GEOTECHNICAL ENGINEERING REPORT

Carpenters Park Improvements

Milton, Santa Rosa County, Florida

PREPARED FOR:

Volkert, Inc.
6601 North Davis Highway, Suite 102
Pensacola, Florida 32504

NOVA Project Number: 10116-2018169

January 14, 2019

NOVA

PROFESSIONAL | PRACTICAL | PROVEN

January 14, 2019

Volkert, Inc.
6601 North Davis Highway, Suite 102
Pensacola, Florida 32504

Attention: Mr. Mike Warnke, P.E., ENV SP – Project Manager

Subject: Geotechnical Engineering Report
CARPENTERS PARK IMPROVEMENTS
Milton, Santa Rosa County, Florida
NOVA Project Number 10116-2018169

Dear Mr. Warnke:

NOVA Engineering and Environmental LLC (NOVA) has completed the authorized Geotechnical Engineering Report for the proposed improements to Carpenters Park located in Milton, Santa Rosa County, Florida. The work was performed in general accordance with NOVA Proposal Number 016-20170572r1, dated July 25, 2018. This report briefly discusses our understanding of the project at the time of the subsurface exploration, describes the geotechnical consulting services provided by NOVA, and presents our findings, conclusions, and recommendations.

We appreciate your selection of NOVA and the opportunity to be of service on this project. If you have any questions, or if we may be of further assistance, please do not hesitate to contact us.

Sincerely,
NOVA Engineering and Environmental LLC

Jesse A. James E.I.
Assistant Branch Manager
Florida Certificate No. 1100019359

William L. Lawrence, P.E.
Senior Regional Engineer
Florida Registration No. 60147

WILLIAM LEE LAWRENCE, JR. ★ LICENSE ★ No. 60147 ★ STATE OF FLORIDA ★ PROFESSIONAL ENGINEER

Copies Submitted: via electronic mail service

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1.0 INTRODUCTION

1.1 PROJECT INFORMATION

Our understanding of this project is based on discussions with the project design team, review of the provided site plan, a site reconnaissance performed during the boring layout, review of aerial photography of the site via internet-based GIS software, and our experience with similar geotechnical conditions in the near vicinity to this project site.

1.1.1 Site Plans and Documents

We were furnished with the following plans and documents:

- Document: Carpenter's Park Phase 1
  Prepared by: TSW
  Dated: January 4, 2019

1.1.2 Proposed Construction

NOVA understands that this phase of the planned improvements to the existing water-front park facility will include constructing additional sidewalks and a splash pad feature.

1.1.3 Maximum Loads

Foundation support for the proposed splash pad is anticipated to be accomplished via conventional shallow footings and a slab-on-grade system. Structural loadings and grading details were not available from the design team at the time of the issuance of this report; we have therefore assumed that an allowable design soil bearing pressure of 1,500 pounds per square foot (psf) will be sufficient for the design of the splash pad foundation.

1.1.4 Floor Elevations / Site Grading

We assume that finish site grades will not change greater than +/- 2 feet from existing grades within the footprint of the proposed splash pad feature.

1.2 SCOPE OF WORK

Vilkert, Inc., engaged NOVA to provide geotechnical engineering consulting services for the planned **Carpenters Park Improvements** project. This report briefly discusses our understanding of the project, describes our exploratory procedures, and presents our findings, conclusions, and recommendations.

The primary objective of this study was to perform a geotechnical exploration within the areas of the proposed construction and to assess these findings as they relate to geotechnical aspects of the planned site development. The authorized geotechnical engineering services included a site reconnaissance, a soil test boring and sampling program, laboratory testing, engineering evaluation of the field and laboratory data, and the preparation of this report. The services were performed substantially as outlined in our proposal number 016-20170572r1, dated July 25, 2018, and in general accordance with industry standards. As authorized by the client, this geotechnical report includes:

- A description of the site, fieldwork, laboratory testing and general soil conditions encountered, as well as a Boring Location Plan, and individual Test Boring Records.
- Site preparation considerations that include geotechnical discussions regarding site stripping and subgrade preparation, and engineered fill/backfill placement.
- Recommendations for controlling groundwater and/or run-off during construction and, the need for permanent dewatering systems based on the anticipated post construction groundwater levels.
- Shallow foundation system recommendations for the proposed splash pad feature.
- Suitability of on-site soils for re-use as structural fill and backfill. Additionally, the criteria for suitable fill materials will be provided.
- Recommended quality control measures (i.e. sampling, testing, and inspection requirements) for site grading, foundation, and pavement construction.

The assessment of site environmental conditions, including the presence of wetlands or detection of pollutants in the soil, rock or groundwater, laboratory testing of samples, or a site-specific seismic study was beyond the scope of this geotechnical study. If requested, NOVA can provide these services.

2.0 SITE DESCRIPTION

2.1 LOCATION AND LEGAL DESCRIPTION

Carpenters Park is located southeast of the intersection of Munson Highway and Broad Street in Milton, Santa Rosa County, Florida. A Site Location Map is included in Appendix A.

