GEOTECHNICAL ENGINEERING REPORT



909 West Street Warehouse

Parker, Bay County, Florida

PREPARED FOR:

Northstar Engineering Services, LLC
2431 Hartford Highway
Dothan, Alabama 36305

NOVA Project Number: 10111-2023184

October 25, 2023

NOVA

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October 25, 2023

Northstar Engineering Services, LLC
2431 Hartford Highway
Dothan, Alabama 36305

Attention: Mr. Nathan Parish

Subject: **Geotechnical Engineering Report**
909 West Street Warehouse
Parker, Bay County, Florida
NOVA Project Number 10111-2023184

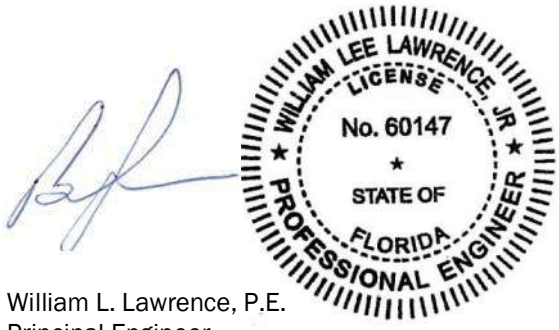
Dear Mr. Parish:

NOVA Engineering and Environmental, LLC (NOVA) has completed the authorized Geotechnical Engineering Report for the developemnt in Parker, Bay County, Florida. The work was performed in general accordance with NOVA Proposal Number 10111-2023184, dated August 31, 2023. 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

K. Nick Gonzalez
Staff Engineer



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

Copies Submitted: Addressee (electronic)

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1.0 INTRODUCTION

This section provides information relating to our contract, the purpose of our work, and a summary of our understanding of the project,

1.1 NAME AND LOCATION OF PROJECT

The ±2.6-acre Subject Property (Bay County Parcel Numbers 5870-000-000, 25869-000-000 and 25838-000-000) is located at 909 West Street in Parker, Bay County, Florida. The location of the site is indicated on the Site Location Map included in Appendix A.

1.2 AUTHORIZATION AND SCOPE OF STUDY

Our work on this project was as described in our Proposal Number 10111-2023184, dated August 31, 2023, and authorized by the Client on September 5, 2023. The primary objectives of this work were 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, soil test borings and sampling, engineering evaluation of the field and laboratory data, and the preparation of this report. As authorized per the above referenced proposal, this completed geotechnical report includes:

- A description of the site, fieldwork, laboratory testing and general soil conditions encountered, together with 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.
- Foundation system recommendations for the proposed structure, as deemed necessary based on the boring results.
- Slab-on-grade construction considerations based on the geotechnical findings, including the need for a sub-slab vapor barrier or a capillary barrier.
- 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 and foundation construction.
- Recommended pavement sections based on assumed traffic loading and subgrade strengths estimate from correlation with test borings, laboratory data, and soil types collected from the test borings.

- Recommended soil related design parameters for the SMS area including measured hydraulic conductivity rates and an estimated fillable porosity value.

The assessment of the presence of wetlands, floodplains, or water classified as state waters was beyond the scope of this exploration. Additionally, the assessment of site environmental conditions, including the detection of pollutants in the soil, rock, or groundwater, at the site was also beyond the scope of this geotechnical exploration and evaluation.

2.0 PROJECT INFORMATION

Our understanding of this project is based on discussions with The Client, review of the provided site plans with requested boring locations, a site reconnaissance during boring layout and field testing, and our experience with similar projects.

2.1 Site Plans and Documents

We were furnished with the following document:

- Document: Boring Markers/Site Construction Plans for All Metal Roofing and Siding
  Dated: February 2023
  Created By: Northstar Engineering Services, LLC.
  Note: Boring locations and depths were provided by the Client.

2.2 PROJECT SITE

The ±2.6-acre Subject Property (Bay County Parcel Numbers 5870-000-000, 25869-000-000 and 25838-000-000) is located at 909 West Street in Parker, Bay County, Florida. At the time of our field exploration, the vicinity of the Subject Property was observed to be moderately developed with existing medium-sized commercial warehouse structures and a graveyard to the west, a church and a single family residence located to the east and undeveloped lots of similar size to the north and south. Parker Bayou is located about 900 feet south of the Subject Property. We note that the Subject Property was previously developed with a single-story structure and paved areas that had been demolished prior to our exploration.

2.3 PROPOSED DEVELOPMENT

NOVA understands the project will include the construction of a single-story, commercial warehouse structure with a plan footprint of approximately 28,000 square feet with associated asphaltic and concrete pavements and a stormwater management system (SMS) consisting of a conventional shallow dry retention pond.

The warehouse structure is anticipated to be of metal frame construction supported by a shallow foundation system.

Maximium Loads

Final structural loading details were not available from the Design Team at the time of the issuance of this report. We have therefore assumed that maximum loadings for the proposed structure will not exceed 75 kips per column for isolated interior columns and 8 kips per linear foot for continuous load bearing walls.

Site Grading

Final grading details were not available from the Design Team at the time of the issuance of this report. We have therefore assumed that finished site grades will not change greater than +/- 3 feet from existing grades within the proposed structure footprint.

3.0 SUBSURFACE EXPLORATION

3.1 AREA GEOLOGY

According to the United States Geological Survey (USGS), the subject site is located in Bay County within the Gulf Coastal Plain, separated from the Florida Platform by geologic structures known as the Gulf Trough and Apalachicola Embayment. These structures formed a bathymetric and environmental barrier from the earliest Eocene or earliest Oligocene periods into the Miocene. According to the "Text to Accompany the Geologic Map of Florida" by Scott, 2001, the site is generally underlain by undifferentiated sediments deposited during the Quaternary period. These sediments typically consist of siliciclastics (sand), organics and freshwater carbonates. These soils are highly permeable and form the Sand and Gravel Aquifer of the surficial aquifer system. 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.

NRCS Soil Survey

The Natural Resources Conservation Service (NRCS) "Web Soil" was reviewed to obtain shallow soil and seasonal high-water table (SHWT) information. Generally, the site lies within the Lakeland sand (Map Unit 9) unit. The NRCS Soil Survey map and data have been included in the Appendix.

Unit no.	Soil Name	Depth (in)	Soil Description	Depth to Seasonal High Groundwater (in)
9	Lakeland Sand 0 to 5 Percent Slopes	0 - 80	Sand	More than 80

3.2 LOCAL EXPERIENCE

NOVA has conducted numerous geotechnical studies for projects in the general site area. The typical subsurface conditions in this area were found to consist of fine-grained sands to silty sands (USCS classifications of SP, SP-SM, and SM). In some instances, sand to silty sand strata with some organics and/or significant organic staining have also been encountered.

