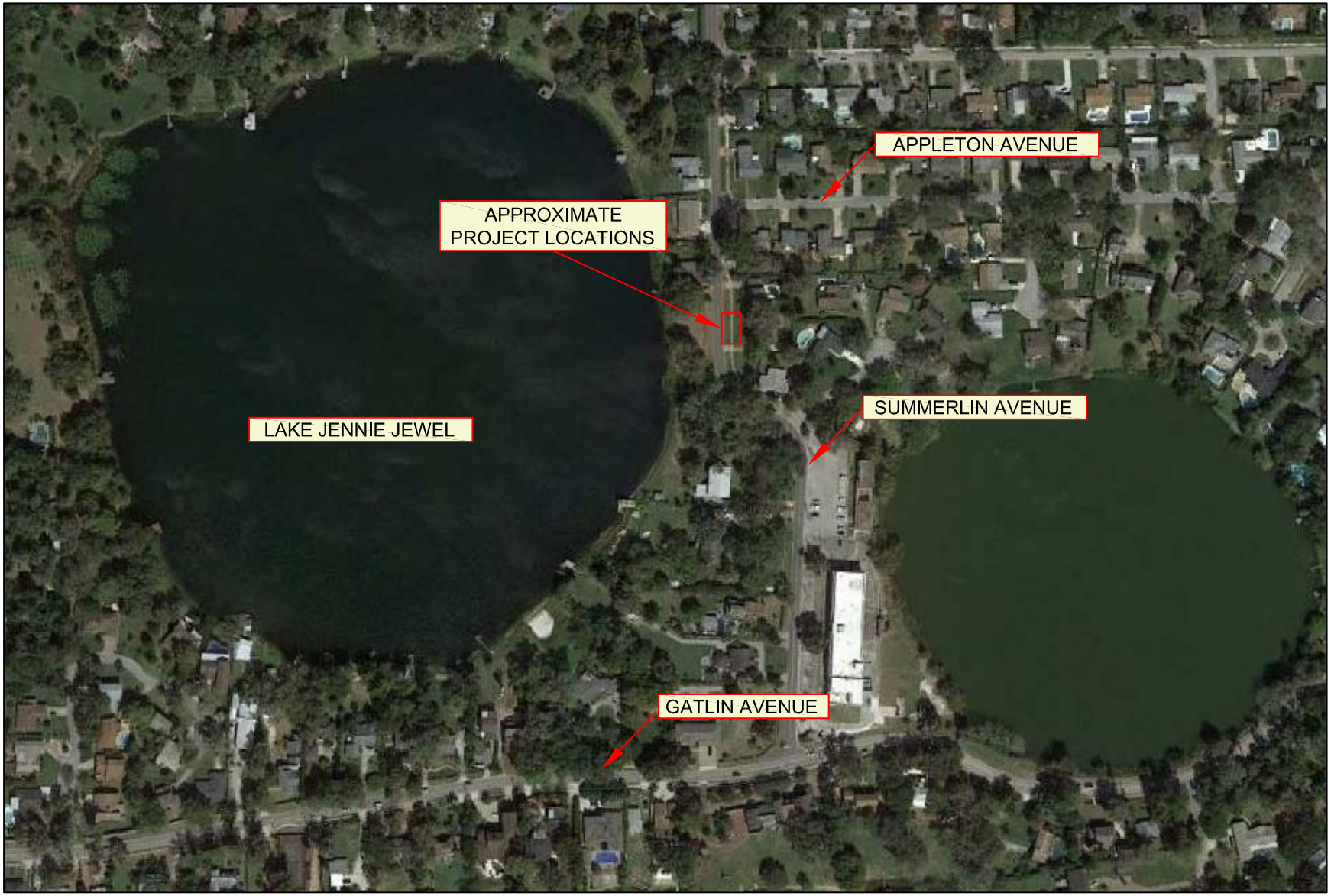
The scope of the exploration was intended to evaluate soil and groundwater conditions within the influence of stormwater improvement. The analyses and recommendations submitted in this report are based upon the data obtained from the soil borings performed at the locations indicated and does not reflect any variations which may occur among these borings. If any variations become evident during the course of this project, a re-evaluation of the recommendations

contained in this report will be necessary after we have had an opportunity to observe the characteristics of the conditions encountered. The applicability of the report should be reviewed in the event of significant changes occurring in the design, nature or location of the proposed improvements.