2.2 SUBJECT PROPERTY AND VICINITY GENERAL CHARACTERISTICS

The vicinity of the Subject Property is generally developed with mixed residential and light commercial uses, and is bordered by the following:

DIRECTION	LAND USE DESCRIPTION/OBSERVATIONS
NORTH	Munson Highway
WEST	Broad Street
SOUTH	Blackwater River
EAST	Blackwater River

2.3 CURRENT USE OF THE PROPERTY

At the time of our field exploration, the subject waterfront property was being utilized as a park with a playground area, several single-story structures, as well as asphalt paved entrance drives and parking areas. Greenbelt areas of the property were vegetated with short grasses and isolated sapling to mature trees.

3.0 FIELD EXPLORATION

Boring locations were established in the field by NOVA personnel using the provided site plan and handheld GPS equipment. The approximate locations are shown in Appendix A. Consequently, referenced boring locations and elevations should be considered approximate. If increased accuracy is desired by the client, NOVA recommends that the boring locations and elevations be surveyed.

Our field exploration was conducted between January 2 and January 9, 2019 and included:

- Two (2), 15-foot deep SPT borings (designated B-1 and B-2) performed within the proposed splash pad feature footprint, and;
- Three (3), 5-foot deep auger borings (designated A-1, A-2 and A-3) performed within the proposed sidewalk alignments.

Test Borings: The structural test borings were performed using the guidelines of ASTM Designation D-1586, "Penetration Test and Split-Barrel Sampling of Soils". A mud rotary drilling process was used to advance the borings. At regular intervals, soil samples were obtained with a standard 1.4-inch I.D., 2.0-inch O.D., split-tube sampler. The sampler was first seated six inches and then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is designated the "Penetration Resistance". The penetration resistance, when properly interpreted, is an index to the soil strength and density.

The auger borings were conducted utilizing a 3-inch diameter bucket-type hand auger.

Representative portions of the soil samples, obtained from the sampler, were placed in sealed containers and transported to our laboratory for further evaluation and laboratory testing. Test Boring Records in Appendix B show the standard penetration test (SPT) resistances, or “N-values”, and present the soil conditions encountered in the borings.

These records represent our interpretation of the subsurface conditions based on the field exploration data, visual examination of the split-barrel samples, laboratory test data, and generally accepted geotechnical engineering practices. The stratification lines and depth designations represent approximate boundaries between various subsurface strata. Actual transitions between materials may be gradual.

4.0 LABORATORY TESTING

A laboratory testing program was conducted to characterize materials which exist at the site using the recovered split-barrel samples. Selected test data are presented on the Test Boring Records attached in the Appendix. The specific tests are briefly described on the following page.

It should be noted that all soil samples will be properly disposed of 30 days following the submittal of this NOVA subsurface exploration report unless you request otherwise.

4.1 SOIL CLASSIFICATION

Soil classification provides a general guide to the engineering properties of various soil types and enable the engineer to apply past experience to current problems. In our explorations, samples obtained during drilling operations are observed in our laboratory and visually classified by an engineer. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our Test Boring Records. The classification system discussed above is primarily qualitative; laboratory testing is generally performed for detailed soil classification. Using the test results, the soils were classified using the Unified Soil Classification System. This classification system and the in-place physical soil properties provide an index for estimating the soil's behavior. The soil classification and physical properties obtained are presented in this report.

4.2 MOISTURE CONTENT

The moisture content is the ratio expressed as a percentage of the weight of water in a given mass of soil to the weight of the solid particles. This test was conducted in general accordance with ASTM D-2216.

4.3 SIEVE ANALYSIS

The sieve analysis consists of passing a soil sample through a series of standard sieve openings. The percentage of fines passing through the No. 200 sieve is generally considered to represent the amount of silt and clay of the tested soil sample. The sieve analysis test was conducted in general accordance with ASTM Designation D-1140.

5.0 SUBSURFACE CONDITIONS

5.1 GEOLOGY

The site is located in the Santa Rosa County, Florida area and according to the United States Geological Survey (USGS), is situated within the greater Gulf Coastal Plain region. The site is generally covered with Alluvium sediments of the Pleistocene/Holocene periods underlain by the Citronelle formation of the Pliocene/Pleistocene periods. The alluvial sediments typically consist of siliciclastics that are fine to coarse quartz sand containing clay lenses and gravel in places. Sands consists primarily of very fine to very coarse poorly sorted quartz grains; gravel is composed of quartz, quartzite, and chert pebbles. In areas of the Valley and Ridge province gravels are generally composed of angular to sub-rounded chert, quartz, and quartzite pebbles. Coastal deposits in the Santa Rosa County area include fine to medium quartz sand with shell fragments and accessory heavy minerals along Gulf beaches and fine to medium quartz sand, silt, clay, peat, mud and ooze in the Mississippi Sound, Little Lagoon, bays, lakes, streams, and estuaries. The Citronelle formation consists primarily of varicolored/mottled lenticular beds of poorly sorted sand, clayey sand, clay, and clayey gravel. Limonite pebbles and lenses of limonite cemented sand occur locally in weathered Miocene exposures.

Surficial soils in the region are primarily siliciclastic sediments deposited in response to the renewed uplift and erosion in the Appalachian highlands to the north and sea-level fluctuations. The extent and type of deposit is influenced by numerous factors, including mineral composition of the parent rock and meteorological events.

5.2 SOIL CONDITIONS

The following paragraph provides a generalized description of the subsurface profiles and soil conditions encountered in the borings conducted during this study. The Log of Boring Records in the Appendix should be reviewed to provide detailed descriptions of the conditions encountered at each boring location. Conditions may vary at other locations and times.