3.3 FIELD EXPLORATION

Our field exploration was conducted on September 22 and October 3, 2023, and included:

- Four 15-foot-SPT borings at locations provided by the Client (designated B-1 through B-4 in the attached Appendix).
- Two 10-foot-auger borings at locations provided by the Client (designated S-1 and S-2).
- One Double Ring Infiltration (DRI) test at a location provided by the Client.

The boring and test locations were established in the field by NOVA personnel using a handheld GPS device and by estimating distances and angles from site landmarks. Prior to initiating field testing, underground utilities were marked by the state utility locate service (811, or Sunshine One-Call). Any required underground utility related adjustments of the test locations were then made at the time of the field exploration. The approximate test locations are shown on the Boring Location Plan presented in Appendix B. If increased accuracy is desired by the Client, test locations and elevations may be surveyed.

The 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.

The groundwater levels reported on the Test Boring Records represent measurements made at the completion of each test boring, following a suitable stabilization period. The test borings were subsequently backfilled with soil cuttings from the drilling process for safety concerns.

SPT Borings

The 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 once groundwater was encountered. 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". 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.

Auger Borings

The auger borings were performed using a hand operated soil sampler. Soil samples were obtained from the auger bucket approximately at each stratum break.

Test Boring Records in Appendix B 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 recovered 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.

3.4 LABORATORY TESTING

Following completion of the field work, soil samples obtained in the field were returned to our office for classification and laboratory testing assignment. These tests included the following:

- Manual/Visual Soil Classification
- Moisture Content
- Fines Content
- Organic Content
- Re-Molded Falling Head Permeability

The purpose of the testing program was to classify the subsurface materials relative to the Unified Classification System and to determine their physical characteristics including strength, and compressibility.

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 testing was conducted in general accordance with ASTM Designation D-2216. Seven moisture content tests were performed in this study.

Fines Content

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 testing

was conducted in general accordance with ASTM Designations D-6913 and D-1140. Seven fines content tests were performed in this study.

Organic Content

The organic content is the ratio expressed as a percentage of the weight of organic material in a given mass of soil to the weight of the solid particles. This testing was conducted in general accordance with ASTM D-2974. Seven organic content tests were performed in this study.

Re-Molded Falling Head Permeability

A remolded falling head permeability test (ASTM D-5084) is a common laboratory test used to determine the hydraulic conductivity of fine-grained soils. The test involves the flow of water through a re-molded, fully saturated soil sample inside a rigid-wall permeameter connected to a standpipe of constant diameter. Before beginning the flow measurements, the soil sample is saturated, and the standpipe is filled with water to a given level. The test then starts by allowing the water to flow through the sample until the water in the standpipe reaches a lower limit. The time required for the water to flow from the upper to lower limit is recorded. One remolded permeability test was performed in this study.

Detailed descriptions of the tests conducted are presented in Appendix C. The soil samples will be discarded 30 days following the submittal of this report, unless you request otherwise.

3.5 SUBSURFACE CONDITIONS

The following paragraphs provide generalized descriptions of the subsurface profiles and soil conditions encountered by the borings conducted during this exploration.

Surface Materials

Surface materials encountered in test borings generally consisted of sand with trace organics and building debris (from the recently demolished building). Further, existing asphaltic pavement occupies part of the subject property.

Fill

Based on the boring results and our observations of the property at the time of our field exploration, previously installed fill materials do not appear to be present on this property.

Native Soils

The soil borings generally encountered very loose to medium-dense fine-grained sands (USCS classification of SP) below surficial materials to about 12 feet below existing grade (BEG), underlain by medium dense fine-grained slightly clayey to clayey sands (SP-SC, SC) to the maximum explored depth of about 15 feet BEG.

Standard Penetration Test (SPT) resistance values ("N"- values) varied from 2 to 16 blows per foot (bpf) and generally increased with depth. SPT values typically ranged from 2 to 8 bpf in the upper 10 feet of the soil horizon, and 11 to 16 bpf at greater depths.

Groundwater Conditions

Groundwater in the Bay County, Florida area typically occurs as an unconfined aquifer condition. Consequently, the groundwater table is expected to be a subdued replica of the original surface topography.

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.

A stabilized groundwater table was not encountered in the test borings at the time of our final field exploration, which occurred during a period of relatively normal seasonal rainfall and within a pattern of frequent (daily) rain events. 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 (i.e., towards nearby Parker Bayou).

Groundwater levels vary with changes in season and rainfall, construction activity, surface water runoff, and other site-specific factors. Groundwater levels in the Bay 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. Based on comparisons of current annual monthly rainfall data to historical rainfall data extending back 50+ years in time and the boring results, we estimate that the normal permanent seasonal high groundwater (SHGW) elevation will remain at a depth below 15 feet BEG, during the wet season. This data generally correlates to the values provided by the USGS Natural Resources Conservation Service (NRCS). The following table shows the following information for each soil test boring: soil type per NRCS, the encountered groundwater table and the estimated seasonal high groundwater level.

Test Boring	Soil Type*	Encountered Groundwater Depth (ft)**	Estimated Seasonal High Groundwater Depth (ft)**
B-1	Sand	Not Encountered	Below 15 feet
B-2	Sand	Not Encountered	Below 15 feet
B-3	Sand	Not Encountered	Below 15 feet
B-4	Sand	Not Encountered	Below 15 feet
S-1	Sand	Not Encountered	Below 15 feet
S-2	Sand	Not Encountered	Below 15 feet

* Based on the NRCS Soil Survey provided Appendix A
** From the existing ground surface

4.0 GEOTECHNICAL ASSESSMENT

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

Based on boring data and analysis, the subject site appears to be favorable for the proposed development. On-site near surface soils that are categorized as fine-grained sands (SP) based on the Unified Soil Classification System (USCS) are considered suitable for reuse as structural fill or backfill (if required), provided that the materials are free of building debris, rubble, clay, rock, roots, and organics.

We note that subsurface conditions in unexplored locations can and will vary from those encountered at the boring locations considered and discussed herein. 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.

The following sections present our recommendations for site preparation and grading, and for the design of foundations.