The scope of services of this project, included herein, did not include any environmental assessment for the presence or absence of hazardous or toxic materials in the soil, surface water and groundwater, air on the site, below and around the site. Any statements in this report or on the boring logs regarding odors, colors, unusual or suspicious items and conditions are strictly for the information of the client.

APPENDIX A

Figure 1	**Aerial Map**
Figure 2	**USGS Topographic Map**
Figure 3	**USDA/NRCS Soils Map**
Figure 4	**Potentiometric Surface Map**
Table 2	**Summary of Laboratory Test Results**



REFERENCE: Google Earth Aerial Maps

REFERENCE	PROJECT LOCATION	U.S.G.S QUADRANGLE MAP	ISSUED	PHOTO REVISED
GOOGLE EARTH	S12; T23S; R29E	PINE CASTLE, FL	1953	1980

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DATE: 11-09-2016
DRAWN: MS
CHECKED: GNN

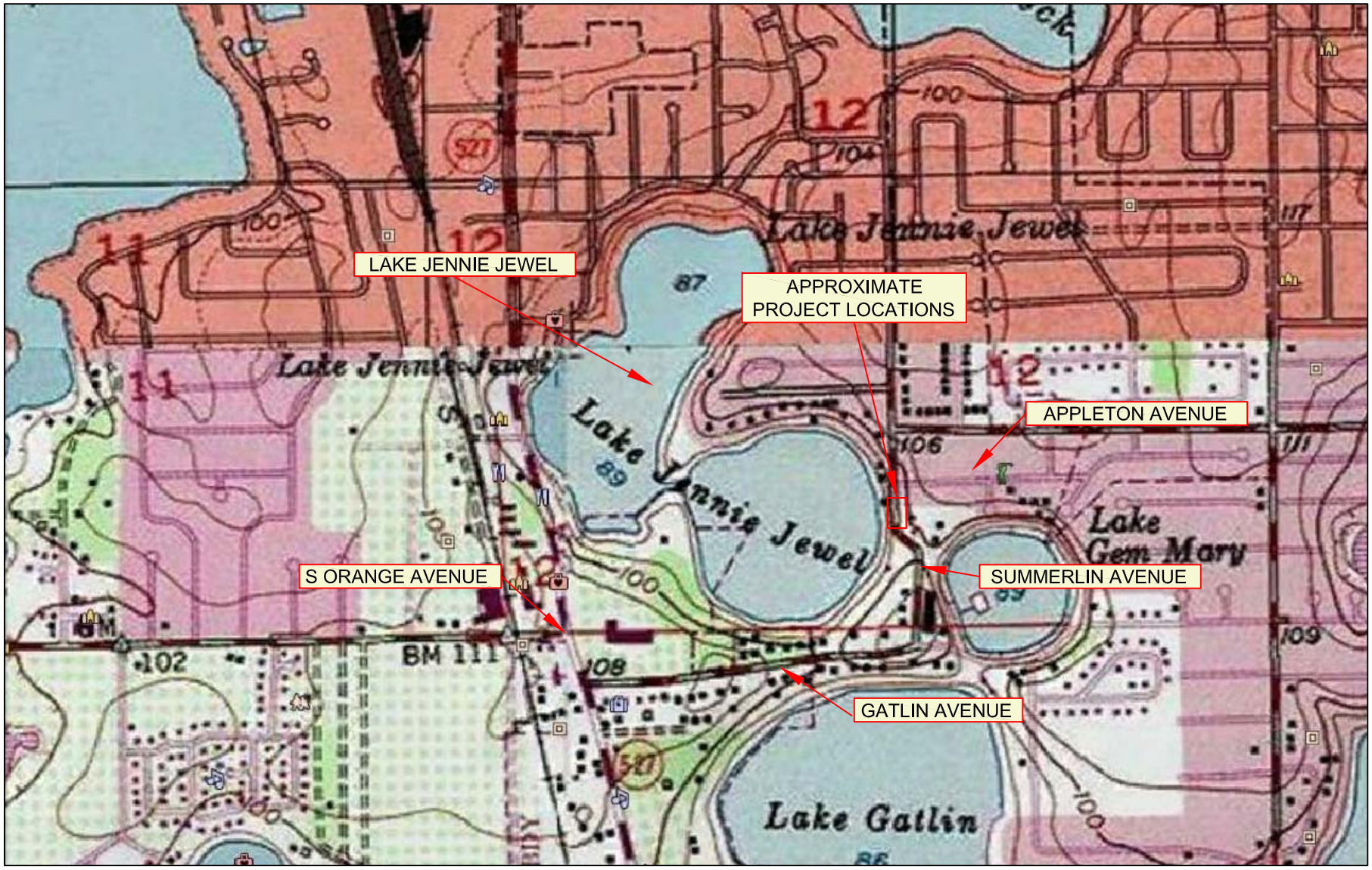
ORANGE COUNTY
PUBLIC WORKS
DEPARTMENT

PROJECT NAME:
AERIAL MAP