Beneath a stratum of topsoil which varied in thickness from about 3 to 6 inches, the test borings generally encountered very loose to medium dense fine-grained slightly silty sands and silty sands (USCS classifications of SP-SM and SM, respectively) to the maximum depth explored of about 15 feet BEG.

5.3 GROUNDWATER CONDITIONS

5.3.1 General

Groundwater in the Gulf Coastal Plain typically occurs as an unconfined aquifer condition.

Recharge is provided by the infiltration of rainfall and surface water through the soil overburden. More permeable zones in the soil matrix can affect groundwater conditions. The groundwater table is expected to be a subdued replica of the original surface topography. Based on a review of topographic maps and our visual site observations, we anticipate the groundwater flow at the site to be towards the south.

Groundwater levels vary with changes in season and rainfall, construction activity, surface water runoff and other site-specific factors. Groundwater levels in the south Santa Rosa County area are typically lowest in the late fall to winter and highest in the early spring to mid-summer with annual groundwater fluctuations by seasonal rainfall; consequently, the water table may vary at times.

5.3.2 Soil Test Boring Groundwater Conditions

A stabilized groundwater table was encountered in the test borings at depths varying between about 1 foot to 2½ feet BEG at the time of our field exploration, which occurred during a period of above normal seasonal rainfall and shortly following an extended period of frequent rain events. We note that the differences in the depths to groundwater can be primarily attributed to the differences in ground surface elevations at which the borings were drilled.

Based on comparisons of current annual monthly rainfall data to historical rainfall data extending back 50+ years in time, we estimate that the normal permanent seasonal high groundwater (SHGW) table for this site will occur within 1 foot above the depths to groundwater measured at each boring location, during the wet season.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on our understanding of the proposed construction, our site observations, our evaluation and interpretation of the field and laboratory data obtained during this exploration, our experience with similar subsurface conditions, and generally accepted geotechnical engineering principles and practices.

Subsurface conditions in unexplored locations or at other times may vary from those encountered at specific boring locations. If such variations are noted during construction, or if project development plans are changed, we request the opportunity to review the changes and amend our recommendations, if necessary.

As previously noted, boring locations were established in the field utilizing handheld GPS equipment and the provided site plan. If increased accuracy is desired by the client, we recommend that the boring locations and elevations be surveyed.

6.1 SITE PREPARATION

We anticipate that finish site grades will not change greater than +/- 2 feet from existing grades within the proposed splash pad feature footprint, and along the proposed sidewalk alignments.

We recommend stripping and grubbing the proposed splash pad footprint and sidewalk alignments to remove all topsoil and surficial vegetation, trees and associated root systems, and any other deleterious non-soil materials that are found to be present. The soils exposed at the stripped grade elevation, as well as subsequent lifts of fill soils, should be compacted to a minimum soil density of at least 95 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557). Resulting or additional excavations should be backfilled with structural fill also compacted to a minimum soil density of at least 95 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557).

We note that vibratory compaction operations should not be performed within a clear distance of 50 feet from any adjacent structures.

NOVA should observe the compaction of the subgrade to locate soft, weak, or excessively wet fill or existing soils present at the time of construction. Any unstable materials observed during the evaluation and compaction operations should be undercut and replaced with structural fill or stabilized in-place by scarifying and re-densifying.

6.1.1 Soil Suitability

Fill materials should be relatively clean sands with less than 12 percent fines (material passing the No. 200 sieve), and free of non-soil materials and rock fragments larger than 3 inches in diameter. Soils with fines contents between 13 and 25 percent may also be used as fill soils for this project, but we note that strict moisture control would be required at the time of placement for these moisture-sensitive soils.

Based on visual examination, the existing surficial soils encountered during this exploration are generally suitable for re-use as structural fill soils, provided they are at or near their optimum moisture content at the time of re-use. The majority of the on-site near surface soils can be categorized as SP-SM, or fine-grained slightly silty sands based on the Unified Soil Classification System (USCS). Prior to construction, bulk samples of the proposed fill materials should be laboratory tested to confirm their suitability.

Organic and/or debris-laden material is not suitable for re-use as structural fill. Topsoil, mulch, and similar organic materials can be wasted in architectural areas. Debris-laden materials should be excavated, transported, and disposed of off-site in accordance with appropriate solid waste rules and regulations.

6.1.2 Soil Compaction

Fill should be placed in thin, horizontal loose lifts (maximum 12-inch) and compacted to a minimum soil density of at least 95 percent of the Modified Proctor maximum dry density (ASTM D-1557). The upper 12 inches of soil beneath the bottoms of all foundation footings should be compacted to at least 98 percent. In confined areas, such as utility trenches or behind retaining walls, portable compaction equipment and thinner fill lifts (3 to 4 inches) may be necessary.

We note that vibratory compaction operations should not be performed within a clear distance of 50 feet from any adjacent structures.

Fill materials used in structural areas should have a target maximum dry density of at least 95 pounds per cubic foot (pcf). If lighter weight fill materials are used, the NOVA geotechnical engineer should be consulted to assess the impact on design recommendations.

Soil moisture content should be maintained within 3 percent of the optimum moisture content. We recommend that the grading contractor have equipment on site during earthwork for both drying and wetting fill soils. Moisture control may be difficult during rainy weather.