5.0 RECOMMENDATIONS

5.1 SITE PREPARATION

Prior to proceeding with construction, all topsoil and vegetation, trees and associated root systems, and any other deleterious non-soil materials found to be present should be stripped from the proposed construction areas. Clean topsoil may be stockpiled and subsequently re-used in landscaped areas. Debris-laden materials should be excavated, transported, and disposed of off-site in accordance with appropriate solid waste rules and regulations. Any existing utility locations should be reviewed to assess their impact on the proposed construction and relocated/grouted in-place as appropriate.

Prior to fill placement or construction within cut areas, we recommend densifying (compacting) the upper zone of fine-grained sand (SP, N-values of concern varying between 2 and 6) that were generally encountered in the upper 2 feet to 6 feet of the soil horizon all SPT borings performed for this project.

This can most likely be accomplished by compacting the exposed subgrade from the stripped grade elevation with a heavy weight vibratory roller (i.e., a minimum 10-ton roller, static weight, with a minimum 5-foot drum diameter) to a minimum soil density of at least 98 percent of the maximum dry density as determined by the Modified Proctor test method (ASTM D-1557), as equipment of this size can typically impact sandy profiles to depths of 5+ feet. We note that vibratory compaction operations should not be conducted within a clear distance of 50 feet from any existing structures on adjacent properties.

Verification of the improvement of the loose subgrade soils within the proposed structure footprints that are at grade should be achieved via Dynamic Cone Penetrometer testing to a depth of at least 4 feet BEG and additional recommendations (i.e., further compaction effort, possible undercutting, choking stone into the exposed subgrade, etc.) can be rendered in the field as these tests are performed.

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. Actual remedial recommendations can best be determined by the geotechnical engineer in the field at the time of construction.

5.2 EXCAVATION

Excavations greater than five feet deep (such as for deeper foundations and underground utilities) should be sloped or shored in accordance with local, state, and federal regulations, including OSHA (29CFR Part 1926), excavation safety standards. It should be noted that the Contractor is solely responsible for site safety. This information is provided only as a service and under no circumstances should NOVA be assumed to be responsible for construction site safety. Each excavation should be observed and classified by an OSHA-competent person. All excavations below the groundwater level are classified as OSHA Class C soils for excavation purposes.

After stripping and trench excavation, a NOVA geotechnical engineer should carefully evaluate the exposed soils. We recommend undercutting the proposed pipe trench areas approximately ½ feet below the proposed pipe bearing elevations and installing structural backfill for use as pipe bedding materials. Sewer pipe installation should be constructed in general compliance with ASTM D 2321, standard practice for underground installation of pipe for sewers and other gravity flow applications.

Groundwater Control

A stabilized groundwater table was not encountered in the test borings during of our field exploration, which occurred during a period of relatively normal seasonal rainfall and within a period of frequent (daily) rain events. Based on our understanding of the proposed construction, we do not anticipate that significant groundwater control issues will develop during mass grading and foundation construction.

5.3 FILL PLACEMENT

Fill 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. Based on visual examination and limited laboratory soil testing results, the existing surficial soils encountered during this exploration typically consisted of fine-grained sands (SP) that should be suitable for re-use as fill or backfill material, provided they are within acceptable moisture tolerances at the time of replacement and compaction.

We recommend that stockpiles of all materials planned for re-use be sealed as they are excavated to prevent (to the greatest extent practical) the intrusion of moisture into the core of the soil stockpile(s) during significant rain events prior to their potential re-use as fill and/or backfill soils.

Prior to construction, bulk samples of all proposed fill materials (both native and import) 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.

Soil Compaction

Fill should be placed in thin, horizontal loose lifts (maximum 8-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, portable compaction equipment and thinner fill lifts (3 to 4 inches) may be necessary.

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. Soils excavated from below the groundwater table will likely require significant efforts to achieve acceptable moisture contents prior to re-use as fill.

One test per 2,500 square feet of building footprint and per 5,000 square feet of pavement area should be performed at the stripped grade elevation and in each lift of fill, 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. One test in conventional spread foundations, one test per in each column footing, and one test per 50 linear feet of continuous strip foundations is also recommended.

The site should be graded during construction to maintain positive drainage away from the construction areas, to prevent ponding of stormwater on the site during and shortly following significant rain events. The construction areas should be sealed and crowned with a smooth roller to minimize ponding water from storm events at the end of each day of work.

5.4 FOUNDATIONS

General

We understand that the proposed structure will be supported on a conventional shallow foundation system. Final structural loadings were not available from the design team at the time of the issuance of this report; we have therefore assumed that maximum isolated interior column and continuous load bearing wall loads will not exceed 75 kips per column and 8 kips per linear foot, respectively, for the proposed structure.

If any of the above stated design assumptions are found to be incorrect or are revised, NOVA should be contacted immediately so that additional analyses can be performed to determine if the recommendations presented herein will need to be modified.

Shallow Foundations

Design: After the recommended site and subgrade preparation and fill placement has been completed, it is our opinion that a conventional shallow foundation consisting of isolated spread footings and/or turn-down slab-on-grade construction can be used to support the proposed structure.

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

We recommend a value of 0.35 can be employed as the coefficient of friction (sliding resistance) between foundations and the underlying residual or fill soils. Footings should be a minimum of 24 inches in width for ease of construction and to reduce the possibility of localized shear failures. Isolated exterior and interior footing bottoms should be established at least 18 inches below finished surrounding exterior grades. When utilizing a post-tensioned monolithic slab-on-grade design, exterior and interior footing bottoms should be established a minimum of 12 inches below adjacent finished grades.

Settlement: Settlements for a spread foundation bearing on structural fill were assessed using SPT values to estimate elastic modulus, based on published correlations and previous NOVA experience. We note that the settlements presented are based on the SPT boring results. Conditions may be better or worse in other areas; however, we believe the estimated settlements are reasonably conservative.

Based on the provided structural loadings, the soil bearing capacity provided above, the presumed foundation elevations as discussed above, we expect residual primary total settlement beneath individual foundations to be on the order of 1-inch.

The amount of differential settlement is difficult to predict because the subsurface and foundation loading conditions can vary considerably across the site. However, we anticipate residual differential settlement between adjacent foundations will be less than ½ inch. The final deflected shape of the structure will be dependent on actual foundation locations and loading.

Foundation support conditions are highly erratic and may vary dramatically in short horizontal distances. It is anticipated that the geotechnical engineer may recommend a different bearing capacity upon examination of the actual foundation subgrade at numerous locations.

To reduce the differential settlement if lower consistency materials are encountered, a lower bearing capacity should be used. We anticipate that timely communication between the geotechnical engineer and the structural engineer, as well as other design and construction team members, will be required.