LAKE JENNIE JEWEL NUTRIENT REMOVAL - SUMMERLIN AVENUE BAFFLE BOX

COUNTY	CONTRACT NO.
ORANGE	Y12-905C

NES PROJECT No.
R15-021.1

FIGURE 1



REFERENCE: United States Geological Survey (USGS)

REFERENCE	PROJECT LOCATION	U.S.G.S QUADRANGLE MAP	ISSUED	PHOTO REVISED
United States Geological Survey (USGS)	S12; T23S; R29E	PINE CASTLE, FL	1953	1980

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DATE:	11-09-2016
DRAWN:	MS
CHECKED:	GNN

ORANGE COUNTY PUBLIC WORKS DEPARTMENT

PROJECT NAME:
USGS TOPOGRAPHIC MAP
LAKE JENNIE JEWEL NUTRIENT REMOVAL - SUMMERLIN AVENUE BAFFLE BOX

COUNTY	CONTRACT NO.
ORANGE	Y12-905C

NES PROJECT No.
R15-021.1

FIGURE 2

REFERENCE: National Resources Conservation Services (NRCS) Soil Survey Data - Google Earth

LEGEND

8 Candler -Urban Land Complex

REFERENCE	PROJECT LOCATION	U.S.G.S QUADRANGLE MAP	ISSUED	PHOTO REVISED
United States Geological Survey (USGS)	S12; T23S; R29E	PINE CASTLE, FL	1953	1980

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DATE: 02-06-2017
DRAWN: MS
CHECKED: GNN