Filling operations should be observed by a NOVA soils technician, who can confirm suitability of material used and uniformity and appropriateness of compaction efforts. He/she can also document compliance with the specifications by performing field density tests using thin-walled tube, nuclear, or sand cone testing methods (ASTM D-2937, D-6938, or D-1556, respectively). One test per 400 cubic yards and every 2 feet of placed fill is recommended, with test locations well distributed throughout the fill mass. When filling in small areas, at least one test per day per area should be performed.

6.2 GROUNDWATER CONTROL

As was noted previously, a stabilized groundwater table was encountered in the test borings at depths ranging between about 1 foot to 2½ feet BEG at the time of our field exploration. Depending on the areas of the site under consideration, groundwater levels have differing implications for design and construction. The extent and nature of any dewatering required during construction will be dependent on the actual groundwater conditions prevalent at the time of construction and the effectiveness of construction drainage to prevent run-off into open excavations.

Based on our understanding of the proposed construction, groundwater could potentially adversely impact the planned development of this property, most especially with respect to the installation of subsurface utilities in lower-lying areas of the site. As previously noted, groundwater levels are subject to seasonal, climatic and other variations and may be different at other times and locations.

6.3 FOUNDATIONS

Foundation support for the proposed splash pad feature is anticipated to be accomplished via conventional shallow footings and slab-on-grade systems. Final structural loadings and grading details were not available from the design team at the time of the issuance of this report.

6.3.1 Shallow Foundations

Design: After the recommended site and subgrade preparation and fill placement, we recommend that a conventional shallow foundation system consisting of isolated spread footings and/or turn-down slab-on-grade construction be used to support the proposed splash pad feature.

Foundations bearing on densified existing soils and/or compacted structural fill, as recommended in this report, may be designed for a maximum allowable bearing pressure of **1,500 pounds per square foot (psf)**.

We recommend minimum footing widths of 24 inches for ease of construction and to reduce the possibility of localized shear failures. Exterior and interior footing bottoms should be established at least 16 inches below finished surrounding exterior grades.

Construction: Foundation excavations should be evaluated by the NOVA geotechnical engineer prior to reinforcing steel placement to observe foundation subgrade preparation and confirm bearing pressure capacity. Foundation excavations should be level and free of debris, ponded water, mud, and loose, frozen, or water-softened soils.

Concrete should be placed as soon as is practical after the foundation is excavated, and the subgrade evaluated. Foundation concrete should not be placed on frozen or saturated soil. If a foundation excavation remains open overnight, or if rain or snow is imminent, a 3 to 4-inch thick "mud mat" of lean concrete should be placed in the bottom of the excavation to protect the bearing soils until reinforcing steel and concrete can be placed.

7.0 CONSTRUCTION OBSERVATIONS

7.1 SUBGRADE

Once site grading is completed, the subgrade may be exposed to adverse construction activities and weather conditions. The subgrade should be well-drained to prevent the accumulation of water. If the exposed subgrade becomes saturated or frozen, the NOVA geotechnical engineer should be consulted.

A final subgrade evaluation should be performed by the NOVA geotechnical engineer immediately prior to slab-on-grade placement. If practical, proofrolling may be used to re-densify the surface and to detect any soil, which has become excessively wet or otherwise loosened.

7.2 SHALLOW FOUNDATIONS

Foundation excavations for the proposed structures and bulkhead should be level and free of debris, ponded water, mud, and loose, frozen or water-softened soils. All foundation excavations should be evaluated by the NOVA geotechnical engineer prior to reinforcing steel placement to observe foundation subgrade preparation and confirm bearing pressure capacity. Due to variable site subsurface and construction conditions, some adjustments in isolated foundation bearing pressures, depth of foundations or undercutting and replacement with controlled structural fill may be necessary.

APPENDIX A
Figures and Maps

Scale: Not To Scale	
Date Drawn: January 11, 2019	
Drawn By: J. James	
Checked By: W. Lawrence	