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.

5.5 SLAB-ON-GRADE

General

The conditions exposed at subgrade levels will vary across the site and may include structural fill or densified in-situ soils. The slab-on-grade may be adequately supported on these subgrade conditions subject to the recommendations in this report. The slab-on-grade should be jointed around columns and along walls to reduce cracking due to differential movement. An underdrain system is not necessary beneath the slab, provided that the slab is installed at least 2 feet above the post development high groundwater level. An impermeable vapor barrier is recommended beneath finished spaces to reduce dampness.

Once grading is completed, the subgrade can be exposed to adverse construction activities and weather conditions during the period of sub-slab utility installation. The subgrade should be well drained to prevent the accumulation of water. If the exposed subgrade becomes unstable, excessively wet or exhibits excessive rutting or pumping, the geotechnical engineer should be consulted.

Subgrade Modulus

A coefficient of subgrade reaction (***k***) of 125 pci (psi per inch) may be used for conventional slab design where slabs bear upon subgrades prepared in accordance with previous recommendations.

Please note that this magnitude of ***k*** is intended to reflect the elastic response of soil beneath a typical floor slab under light loads with a small load contact area often measured in square inches, such as loads from forklifts, automobile/truck traffic or lightly loaded storage racks. The recommended coefficient of subgrade reaction (***k***) of 125 pci is not applicable for heavy slab loads caused by bulk storage or tall storage racks, or for mat foundation design.

Several design methods are applicable for conventional slab design. We have assumed that the slab designer will utilize the methods discussed in the American Concrete Institute (ACI) Committee 360 report, *"Guide to Design of Slabs-on-Ground, (ACI 360R-10)*.

5.6 STORMWATER MANAGEMENT SYSTEM RECOMMENDATIONS

NOVA understands that the stormwater management system (SMS) to treat and dispose of stormwater runoff associated with the proposed development is desired to consist of a conventional shallow dry retention basin. Based on the results of our field exploration, the subsurface conditions encountered in the SMS area appear to be adaptable for the treatment and disposal of stormwater runoff via the desired conventional shallow retention basin. We recommend that the soil parameters presented in the table on the next page be considered for the design of the SMS for this project.

SMS SOIL DESIGN PARAMETERS	
Corresponding Soil Boring Test Location	S-1, S-2, and B-2
Approximate Depth to Confining Stratum, BEG**	Below 15 feet
Measured Vertical Hydraulic Conductivity (k_v)*	7 ft/day
Estimated Lateral Saturated Hydraulic Conductivity (k_h)*	10 ft/day
Measured In-Situ Infiltration Rate (DRI)	15 in/hr.*
Estimated Fillable Porosity of Soil	20%
Average Depth to Stabilized Groundwater Table, BEG	Not Encountered
Estimated Average Normal Permanent SHGW Table, BEG**	Below 15 feet

** Factors of Safety have not been applied to the noted hydraulic conductivity and infiltration values.*
***Relative to the maximum explored depth in test borings.*

The estimated normal permanent SHGW level provided in Table 1 above is based on our experience with projects in this locale; the soil strata encountered in the test boring; and the published information by the "Web Soil Survey" National database, NRCS division of the United States Department of Agriculture (USDA).

5.7 PAVEMENT CROSS SECTION DESIGN

General

A recommended flexible (asphalt) pavement section has been developed for this project based on our understanding of the existing subsurface conditions, review of applicable FDOT specifications, and the assumed loading conditions of 50,000 Equivalent Single-Axle Loads (ESALS) for heavy duty pavement areas and 25,000 Equivalent Single-Axle Loads (ESALS) for standard (light) duty pavement areas, with a 20-year design life. The terminal serviceability index and reliability for these pavement sections were assumed to be 2.0 and 85%, respectively. Traffic exceeding the stated criteria will require a heavier pavement section.

Flexible Pavements

We recommend a minimum compaction of at least 98 percent of the maximum dry density be specified for the base and stabilized subgrade courses as determined by the Modified Proctor test method (ASTM D-1557). A minimum separation of at least 24 inches between the bottom of an FDOT approved Crushed Limerock Base or GAB course and the seasonal high groundwater table should be maintained.

All asphalt material and paving operations should meet applicable specifications of the Asphalt Institute and FDOT requirements. A NOVA technician should observe placement and perform density testing of the stabilized subgrade and base course materials as well as asphalt. We recommend using the parameters shown for a flexible pavement section presented below in Table 1 (Standard Duty) and in Table 2 (Heavy Duty) for the flexible pavement section designs for this project.

Table 1 – Recommended Standard Duty Flexible Pavement Section	
Asphaltic Concrete Structural Course (SuperPave SP-9.5 or SP-12.5)	1½ inch
FDOT Approved Crushed Limerock, Crushed Concrete, or Graded Aggregate Base (GAB) Material (minimum LBR of 100)	6 inches
Stabilized Subgrade Course (minimum LBR of 40)	12 inches

Table 2 – Recommended Heavy Duty Flexible Pavement Section (Primary Entrance, and areas where static wheel turning is required)	
Asphaltic Concrete Surface Course (such as a 9.5 mm SuperPave approved FDOT mix)	1 inch
Asphaltic Concrete Structural Course (such as a 12.5 mm SuperPave approved FDOT mix)	1½ inches
FDOT Approved Crushed Limerock, Crushed Concrete, or Graded Aggregate Base (GAB) Material (minimum LBR of 100)	8 inches
Stabilized Subgrade Course (minimum LBR of 40)	12 inches

Based on visual classification of the near-surface materials encountered in the test borings, it appears that the native sand (SP) soils will likely not meet the minimum LBR requirement of 40 for the Stabilized Subgrade Course (SSC, which is the upper 12 inches of subgrade beneath flexible pavement sections) and will require stabilization with soil fines or additional base course material. An imported material having a minimum LBR value of 40 should be specified for the final (12-inch) lift of fill for pavement areas being installed over fill.

All asphalt material and paving operations should meet applicable specifications of the Asphalt Institute and Florida Department of Transportation. A NOVA technician should observe placement and perform density testing of the SSC, base course material and asphalt.

Rigid Pavements

We understand that a rigid (concrete) pavement section may also be employed for the proposed pavement areas planned as part of this development. Recommended heavy duty and light duty pavement sections have been developed for this project based on our understanding of the existing subsurface conditions, review of applicable FDOT specifications, and the assumed pavement design parameters stated previously.