ORANGE COUNTY PUBLIC WORKS DEPARTMENT

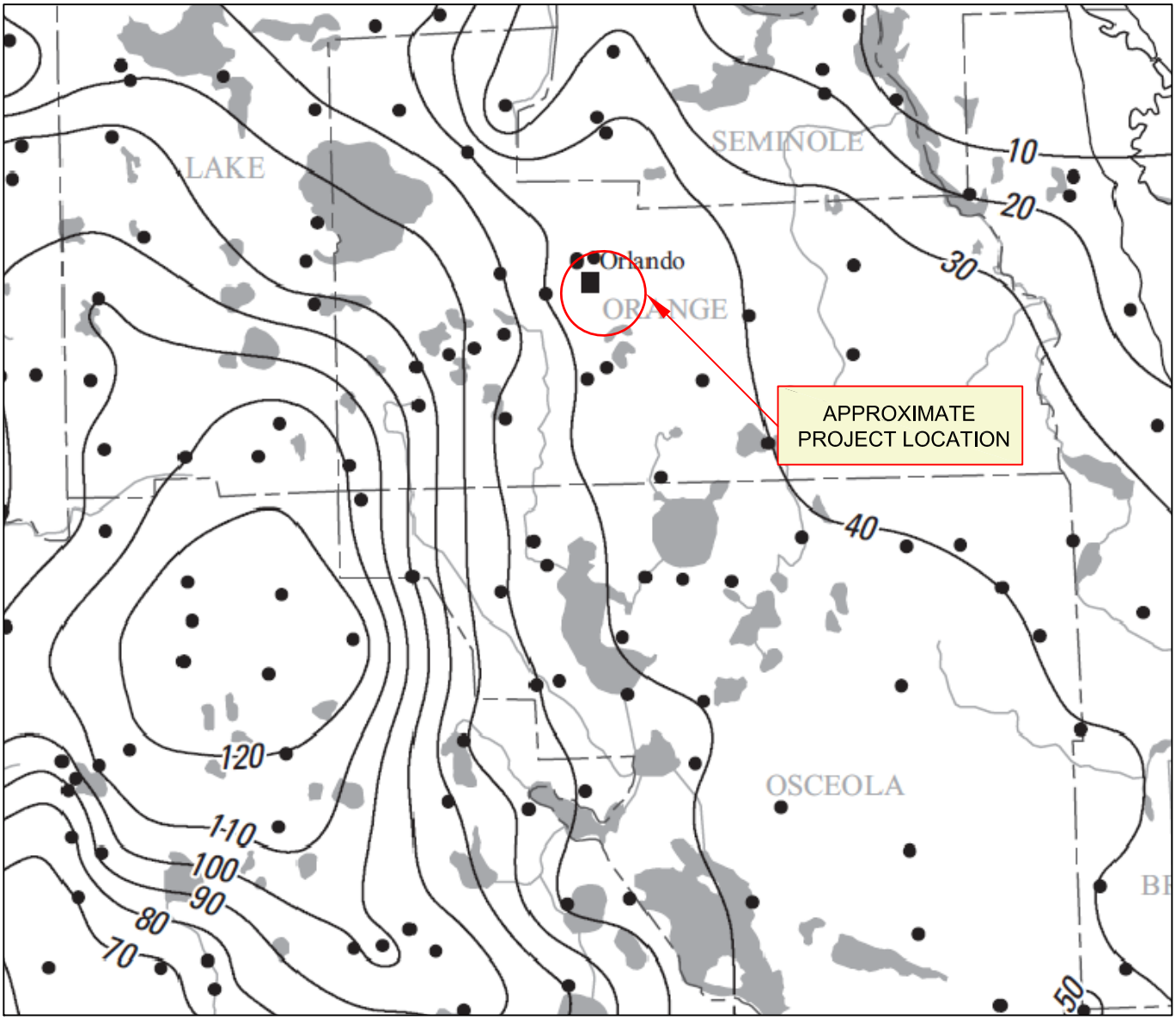
PROJECT NAME:
USDA/NRCS SOILS MAP

LAKE JENNIE JEWEL NUTRIENT REMOVAL - SUMMERLIN AVENUE BAFFLE BOX

NES PROJECT No.
R15-021.1

COUNTY	CONTRACT NO.
ORANGE	Y12-905C

FIGURE 3



REFERENCE: "Potentiometric Surface of the Upper Floridan Aquifer in the St. Johns River Water Management District and Vicinity, Florida, 2009," published by the United States Geological Survey (USGS).

QUAD: PINE CASTLE, FL (Issued 1953, Photo Revised 1980)

SECTIONS: 12

TOWNSHIPS: 23 SOUTH

RANGES: 29 EAST

LEGEND

— 40 — POTENTIOMETRIC CONTOUR-Shows altitude at which water level would have stood in tightly cased wells. Contour interval is 10 feet.

Note: Elevations shown on map are in feet, National Geodetic Vertical Datum of 1929 (NGVD-29)

POTENTIOMETRIC SURFACE MAP

LAKE JENNIE JEWEL NUTRIENT REMOVAL
SUMMERLIN AVENUE BAFFLE BOX
ORANGE COUNTY, FLORIDA

NES Civil Geotechnical Environmental Consulting Engineering

DRAWN: MS	SCALE: N.T.S.	PROJECT NO. R15-021.1
DRAWN: GNN	DATE: 12-07-15	FIGURE 4

TABLE 2
SUMMARY OF LABORATORY TEST RESULTS

Location	Boring Number	Sample Depth (feet)	Stratum No:	Moisture Content (%)	Organic Content (%)	Sieve Analysis (Percent Passing)					Atterberg Limits (%)		AASHTO	Unified Soil Classification (USCS)
						#10	#40	#60	#100	#200	Liquid Limit	Plasticity Index		
Summerlin Ave.	BB-1	8	1	22	-	100	98	88	40	10	-	-	A-3	SP-SM