NOVA

140-A Lurton Street
Pensacola, Florida 32505
850.607.7782 ♦ 850.249.6683

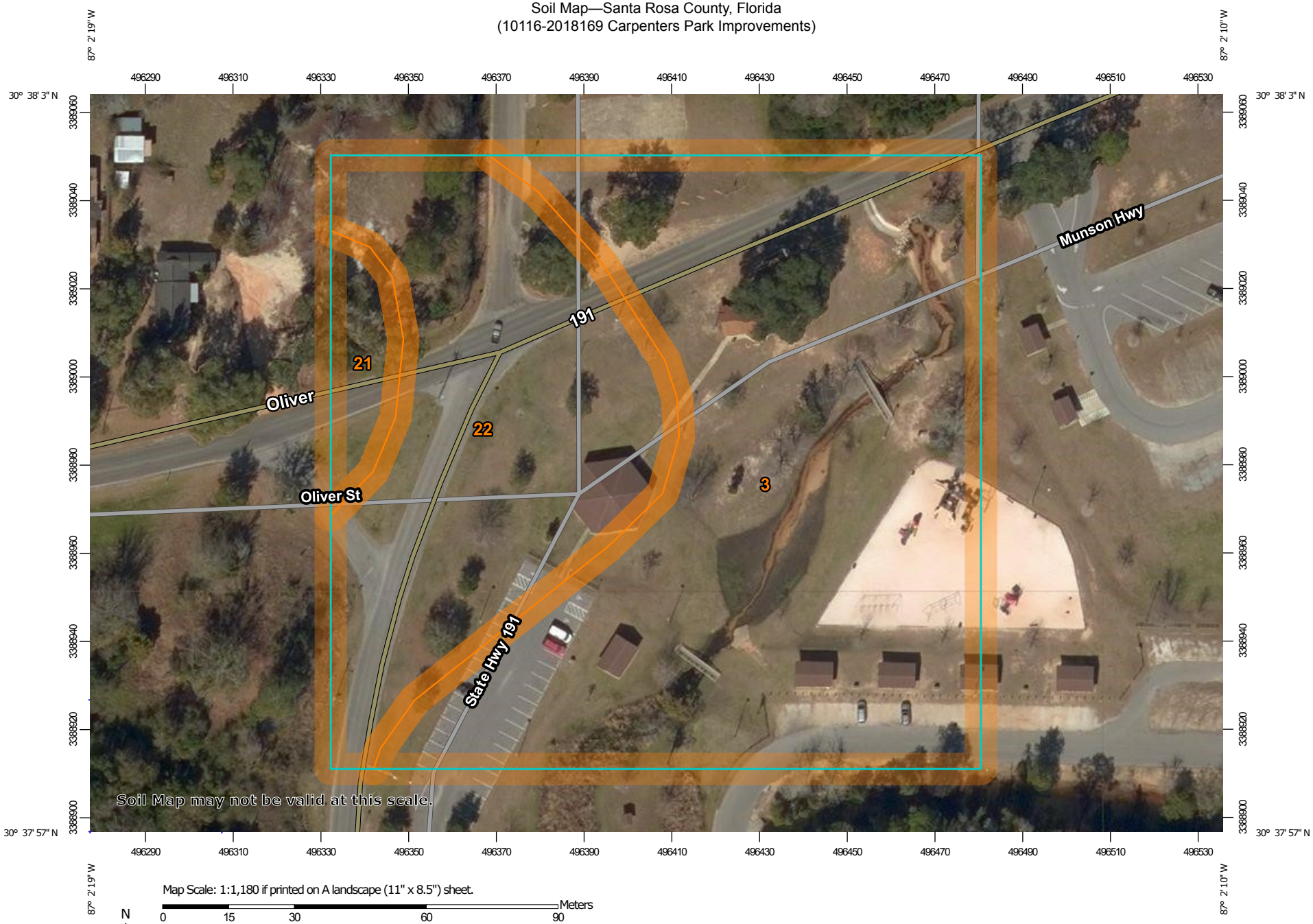
SITE LOCATION MAP

Carpenters Park Improvements

Milton, Santa Rosa County, Florida

NOVA Project Number 10116-2018169

Soil Map—Santa Rosa County, Florida
(10116-2018169 Carpenters Park Improvements)



Map Scale: 1:1,180 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 15 30 60 90

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Santa Rosa County, Florida
Survey Area Data: Version 15, Sep 5, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

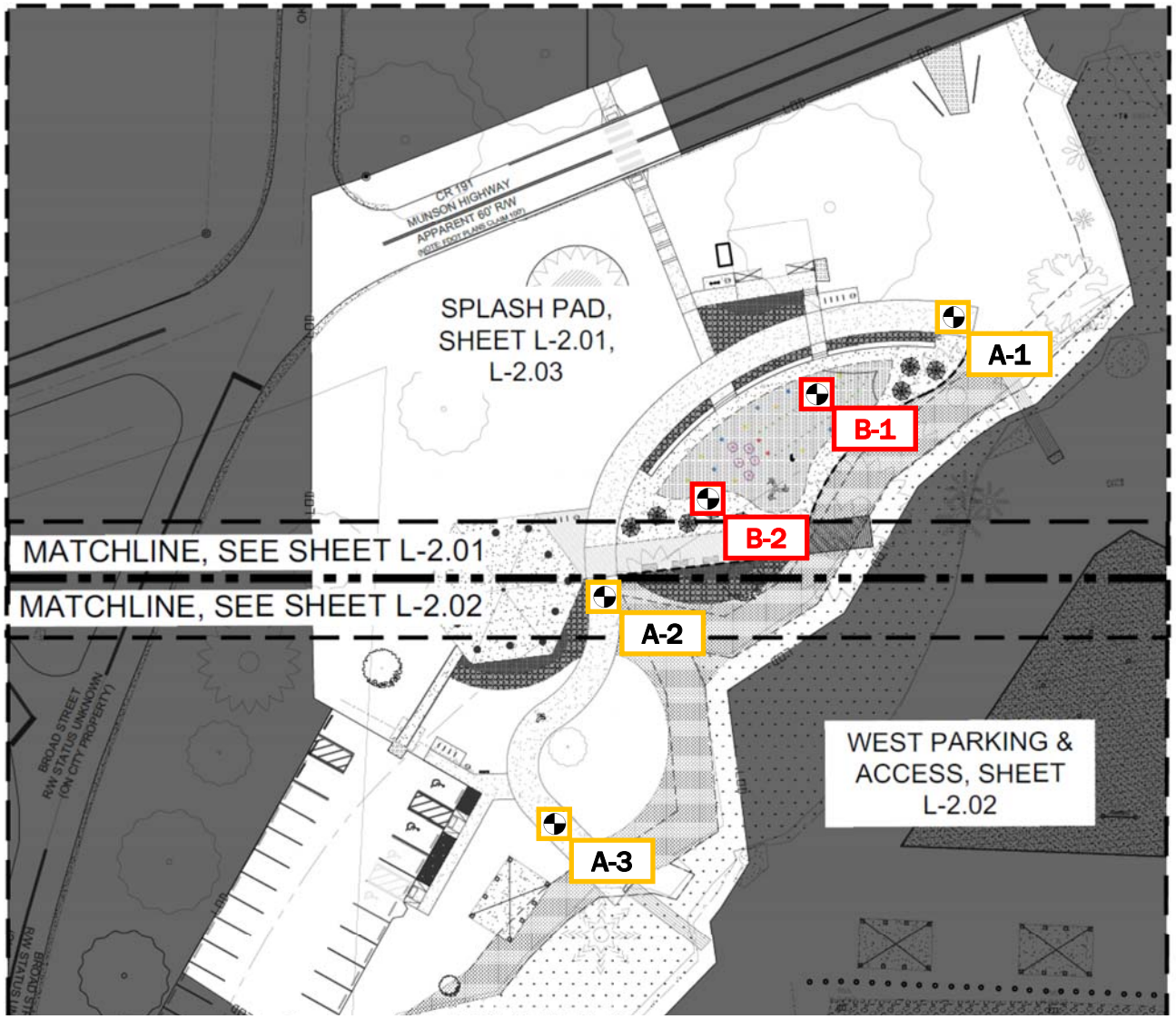
Date(s) aerial images were photographed: Jan 31, 2015—Feb 13, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Bibb-Kinston association	3.2	63.2%
21	Lakeland sand, 0 to 5 percent slopes	0.2	3.8%
22	Lakeland sand, 5 to 12 percent slopes	1.7	33.0%
Totals for Area of Interest		**5.1**	**100.0%**