Our recommendations for slab thickness for standard duty and heavy-duty concrete pavements are also based on the subgrade soils being densified to a minimum soil density of at least 98 percent of the Modified Proctor test method (ASTM D-1557), and employment of a design modulus of subgrade reaction (k) equal to 150 pounds per cubic inch.

We recommend using the designs in Table 3 for Standard Duty and Heavy-Duty concrete (rigid) pavement sections.

Table 3 - Recommended Rigid Pavement Sections		
STANDARD DUTY PAVEMENT SECTION		
Minimum Pavement Thickness	**Maximum Control Joint Spacing**	**Recommended Saw-Cut Depth**
5½ Inches	10 feet x 10 feet	$1^{3}/_{8}$ Inches
HEAVY DUTY PAVEMENT SECTION		
Minimum Pavement Thickness	**Maximum Control Joint Spacing**	**Recommended Saw-Cut Depth**
8 Inches	12 feet x 12 feet	2 Inches

All concrete materials and placement should conform to applicable FDOT specifications. We recommend that a non-woven geotextile (about 3 feet wide) be placed beneath the construction joints to prevent upward "pumping" movement of soil fines through the joints.

The recommend using concrete with a minimum compressive strength of 4,000 psi and a minimum 28-day flexural strength (modulus of rupture) of at least 600 pounds per square inch, based on 3rd point loading of concrete beam test samples. All sections should be reinforced with #3 (3/8-in. diameter) rebar every 18-in OC. Layout of the sawcut control joints should form square panels, and the depth of sawcut joint should

be ¼ of the concrete slab thickness. The joints should be sawed within six hours of concrete placement or as soon as the concrete has developed sufficient strength to support workers and equipment.

We also recommend allowing NOVA to review and comment on the final concrete pavement design, including section and joint details (type of joints, joint spacing, etc.), prior to the start of construction. For further details on concrete pavement construction, please reference "Building Quality Concrete Parking Areas", published by the Portland Cement Association.

5.8 DRAINAGE CONSIDERATIONS

Soil strength and settlement potential is highly dependent upon the moisture condition of the supportive soil. Soil characteristics can change dramatically when moisture conditions change. As such, building pads, walkways, structures and surrounding grades should be properly designed and constructed to properly control water (surface and subsurface). Building pads should be designed to shed surface water prior to building construction. Grades surrounding structures should be adequately sloped away from the structure to promote positive drainage and prevent water from ponding near or against the structure. Swales and/or storm drainage structures should be constructed to collect and remove all surface water run-off. All roof drain downspouts should be connected to drain leaders that are properly daylighted or connected to storm drainage structures such that water is removed from structural areas. Interior and/or exterior foundation drains, if provided, should be installed to properly protect foundations from changing moisture conditions, including fluctuating shallow perched/laterally flowing subsurface water levels. All foundation drains, if provided, should be properly daylighted or connected to storm drain structures to remove all water from foundation areas. Roof drain lines and foundation drain lines should always remain independent of each other. Any subsurface water that may rise near structural grades should be controlled by adequately constructed subsurface drainage mechanisms.

6.0 LIMITATIONS

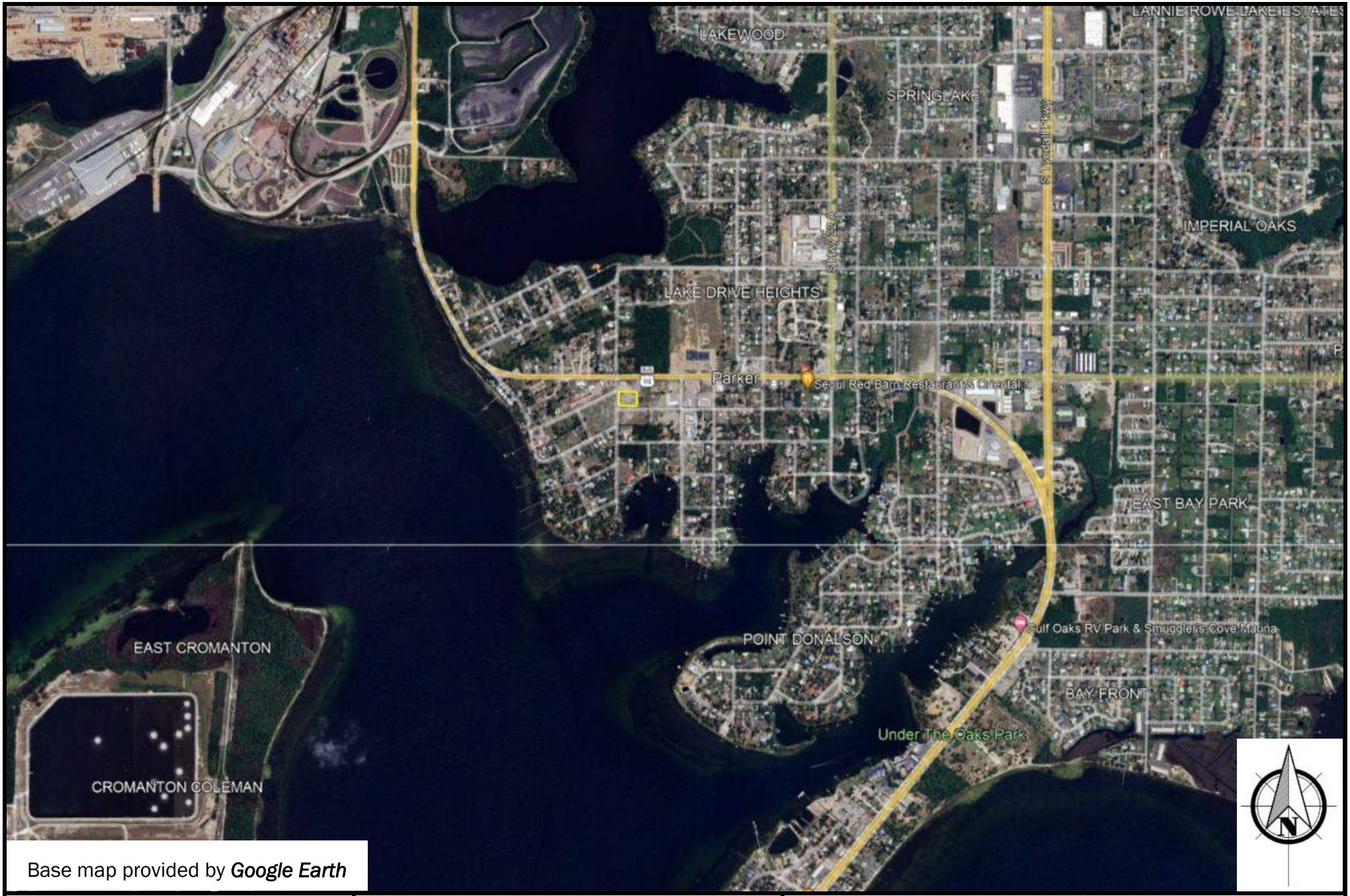
The findings, conclusions and recommendations presented in this report represent our professional opinions concerning subsurface conditions at the site. The opinions presented are relative to the dates of our site work and should not be relied on to represent conditions at significantly later dates or 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 experience. If additional information becomes available that might impact our geotechnical opinions, it will be necessary for NOVA to review the information, reassess 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 test locations will differ from those encountered at specific test locations, that conditions are not as anticipated by the designers and/or the contractors, or that either natural events or the construction process have 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.