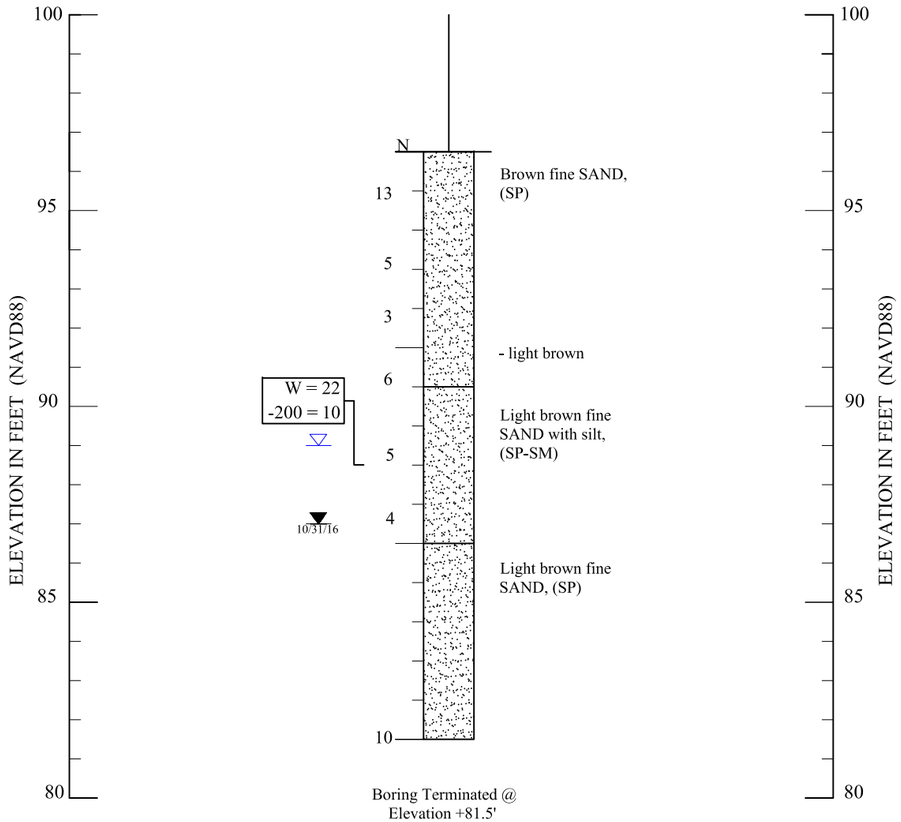
APPENDIX B

Sheet 1 **Report of SPT Boring**

QUADRANGLE: PINE CASTLE, FLA.
SECTION: 12
TOWNSHIP: 23 South
RANGE: 29 East

NOT TO SCALE

Boring No.: **BB -1**
Latitude: 28°29'48.33"N
Longitude: 81°22'4.43"W
Elevation: 96.5'
Date Drilled: 10/31/2016



LEGEND

SAND

(SP) Unified soil classification group symbol

W = Natural Moisture Content (%) (FM 1-T265)
-200 = Percent passing no. 200 U.S. standard sieve (FM 1-T088)

10/31/16 Groundwater level encountered on date shown

Estimated seasonal high groundwater level

Standard Penetration Test Data

N Standard penetration resistance in blows per foot (18" spoon ASTM D-1586)
Spoon Inside Diameter 1 3/8 in.
Spoon Outside Diameter 2 in.
ASTM Standard Drop Safety Hammer (Rope-Cathead)
Average Hammer Drop 30 in.
Hammer Weight 140 lbs.

