Ardaman & Associates, Inc.
Geotechnical, Environmental and
Materials Consultants

November 10, 2022
File No.: 22-2609

Mr. Christian Diaz
12700 Rolling Road Drive
Miami, Fl. 33156

RE: SUBSURFACE EXPLORATION REPORT
PROPOSED TWO-STORY RESIDENCE
12700 ROLLING ROAD DRIVE
MIAMI, FL. 33156

As requested and authorized by you, we have completed a shallow subsurface soil exploration at the above referenced location. The purposes of performing this exploration were to evaluate the general subsurface conditions within the project area and to provide recommendations for site preparation and foundation support. Our work included Standard Penetration Test (SPT) borings and engineering analysis. In addition, we estimated the coefficient of design permeability of the soils. This report documents our findings and presents our engineering recommendations.

SITE LOCATION AND SITE DESCRIPTION

The site for the proposed two-story residence is located at 12700 Rolling Road Drive, Miami, Fl. 33156 (Section 13, Township 55 S, Range 40 E). A site vicinity map provided by Google Earth Pro 2022 is presented as our Figure 1. The site is currently occupied by a one-story residence and miscellaneous structures including a pool basin and pool deck. The residence is centered on the lot, which slopes gently towards the west, or back yard, of the property. There are some ornamental trees along the perimeter of the property.

PROPOSED CONSTRUCTION AND GRADING

It is our understanding that the proposed construction consists of a new two-story residence with load-bearing masonry walls and interior columns with slab-on-grade floors. For the purposes of our analysis, we have assumed the maximum loading conditions for the two-story structure to be on the order of 3.5 kips per lineal foot, a maximum of 180 kips for individual column foundations, and 130 pounds per square foot (psf) for slab-on-grade floors.

FIELD EXPLORATION PROGRAM

SPT Borings

The field exploration program consisted of performing four (4) Standard Penetration Test (SPT) borings.

The SPT borings were performed at the locations shown on our Boring Location Plan. The borings were advanced to a depth of 20 feet below the ground surface using the methodology outlined in ASTM D-1586. A summary of this field procedure is included in the Appendix. Split-spoon soil samples recovered during performance of the borings were visually classified in the field and representative portions of the samples were transported to our laboratory in sealed sample jars for further classification and laboratory testing.

The groundwater level at the boring location was measured upon completion of drilling.

LABORATORY TESTING PROGRAM

Representative soil samples obtained during our field sampling operation were packaged and transferred to our laboratory for further visual examination and classification. The resulting soil descriptions are shown on the soil boring profiles presented in the Appendix.

GENERAL SUBSURFACE CONDITIONS

General Soil Profile

The results of the field exploration and laboratory testing programs are graphically summarized on the soil boring profiles presented in the Appendix. The stratification of the boring profiles represents our interpretation of the field boring logs and the results of laboratory examinations of the recovered samples. The stratification lines represent the approximate boundary between soil types. The actual transitions may be more gradual than implied.

The results of our test borings indicate the following general soil profile:

Depth Below Ground Surface (feet)	Description
0 – 0.5	Fill, sand, with a few rock fragments (SP)
0.5 – 2.5	Limestone, poorly cemented, with large pockets of silty sand
2.5 - 5	Limestone, medium cemented
5 - 20	Limestone

The above soil profile is outlined in general terms only. Please refer to the boring logs for soil profile details. Borings B3 and B4, performed in the west portion of the property, did not encounter the sandy, poorly cemented layer found in the upper 5 feet of the excavation.

GROUNDWATER CONDITIONS

Our drillers observed groundwater in the boreholes at about 15.5 feet below the ground surface, as noted on the attached boring logs. Fluctuations in groundwater level on this site should be anticipated throughout the year due to a variety of factors, the most important of which is drainage conditions. Groundwater levels in the range of six to twelve inches above the present levels should be expected after periods of heavy rains.

FIELD PERMEABILITY TEST

In order to estimate the hydraulic conductivity of the upper soils, two (2) constant head exfiltration tests were performed at the locations shown on our Boring Location Plan. The tests were performed in accordance with methods described in the South Florida Water Management District (SFWMD) Permit Information Manual, Volume IV.

Descriptions of the soils observed in the exfiltration test boreholes and the test results are presented in the Appendix. In brief, the exfiltration tests yielded a hydraulic conductivity of values of about 2.10 and 2.32 x 10^{-4} cfs/ft^2-ft head.

ENGINEERING EVALUATION AND RECOMMENDATIONS

General

The results of our exploration indicate that, with proper site preparation as recommended in this report, the existing soils are suitable for supporting the proposed structures on conventional shallow foundations. Spread footings should provide an adequate support system for the two-story residence. Following are our recommendations for overall site preparation, foundation support, and pavement construction which we feel best suited for the proposed structure and existing soil conditions. The recommendations are made as a guide for the design engineer and/or architect, parts of which should be incorporated into the project's specifications.

Suitable Fill Material and the Compaction of Fill Soils

All fill materials should be free of organic materials, such as roots and vegetation. As a general guide to aid the contractor, we recommend using fill with 3 to 10 percent by dry weight of material passing the U.S. Standard No. 200 sieve size. All structural fill should be placed in level lifts not to exceed 12 inches in uncompacted thickness. Each lift should be compacted to at least 95 percent of the modified Proctor (ASTM D-1557) maximum dry density value. The filling and compaction operations should continue in lifts until the desired elevation is achieved. If hand-held compaction equipment is used, the lift thickness should be reduced to 6 inches.