This report is intended for the sole use of **Northstar Engineering Services, LLC.** for the above noted project. The scope of work performed during this study may not satisfy other user's 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.

APPENDIX A
Figures and Maps



Base map provided by ***Google Earth***

Scale: Not To Scale	
Date Drawn: October 11, 2023	
Drawn By: C. Alessio	
Checked By: W. Lawrence	

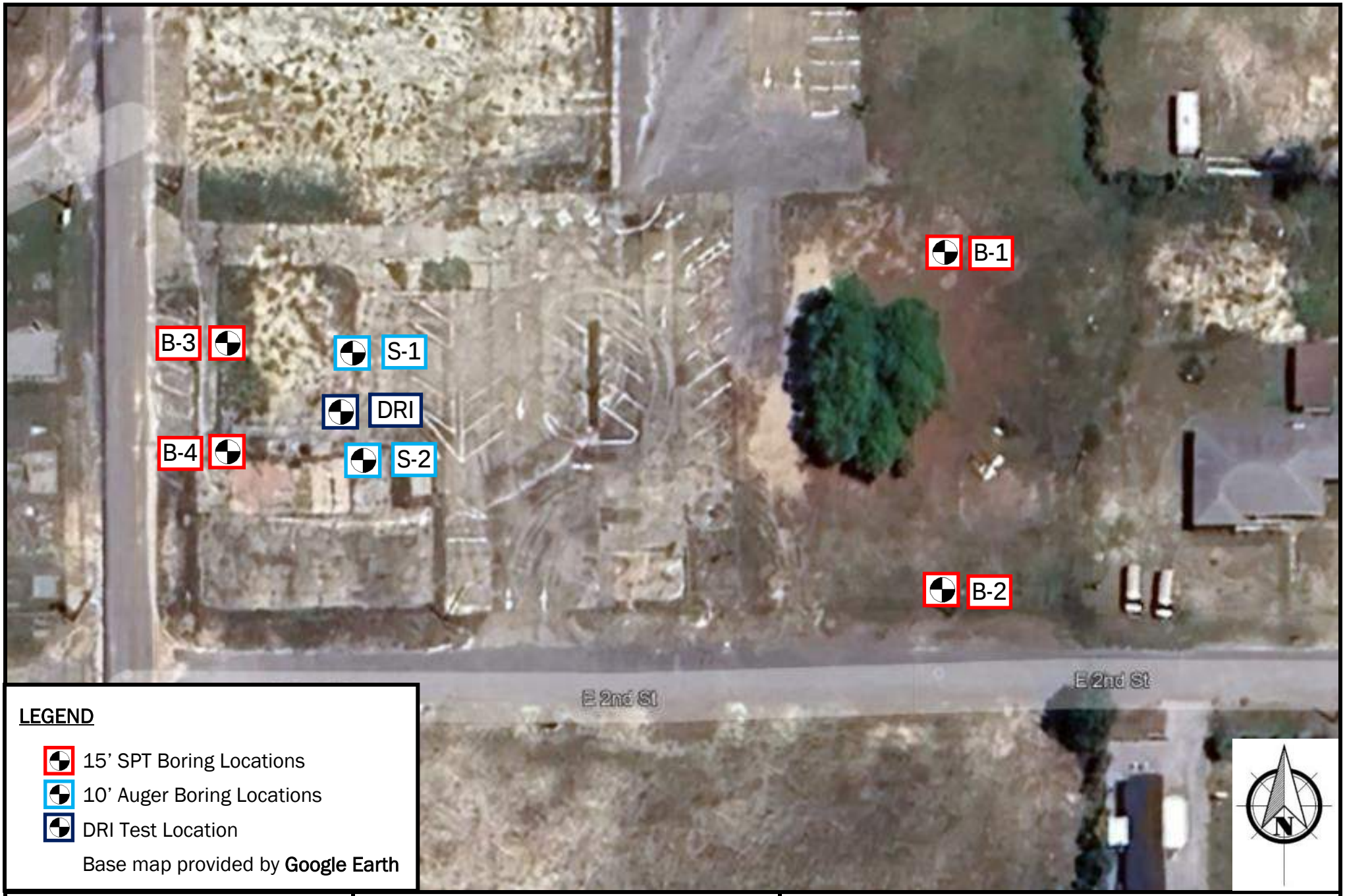
NOVA
17612 Ashley Drive
Panama City Beach, Florida 32413
850.249.6682 ♦ 850.249.6683

PROJECT LOCATION MAP

909 West Street Warehouse

Parker, Bay County, Florida

NOVA Project Number 10111-2023184



LEGEND

- 15’ SPT Boring Locations
- 10’ Auger Boring Locations
- DRI Test Location

Base map provided by **Google Earth**

Scale:	Not To Scale
Date Drawn:	October 11, 2023
Drawn By:	C. Alessio
Checked By:	W. Lawrence

NOVA
17612 Ashley Drive
Panama City Beach, Florida 32413
850.249.NOVA(6682) ♦ 850.249.6683

BORING LOCATION PLAN
909 West Street Warehouse
Parker, Bay County, Florida
NOVA Project Number 10111-2023184

Soil Map—Bay County, Florida
(909 West Street Warehouse)



Map Scale: 1:598 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 25 50 100 150

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 1:20,000.