NOTES

1. Standard Penetration Test borings were performed in accordance with ASTM D-1586. Standard Penetration Resistance are shown on the borings at the test depths in blows per foot unless otherwise noticed
2. Subsurface conditions shown on the boring do not represent conditions between boring locations. Actual conditions between the borings may vary from those shown.
3. Unified Soil Classifications shown on the boring are based on visual examination and limited laboratory testing

GRANULAR MATERIALS

RELATIVE DENSITY	SPT (BLOWS/FT.)
Very loose	Less than 4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Greater than 50

SILTS AND CLAYS

CONSISTENCY	SPT (BLOWS/FT.)
Very soft	Less than 2
Soft	2-4
Firm	4-8
Stiff	8-15
Very Stiff	15-30
Hard	Greater than 30

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAMES	DATES
Drawn by:	MS	02-06-17
Checked by:	GNN	02-06-17
Designed by:	N/A	N/A
Checked by:	N/A	N/A
Approved by:	GNN	

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CERTIFICATE OF AUTHORIZATION NO. 8214

NES CIVIL GEOTECHNICAL ENVIRONMENTAL CONSULTING ENGINEERING

ORANGE COUNTY FLORIDA

ORANGE COUNTY
PUBLIC WORKS DEPARTMENT

COUNTY	CONTRACT NO.
ORANGE	Y12-905C

SHEET TITLE:
REPORT OF SPT BORING

PROJECT NAME:
LAKE JENNIE JEWEL NUTRIENT REMOVAL
SUMMERLIN AVENUE BAFFLE BOX

SHEET NO.

SHEET 1

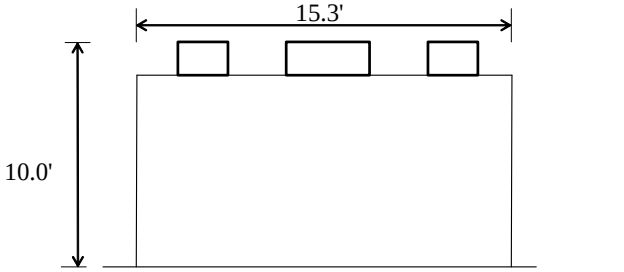
NES Project No. R15-021.1

Z:\Civil\GNnadi\Orange County\Summerlin \Working folder\CAD

APPENDIX C

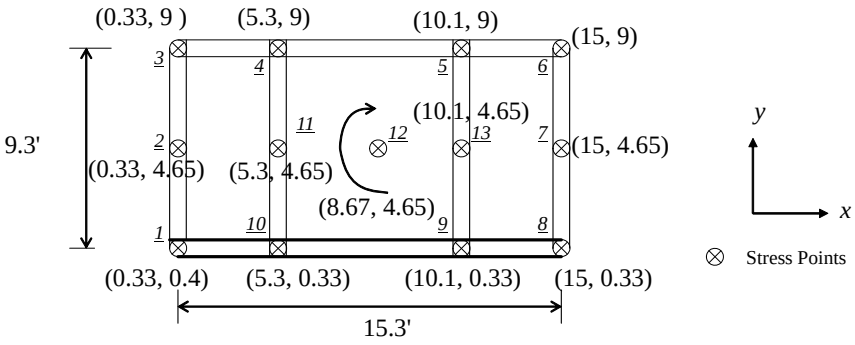
Sample Calculations

ALTERNATIVE 1 - BAFFLE BOX LAKE JENNIE JEWEL EAST LOBE **Date: November 08, 2016**
Settlement Calculation Using Boring BB-1