APPENDIX B
Subsurface Data



LEGEND

A-x = Pavement Auger Boring

B-x = 15-foot deep Structural SPT Boring

Scale: Not To Scale **Date Drawn:** January 11, 2019 **Drawn By:** J. James **Checked By:** W. Lawrence	NOVA 140-A Lurton Street Pensacola, Florida 32505 850.607.7782 ♦ 850.249.6683	**BORING LOCATION PLAN** **Carpenters Park Improvements** Milton, Santa Rosa County, Florida *NOVA Project Number 10116-2018169*

KEY TO BORING LOGS

SYMBOLS AND ABBREVIATIONS

SYMBOL	DESCRIPTION
N-Value	No. of Blows of a 140-lb. Weight Falling 30 Inches Required to Drive a Standard Spoon 1 Foot
WOR	Weight of Drill Rods
WOH	Weight of Drill Rods and Hammer
	Sample from Auger Cuttings
	Standard Penetration Test Sample
	Thin-wall Shelby Tube Sample (Undisturbed Sampler Used)
% REC	Percent Core Recovery from Rock Core Drilling
RQD	Rock Quality Designation
	Stabilized Groundwater Level
	Seasonal High Groundwater Level (also referred to as the W.S.W.T.)
NE	Not Encountered
GNE	Groundwater Not Encountered
BT	Boring Terminated
-200 (%)	Fines Content or % Passing No. 200 Sieve
MC (%)	Moisture Content
LL	Liquid Limit (Atterberg Limits Test)
PI	Plasticity Index (Atterberg Limits Test)
K	Coefficient of Permeability
Org. Cont.	Organic Content
G.S. Elevation	Ground Surface Elevation

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS More than 50% retained on the No. 200 sieve*	GRAVELS 50% or more of coarse fraction retained on 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 and gravel-sand-silt mixtures
			GC	Clayey gravels and gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS 5% or less passing No. 200 sieve	SW**	Well-graded sands and gravelly sands, little or no fines
			SP**	Poorly graded sands and gravelly sands, little or no fines
		SANDS with 12% or more passing No. 200 sieve	SM**	Silty sands, sand-silt mixtures
			SC**	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve*	SILTS AND CLAYS Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, 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 diamicaceous fine sands or silts, elastic silts
			CH	Inorganic clays or clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
			PT	Peat, muck and other highly organic soils

*Based on the material passing the 3-inch (75 mm) sieve
** Use dual symbol (such as SP-SM and SP-SC) for soils with more than 5% but less than 12% passing the No. 200 sieve

RELATIVE DENSITY
(Sands and Gravels)
Very loose – Less than 4 Blow/Foot
Loose – 4 to 10 Blows/Foot
Medium Dense – 11 to 30 Blows/Foot
Dense – 31 to 50 Blows/Foot
Very Dense – More than 50 Blows/Foot

CONSISTENCY
(Silts and Clays)
Very Soft – Less than 2 Blows/Foot
Soft – 2 to 4 Blows/Foot
Medium Stiff – 5 to 8 Blows/Foot
Stiff – 9 to 15 Blows/Foot
Very Stiff – 16 to 30 Blows/Foot
Hard – More than 30 Blows/Foot

RELATIVE HARDNESS
(Limestone)
Soft – 100 Blows for more than 2 Inches
Hard – 100 Blows for less than 2 Inches

MODIFIERS

These modifiers Provide Our Estimate of the Amount of Minor Constituents (Silt or Clay Size Particles) in the Soil Sample
Trace – 5% or less
With Silt or With Clay – 6% to 11%
Silty or Clayey – 12% to 30%
Very Silty or Very Clayey – 31% to 50%