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: Bay County, Florida
Survey Area Data: Version 23, Aug 24, 2023

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

Date(s) aerial images were photographed: Dec 2, 2020—Dec 8, 2020

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
9	Lakeland sand, 0 to 5 percent slopes	1.6	100.0%
Totals for Area of Interest		**1.6**	**100.0%**

Bay County, Florida

9—Lakeland sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2rz0n
Elevation: 100 to 400 feet
Mean annual precipitation: 40 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 190 to 310 days
Farmland classification: Not prime farmland

Map Unit Composition

Lakeland and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lakeland

Setting

Landform: Hills on marine terraces
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 7 inches: sand
C - 7 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R133AY002FL)

Hydric soil rating: No

Minor Components

Troup

Percent of map unit: 6 percent
Landform: Ridges, knolls
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on ridges and dunes of xeric uplands (G133AA111FL)
Hydric soil rating: No

Bonifay

Percent of map unit: 5 percent
Landform: Hills on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G133AA121FL), Longleaf Pine-Turkey Oak Hills (R133AY002FL)
Hydric soil rating: No

Foxworth

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G133AA121FL)
Hydric soil rating: No

Albany

Percent of map unit: 2 percent
Landform: Knolls on marine terraces, ridges on marine terraces, interfluves on marine terraces
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, side slope, tread
Down-slope shape: Convex
Across-slope shape: Convex, linear
Other vegetative classification: Forage suitability group not assigned (G133AA999FL)
Hydric soil rating: No

Chipley

Percent of map unit: 2 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises and knolls of mesic uplands (G133AA131FL)
Hydric soil rating: No

Data Source Information

Soil Survey Area: Bay County, Florida
Survey Area Data: Version 23, Aug 24, 2023

APPENDIX B
Subsurface Data

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%

TEST BORING RECORD B-1

PROJECT NAME: 909 West Street Warehouse **DATE:** 9/22/2023
PROJECT NO.: 2023184 **CLIENT:** Northstar Engineering Services, LLC.
PROJECT LOCATION: Parker, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: L. Griffin **LOGGED BY:** N. Gonzalez
DRILLING METHOD: Mud Rotary **HAMMER:** Manual
INITIAL GW DEPTH: ▼ GNE **EST. SHGW DEPTH:** ▽ GNE

Depth (feet)	Material Description	N-Value
0	SAND with trace organics and building debris (from the recently demolished building) (SP)	
	Very loose to medium dense light brown fine-grained SAND (SP)	4
		4
5		3
		5
		7
10		
		16
15		

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

Note: Boring Terminated at 15 feet

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

TEST BORING RECORD B-2

PROJECT NAME: 909 West Street Warehouse **DATE:** 9/22/2023
PROJECT NO.: 2023184 **CLIENT:** Northstar Engineering Services, LLC.
PROJECT LOCATION: Parker, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: L. Griffin **LOGGED BY:** N. Gonzalez
DRILLING METHOD: Mud Rotary **HAMMER:** Manual
INITIAL GW DEPTH: ▼ GNE **EST. SHGW DEPTH:** ▽ GNE

Depth (feet)	Material Description	N-Value
0	SAND with trace organics and building debris (from the recently demolished building) (SP)	
	Very loose to loose light brown fine-grained SAND (SP)	5
		4
5		2
		4
		6
10		
	Medium dense light brown to grey fine-grained slightly clayey SAND (SP-SC)	11
15		

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

Note: Boring Terminated at 15 feet

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

TEST BORING RECORD B-3

PROJECT NAME: 909 West Street Warehouse **DATE:** 9/22/2023
PROJECT NO.: 2023184 **CLIENT:** Northstar Engineering Services, LLC.
PROJECT LOCATION: Parker, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: L. Griffin **LOGGED BY:** N. Gonzalez
DRILLING METHOD: Mud Rotary **HAMMER:** Manual
INITIAL GW DEPTH: ▼ GNE **EST. SHGW DEPTH:** ▽ GNE

Depth (feet)	Material Description	N-Value
0	SAND with trace organics and building debris (from the recently demolished building) (SP)	
	Loose light brown fine-grained SAND (SP)	5
		8
5		4
		4
		4
10	Medium dense grey fine-grained clayey SAND (SC)	
		16
15		

Graphic: N-Value (Blows per Foot); Moisture Content (%); Organic Content (%); Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

Groundwater

Sample Type

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

Note: Boring Terminated at 15 feet

TEST BORING RECORD B-4

PROJECT NAME: 909 West Street Warehouse **DATE:** 9/22/2023
PROJECT NO.: 2023184 **CLIENT:** Northstar Engineering Services, LLC.
PROJECT LOCATION: Parker, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: L. Griffin **LOGGED BY:** N. Gonzalez
DRILLING METHOD: Mud Rotary **HAMMER:** Manual
INITIAL GW DEPTH: ▼ GNE **EST. SHGW DEPTH:** ▽ GNE

Depth (feet)	Material Description	N-Value
0	SAND with trace organics and building debris (from the recently demolished building) (SP)	
	Very loose to loose light brown fine-grained SAND (SP)	4
		4
5		3
		4
		4
10		
	Medium dense light brown to grey fine-grained slightly clayey SAND (SP-SC)	16
15		

Graphic: Groundwater; Sample Type

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

Note: Boring Terminated at 15 feet

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

TEST BORING RECORD S-1

PROJECT NAME: 909 West Street Warehouse **DATE:** 10/3/2023
PROJECT NO.: 2023184 **CLIENT:** Northstar Engineering Services, LLC.
PROJECT LOCATION: Parker, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: N. Gonzalez **LOGGED BY:** N. Gonzalez
DRILLING METHOD: Hand Auger **HAMMER:** None
INITIAL GW DEPTH: ▼ GNE **EST. SHGW DEPTH:** ▽ GNE

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		SAND with trace organics and building debris (from the recently demolished building) (SP)				
		Light brown fine-grained SAND (SP)				
5						
10		Boring Terminated at 10 feet				
15						

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

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

Note:

TEST BORING RECORD S-2

PROJECT NAME: 909 West Street Warehouse **DATE:** 10/3/2023
PROJECT NO.: 2023184 **CLIENT:** Northstar Engineering Services, LLC.
PROJECT LOCATION: Parker, Bay County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: N. Gonzalez **LOGGED BY:** N. Gonzalez
DRILLING METHOD: Hand Auger **HAMMER:** None
INITIAL GW DEPTH: ▼ GNE **EST. SHGW DEPTH:** ▽ GNE

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		SAND with trace organics and building debris (from the recently demolished building) (SP)				
		Light brown fine-grained SAND (SP)				
5						
10		Boring Terminated at 10 feet				
15						