Baffle Box
Cross-Section

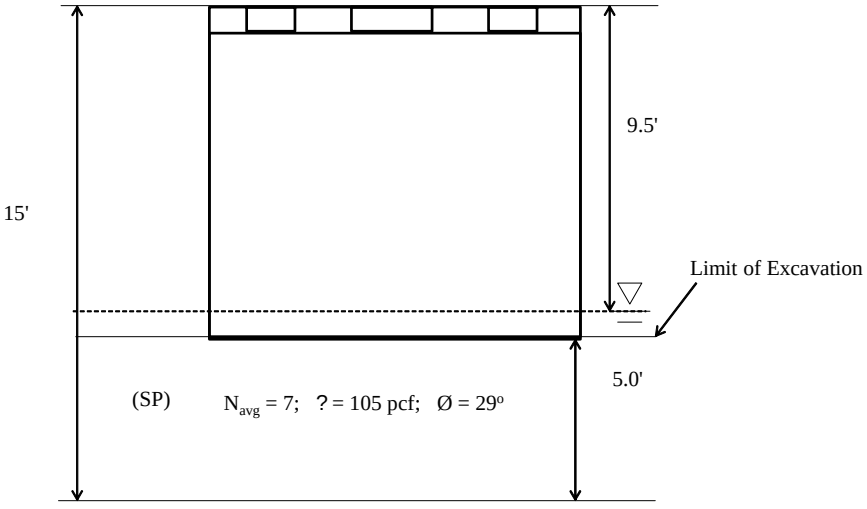
Cross section



Plan View

Unit Weight of Concrete $\gamma_c := 150 \cdot \frac{lb}{ft^3}$

BB-1 SOIL PROFILE



$kip \equiv 1000 \cdot lbf$ $k := 1000 \cdot lb$ $ksf := 0.001k \cdot ft^{-2}$ $kPa := 0.020885434ksf$ $psf := 0.001 \cdot ksf$

LOADED SECTIONS:

A) Screen & Lids:

1. $Area_1 := (6.0 \cdot ft) \cdot (2.5 \cdot ft) + \left(6.47 \cdot ft^2\right)$ $Area_1 = 21.47\ ft^2$

Screen load = 43732.5 lb Lid load = 19335.4 lb

$$Intensity_1 := \left[\left(\frac{43732.5}{12.5} \cdot \frac{lb}{ft^2}\right) + \left(\frac{19335.4}{6.47} \cdot \frac{lb}{ft^2}\right)\right] 0.001 \qquad Intensity_1 = 6.49\ ksf$$

B) Pipes:

For 30" Pipe:

Load Intensity = 353.7 psf

$$Intensity_2 := \left[\left(283.5 \cdot \frac{lb}{ft^2}\right) + \left(70.2 \cdot \frac{lb}{ft^2}\right)\right] 0.001 \qquad Intensity_2 = 0.35\ ksf$$

C) Slab:

(i) Top Slab:

$Area := (15.3 \cdot ft) \cdot (9.3 \cdot ft)$ $Area = 142.29\ ft^2$

$$Intensity_3 := \left[\left(1 \cdot 150 \cdot \frac{lb}{ft^2}\right) + \left(1.66 \cdot 0.2 \cdot 150 \cdot \frac{lb}{ft^2}\right) + \left(250 \cdot \frac{lb}{ft^2}\right)\right] 0.001 \qquad Intensity_3 = 0.45\ ksf$$

(ii) Bottom Slab:

$Area := (15.3 \cdot ft) \cdot (9.3 \cdot ft)$ $Area = 142.29\ ft^2$

$$Intensity_4 := \left(\left(0.8 \cdot 150 \cdot \frac{lb}{ft^2}\right)\right) \cdot 0.001 \qquad Intensity_4 = 0.12\ ksf$$

D) Wall:

$Area := (10 \cdot ft) \cdot \left(\frac{8}{12} \cdot ft\right)$ $Area = 6.67\ ft^2$

$$Intensity_5 := \left[\left(10 \cdot 150 \cdot \frac{lb}{ft^2}\right) + \left(250 \cdot \frac{lb}{ft^2}\right)\right] 0.001 \qquad Intensity_5 = 1.75\ ksf$$

SOIL LAYERS AND CHARACTERISTICS:

***LAYER 1*:** **(SP)**

$\gamma_w := 62.4 \cdot \frac{lb}{ft^3}$

$N_{avg1} := 10$; $\gamma_1 := 105 \cdot \frac{lb}{ft^3}$; $\nu := 0.3$ Layer depth $d_1 := 5 \cdot ft.$; $qN_{avgc1} := 2$

$Q_{c1} := \left(qN_{avgc1}\right) \cdot \left(N_{avg1}\right) \cdot 0.1$ $Q_{c1} = 2$ MPa