These Modifiers Provide Our Estimate of the Amount of Organic Components in the Soil Sample
Trace – Less than 3%
Few – 3% to 4%
Some – 5% to 8%
Many – Greater than 8%

These Modifiers Provide Our Estimate of the Amount of Other Components (Shell, Gravel, Etc.) in the Soil Sample
Trace – 5% or less
Few – 6% to 12%
Some – 13% to 30%
Many – 31% to 50%

NOVA

TEST BORING RECORD B-1

PROJECT: Carpenters Park Improvements PROJECT NO.: 10116-2018169
CLIENT: Volkert, Inc.
PROJECT LOCATION: Milton, Santa Rosa County, Florida
LOCATION: Per Boring Location Plan ELEVATION: Existing Grade
DRILLER: S. Ryan LOGGED BY: J. James
DRILLING METHOD: SPT Boring DATE: January 9, 2019
DEPTH TO - WATER> INITIAL: ▽ 2.5 ft. AFTER 24 HOURS: ▼ _____ CAVING> C _____

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		TOPSOIL (Approx. 4-inches)				
		Light brown/orange loose fine-grained slightly silty SAND (SP-SM)				10
		Gray loose to medium dense fine-grained slightly silty SAND (SP-SM)				12
3				▽		
						7
6						
		Dark brown medium dense fine-grained slightly silty SAND (SP-SM)				26
						30
9						
12		Dark gray loose fine-grained silty SAND (SM)				5
15		Boring Terminated at 15 ft.				
18						
21						

%<#200
BLOW COUNT
NATURAL MOISTURE
PLASTIC LIMIT ⊢ LIQUID LIMIT
10 20 30 40 50 70 90

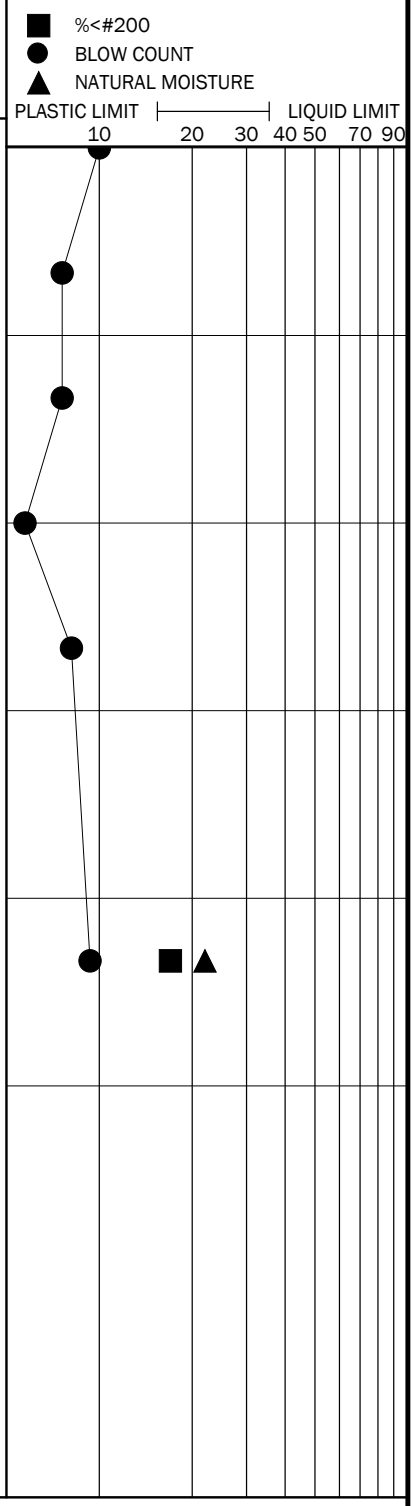
This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD B-2

PROJECT: Carpenters Park Improvements PROJECT NO.: 10116-2018169
CLIENT: Volkert, Inc.
PROJECT LOCATION: Milton, Santa Rosa County, Florida
LOCATION: Per Boring Location Plan ELEVATION: Existing Grade
DRILLER: S. Ryan LOGGED BY: J. James
DRILLING METHOD: SPT Boring DATE: January 9, 2019
DEPTH TO - WATER> INITIAL: ▽ 1 ft. AFTER 24 HOURS: ▼ _____ CAVING> C _____

Depth (feet)	Description	Graphic	Groundwater	Sample Type	N-Value
0	TOPSOIL (Approx. 6-inches)				
	Light brown loose fine-grained slightly silty SAND (SP-SM)		▽		10
	Gray loose fine-grained silty SAND (SM)				6
3					
	Light brown loose fine-grained slightly silty SAND (SP-SM)				6
6					
	Dark brown very loose to loose fine-grained silty SAND (SM)				2
					7
9					
	Gray loose fine-grained silty SAND (SM)				
12					
					9
15					
	Boring Terminated at 15 ft.				
18					
21					



This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD A-1

PROJECT: Carpenters Park Improvements PROJECT NO.: 10116-2018169
CLIENT: Volkert, Inc.
PROJECT LOCATION: Milton, Santa Rosa County, Florida
LOCATION: Per Boring Location Plan ELEVATION: Existing Grade
DRILLER: J. James LOGGED BY: J. James
DRILLING METHOD: Auger Boring DATE: January 2, 2018
DEPTH TO - WATER> INITIAL: ▽ 2 ft. AFTER 24 HOURS: ▼ _____ CAVING> C _____