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

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

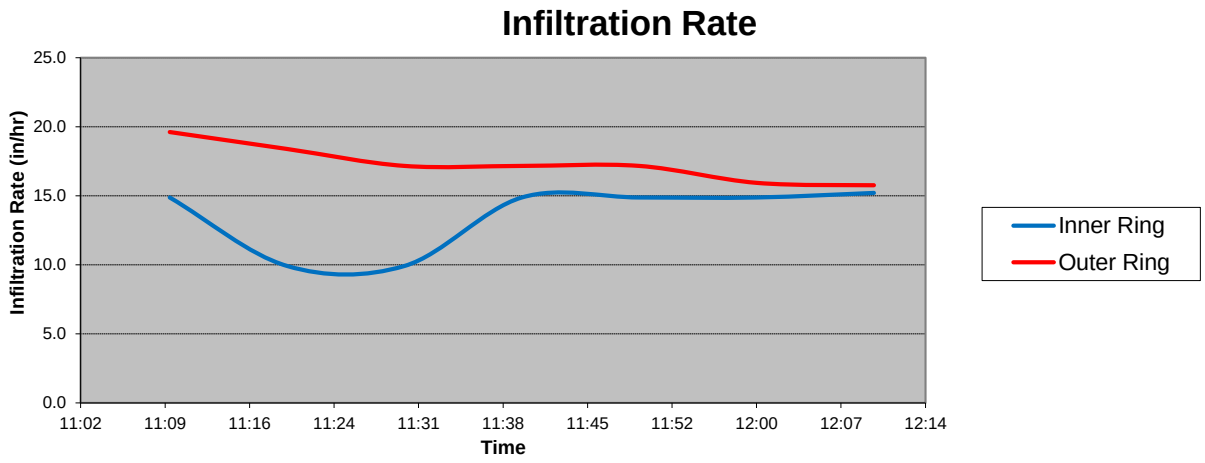
Note:

Project:	**909 West Street Warehouse**	**Report of DRI - 1**
Project Location:	**Bay County, Florida**	
Project Number:	**10111-2023184**	

Date(s) of Test	**October 3, 2023**	Tested by	**N. Gonzalez**	Weather	**Clear**	
Test Method	**ASTM D 3385**	Logged by	**N. Gonzalez**	Type of liquid	**tap water**	
Area Inner Ring	**110.75 sq. in.**	Checked by	**W. Lawrence**	Liquid Temperature	**80 ºF**	
Area Outer Ring	**447.69 sq. in.**	See Auger Boring Record for Soil Profile		Soil Temperature	**83 ºF**	
Area Annular Space	**334.59 sq. in.**	Approx. Elevation	**9 in. below grade**	Location	**Per Boring Location Plan**	

INCREMENTAL INFILTRATION RATE vs. TOTAL ELAPSED TIME

		Inner Ring		Outer Ring		
Time	**Elapsed Time (minutes)**	**Volume (gal)**	**Infiltration Rate (In/hr)**	**Volume (gal)**	**Infiltration Rate (In/hr)**	**Comments**
11:10	10	1.2	14.9	6.3	19.6	Test began after a 30-minute saturation period.
11:20	10	0.8	9.9	5.9	18.4	
11:30	10	0.8	9.9	5.5	17.2	
11:40	10	1.2	14.9	5.5	17.2	
11:50	10	1.2	14.9	5.5	17.2	
12:00	10	1.2	14.9	5.2	15.9	
12:10	10	1.2	15.2	5.1	15.8	



INFILTRATION RATE = 15.4 in/hr

Figure DRI-1

APPENDIX C
Laboratory Data

SUMMARY OF CLASSIFICATION & INDEX TESTING

909 West Street Warehouse
Parker, Bay County, Florida
NOVA Project Number 10111-2023184

Boring Number	Sample Depth (ft)	Natural Moisture (%)	Percent (%) Passing Sieve #200	Organic Content (%)	USCS Soil Classification
B-1	0 – 2	2	5	2	SP
B-1	2 – 4	3	5	1	SP
B-2	2 - 4	4	5	1	SP
B-3	4 – 6	5	5	1	SP
B-3	13 ½ - 15	13	25	1	SC
B-4	0 – 2	3	5	1	SP
B-4	2 – 4	4	5	1	SP

PERMEABILITY, -200 SIEVE WASH, AND MOISTURE CONTENT

PROJECT: 909 West Street Warehouse **NOVA PROJECT #:** 10111-2023184

DATE: 10/3/2023 **ASSIGNED BY:** W.Lawrence **TESTED BY:** N. Gonzalez

Sample LOCATION / BORING NO.	S-1
Sample NUMBER / DEPTH	0' - 5'

PERMEABILITY TESTING SUMMARY			
PERMEABILITY (K_V)	→	7	ft/day
Corresponding K_h	→	10	ft/day
DRY DENSITY	→	104	lbs/ft^3
MOISTURE CONTENT	→	5	%
-200 FINES CONTENT	→	5	%

FALLING HEAD PERMEABILITY (ASTM D 5084)

No. of LAYERS:	3	Wt. of MOLD (lbs):	9.31
BLOWS/LAYER:	15	Wt. of MOLD/SOIL (lbs):	12.95

HEIGHT (FT)	TRIAL #1 (SEC)	TRIAL #2 (SEC)	PERMEABILITY
5	0.0	0.0	
4	15.7	15.6	2.54E-03
3	23.0	20.7	2.35E-03
2	29.2	30.4	2.43E-03
1	53.0	52.4	2.34E-03

Average Permeability 2.4E-03 **cm/sec**

NUMBER OF INCHES MOLD WAS SHORT? 0.000 **INCHES**

PERMEABILITY CONSTANT USED WAS → 0.41 **(Includes 1/2"ID tubing)**

(ZERO INCHES IS DEFAULT)

MOISTURE CONTENT (ASTM D 2216)

Pan NUMBER	SP-9
Wt. of WET SOIL & PAN (g)	325.2
Wt. of DRY SOIL & PAN (g)	313.9
Wt. of PAN (g)	74.0
Wt. of Water (g)	11.3
Wt. of Dry Soil (g)	239.9
MOISTURE CONTENT (%)	4.7

-200 SIEVE WASH (ASTM D 1140)

Pan NUMBER	M-1
Wt. of DRY SOIL & PAN (g)	162.9
Wt. of WASH SOIL & PAN (g)	156.7
Wt. of PAN (g)	48.5
Wt. of Original Dry Sample (g)	114.4
Wt. of -200 Material (g)	6.2
Wt. of Washed Dry Sample (g)	108.2
-200 FINES CONTENT (%)	5.4

APPENDIX D
Support Documents

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
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