$\sigma'_{vc1} := \left[\frac{d_1}{2} \cdot \left(\gamma_1 - \gamma_w\right)\right] \cdot 0.001$ $\sigma'_{vc1} = 5.1 kPa$

From Fig. 5.8, $E_{25} := 1.67\,MPa$ $E_1 := 20.885 \cdot E_{25}$ $E_1 = 34.88$ ksf

Compressibility:

$C'_{n1} := \frac{1 - \nu^2}{3 \cdot E_1}$ $C'_{n1} = 0.008697$ *Enter C'_n as positive number (f-p curve)*

BBR15021

```
*******************************************
*                                         *
*            SETTLEMENT ANALYSIS          *
*                                         *
**************  S E T T L G  **************
*                                         *
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*                                         *
*     ORANGE, CA 92665.  (714) 998-4030   *
*                                         *
*******************************************
```

NUMBER OF LOADED AREAS = 6

NUMBER OF SOIL LAYERS = 1

NUMBER OF STRESS POINTS = 13

POISSONS RATIO = .30

STRESS DISTRIBUTION CODE = 1

0"SUMMERLIN AVENUE - BAFFLE BOX, BORING BB-2 "

0

SURFACE NUMBER	LOADING INTENSITY KSF	DEPTH FEET	LOADED SURFACES X1	Y1	X2	Y2	CORNER CO-ORDINATES X3	Y3	X4	Y4
1	.570	.0	.0	.0	.0	9.3	15.3	9.3	15.3	.0
2	6.840	.0	.0	.0	.0	9.3	15.3	9.3	15.3	.0
3	2.100	.0	.0	.0	.0	9.3	.7	9.3	.7	.0
4	1.750	.0	.0	.0	.0	.7	15.3	.7	15.3	.0
5	1.750	.0	.0	.0	.0	9.3	.7	9.3	.7	.0
6	2.100	.0	14.6	.0	14.6	9.3	15.3	9.3	15.3	.0

SETTLEMENT ANALYSIS

TABLE OF STRESS POINT COORDINATES

POINT NO.	X-COORDINATE	Y-COORDINATE, FEET
1	.3	.3
2	.3	4.7
3	.3	9.0
4	5.3	9.0
5	10.1	9.0
6	15.0	9.0
7	15.0	4.7
8	15.0	.3
9	10.1	.3
10	5.3	.3
11	5.3	4.7
12	8.7	4.7
13	10.1	4.7

SETTLEMENT ANALYSIS

**** BOUSSINESQ STRESS DISTRIBUTION ****

0 STRESS POINT NO.	1	2	3	4	5	6	7
DEPTH FEET	STRESS KSF						
2.5	3.098	4.800	2.876	4.182	4.173	2.663	4.445

0 STRESS POINT NO.	8	9	10	11
DEPTH FEET	STRESS KSF			
2.5	2.879	4.531	4.540	6.995

SETTLEMENT ANALYSIS

**** BOUSSINESQ STRESS DISTRIBUTION ****

0 STRESS POINT NO. 12 13

DEPTH FEET	STRESS KSF	
2.5	7.017	6.981

SETTLEMENT ANALYSIS

0STRATUM	Z FT	H FT	G KCF	PO KSF	SOURCE AND OTHER INFORMATION
1	2.50	5.00	.0426	.106	SP

SETTLEMENT ANALYSIS

0 COMPRESSIBILITY DATA
LAYER

0 1 SLOPE OF F-P CURVE = .0087, FT.*FT./KIP

SETTLEMENT ANALYSIS

0SETTLEMENT (IN.)

0STRESS POINT NO.	1	2	3	4	5	6	7
0 STRATUM 1	1.62	2.50	1.50	2.18	2.18	1.39	2.32
TOTAL SETTLEMENT	1.62	2.50	1.50	2.18	2.18	1.39	2.32

SETTLEMENT ANALYSIS

0SETTLEMENT (IN.)

0STRESS POINT NO.	8	9	10	11	12	13
0 STRATUM						
1	1.50	2.36	2.37	3.65	3.66	3.64
TOTAL SETTLEMENT	1.50	2.36	2.37	3.65	3.66	3.64

****