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		TOPSOIL (Approx. 4-inches)				
		Light brown/orange fine-grained silty SAND (SM)				
3		Light brown/gray fine-grained silty SAND (SM)		▽		
		Boring Terminated at 4 ft.				
6						
9						
12						
15						
18						
21						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD A-2

PROJECT: Carpenters Park Improvements PROJECT NO.: 10116-2018169
CLIENT: Volkert, Inc.
PROJECT LOCATION: Milton, Santa Rosa County, Florida
LOCATION: Per Boring Location Plan ELEVATION: Existing Grade
DRILLER: J. James LOGGED BY: J. James
DRILLING METHOD: Auger Boring DATE: January 2, 2018
DEPTH TO - WATER> INITIAL: ▽ 2 ft. AFTER 24 HOURS: ▼ _____ CAVING> C _____

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		TOPSOIL (Approx. 3-inches)				
		Light brown/orange fine-grained silty SAND (SM)		▽		
3		Light brown/gray fine-grained silty SAND (SM)				
6		Boring Terminated at 5 ft.				
9						
12						
15						
18						
21						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

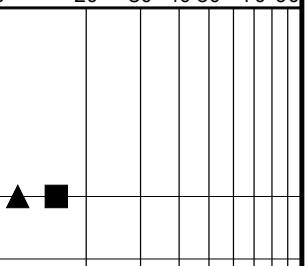
TEST BORING RECORD A-3

PROJECT: Carpenters Park Improvements PROJECT NO.: 10116-2018169
CLIENT: Volkert, Inc.
PROJECT LOCATION: Milton, Santa Rosa County, Florida
LOCATION: Per Boring Location Plan ELEVATION: Existing Grade
DRILLER: J. James LOGGED BY: J. James
DRILLING METHOD: Auger Boring DATE: January 2, 2018
DEPTH TO - WATER> INITIAL: ▽ 1 ft. AFTER 24 HOURS: ▼ _____ CAVING> C _____

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		TOPSOIL (Approx. 4-inches)				
		Light brown/gray fine-grained silty SAND (SM)		▽		
3						
		Boring Terminated at 4 ft.				
6						
9						
12						
15						
18						
21						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE

PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90



This information pertains only to this boring and should not be interpreted as being indicative of the site.

APPENDIX C
Laboratory Data

SUMMARY OF CLASSIFICATION & INDEX TESTING

Carpenters Park Improvements
Milton, Santa Rosa County, Florida
NOVA Project No. 10116-2018169

SUMMARY OF CLASSIFICATION AND INDEX TESTING				
Boring No.	Sample Depth (ft. BEG)	Natural Moisture (%)	Percent Fines (%- #200)	USCS Soil Classification
B-1	0-2	16	8	SP-SM
B-1	6-8	16	11	SP-SM
B-2	13-15	22	17	SM
A-1	1-2	17	15	SM
A-3	3-4	12	16	SM

APPENDIX D
Qualifications of Recommendations

QUALIFICATIONS OF RECOMMENDATIONS

The findings, conclusions and recommendations presented in this report represent our professional opinions concerning subsurface conditions at the site. The opinions presented are relative to the dates of our site work and should not be relied on to represent conditions at later dates or at locations not explored. The opinions included herein are based on information provided to us, the data obtained at specific locations during the study, and our previous experience. If additional information becomes available which might impact our geotechnical opinions, it will be necessary for NOVA to review the information, re-assess the potential concerns, and re-evaluate our conclusions and recommendations.

Regardless of the thoroughness of a geotechnical exploration, there is the possibility that conditions between borings may differ from those encountered at specific boring locations, that conditions are not as anticipated by the designers and/or the contractors, or that either natural events or the construction process has altered the subsurface conditions. These variations are an inherent risk associated with subsurface conditions in this region and the approximate methods used to obtain the data. These variations may not be apparent until construction.

The professional opinions presented in this report are not final. Field observations and foundation installation monitoring by the geotechnical engineer, as well as soil density testing and other quality assurance functions associated with site earthwork and foundation construction, are an extension of this report. Therefore, NOVA should be retained by the owner to observe all earthwork and foundation construction to confirm that the conditions anticipated in this study actually exist, and to finalize or amend our conclusions and recommendations. NOVA is not responsible or liable for the conclusions and recommendations presented in this report if NOVA does not perform these observations and testing services.

This report is intended for the sole use of **Volkert, Inc.** only. The scope of work performed during this study was developed for purposes specifically intended by of **Volkert, Inc.** only and may not satisfy other users' requirements. Use of this report or the findings, conclusions or recommendations by others will be at the sole risk of the user. NOVA is not responsible or liable for the interpretation by others of the data in this report, nor their conclusions, recommendations or opinions.

Our professional services have been performed, our findings obtained, our conclusions derived and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices in the State of Florida. This warranty is in lieu of all other statements or warranties, either expressed or implied.

Important Information about This

Geotechnical-Engineering Report

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

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

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

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

Read the Full Report

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

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

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

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

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

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

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

Subsurface Conditions Can Change

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

Most Geotechnical Findings Are Professional Opinions

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

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

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

Give Constructors a Complete Report and Guidance

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

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

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

Obtain Professional Assistance To Deal with Mold

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

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@geoprofessional.org www.geoprofessional.org