Silty, very soft, poorly cemented limestone with pockets of loose sand may be encountered at shallow depths during foundation installation at locations in the vicinity of borings B1 and B2. The contractor should bid for over-excavation at the locations or revise the foundation bearing elevation during demolition activities.

Proof-rolling

We recommend proof-rolling the cleared and/or excavated surface to locate any unforeseen soft areas or unsuitable surface or near-surface soils, to increase the density of the upper soils, and to prepare the existing surface for the addition of the fill soils (as required). Proof-rolling of the building area should consist of at least 10 passes of a compactor capable of achieving the compaction criteria specified below. Each pass should overlap the preceding pass by 30 percent to achieve complete coverage. If deemed necessary, in areas that continue to "yield", remove all deleterious material and replace with clean, compacted sand backfill. The proof-rolling should occur after cutting and before filling.

A density equivalent to or greater than 95 percent of the modified Proctor (ASTM D-1557) maximum dry density value for a depth of one foot in the building area and parking/drive areas must be achieved beneath the stripped and grubbed ground surface. Additional passes and/or over-excavation and re-compaction may be required if these minimum density requirements are not achieved. The soil moisture should be adjusted as necessary during compaction.

Foundation Support by Spread Footings and Foundation Compaction Criteria

Excavate the foundations to the proposed bottom of the footing elevations, and, thereafter, verify the in-place compaction for a depth of one foot below the footing bottoms. If necessary, compact the bottom of the excavations to achieve a minimum dry density equivalent to 95 percent of the modified Proctor maximum dry density (ASTM D-1557) for a depth of 1 foot below the footing bottoms. Based on the existing soil conditions and, assuming the above outlined proof-rolling and compaction criteria is implemented, an allowable soil bearing pressure of 2,500 pounds per square foot (psf) may be used in the foundation design. Foundations bearing on the surficial limestone formation may be designed with an allowable soil bearing pressure of 4,000 psf.

With the site prepared and the foundations designed and constructed as recommended, we anticipate total settlements of one inch or less, and differential settlements between adjacent footings of less than 0.25 inches. Foundations and slab on grade may be designed using a modulus of subgrade reaction of 100 pci.

All bearing wall foundations should be a minimum of 16 inches wide and column foundations should be 24 inches wide. A minimum soil cover of 24 inches should be maintained from the bottom of the exterior foundations to the adjacent outside finished grades.

For foundations bearing directly over existing natural limestone, no compaction or density test will be required. However, we recommend that Ardaman & Associates, Inc. perform a visual inspection and approve the bottom of the footing.

Floor Slab Vapor Barrier and Slab Compaction Requirements

Compaction beneath all floor slabs should be verified for a depth of 12 inches and meet the 95 percent criteria (modified Proctor, ASTM D-1557).

Precautions should be taken during the slab construction to minimize moisture entry from the underlying subgrade soils. This can be achieved through the installation of an impervious membrane (vapor barrier) between the subgrade soils and floor slab. A ten-mil thick polyethylene film is commonly used for this purpose. Care should be exercised when placing the reinforcing steel or mesh and slab concrete so that the membrane is not punctured.

If interior columns are isolated from the floor slab, an expansion joint should be provided around the columns and sealed with a water-proof sealant.

QUALITY ASSURANCE

We recommend establishing a comprehensive quality assurance program to verify that all site preparation and foundation construction is conducted in accordance with the appropriate plans and specifications. Materials testing and inspection services should be provided by Ardaman & Associates.

As a minimum, an on-site engineering technician should monitor all stripping and grubbing to verify that all deleterious materials have been removed, and should observe the proof-rolling operation to ensure that the appropriate number of passes is applied to the subgrade. In-situ density tests should be conducted during backfilling activities and below all footings and floor slabs to verify that the required densities have been achieved. In-situ density values should be compared to laboratory Proctor moisture-density results for each of the different natural and fill soils encountered.

Finally, we recommend inspecting and testing the construction materials for the foundations and other structural components.

CLOSURE

The analysis and recommendations submitted herein are based upon the data obtained from the soil borings presented in the Appendix and the assumed loading conditions. This report does not reflect any variations which may occur adjacent to or between the borings. The nature and extent of the variations between the borings may not become evident until during construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations presented in this report after performing on-site observations during the construction period and noting the characteristics of the variations.

This report has been prepared for the exclusive use of Mr. Christian Diaz and his representatives in accordance with generally accepted soil and foundation engineering practices. In the event any changes occur in the design, nature, or location of the proposed structure, we should review the applicability of conclusions and recommendations in this report. We also recommend a general review of final design and specifications by our office to make sure that earthwork and foundation recommendations are properly interpreted and implemented in the design specifications.

We are pleased to be of assistance to you on this phase of your project. When we may be of further service to you or should you have any questions, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.
FL Certificate No.: 0005950

Evelio Horta
Digitally signed by Evelio Horta
Date: 2023.04.12 12:50:01 -04'00'

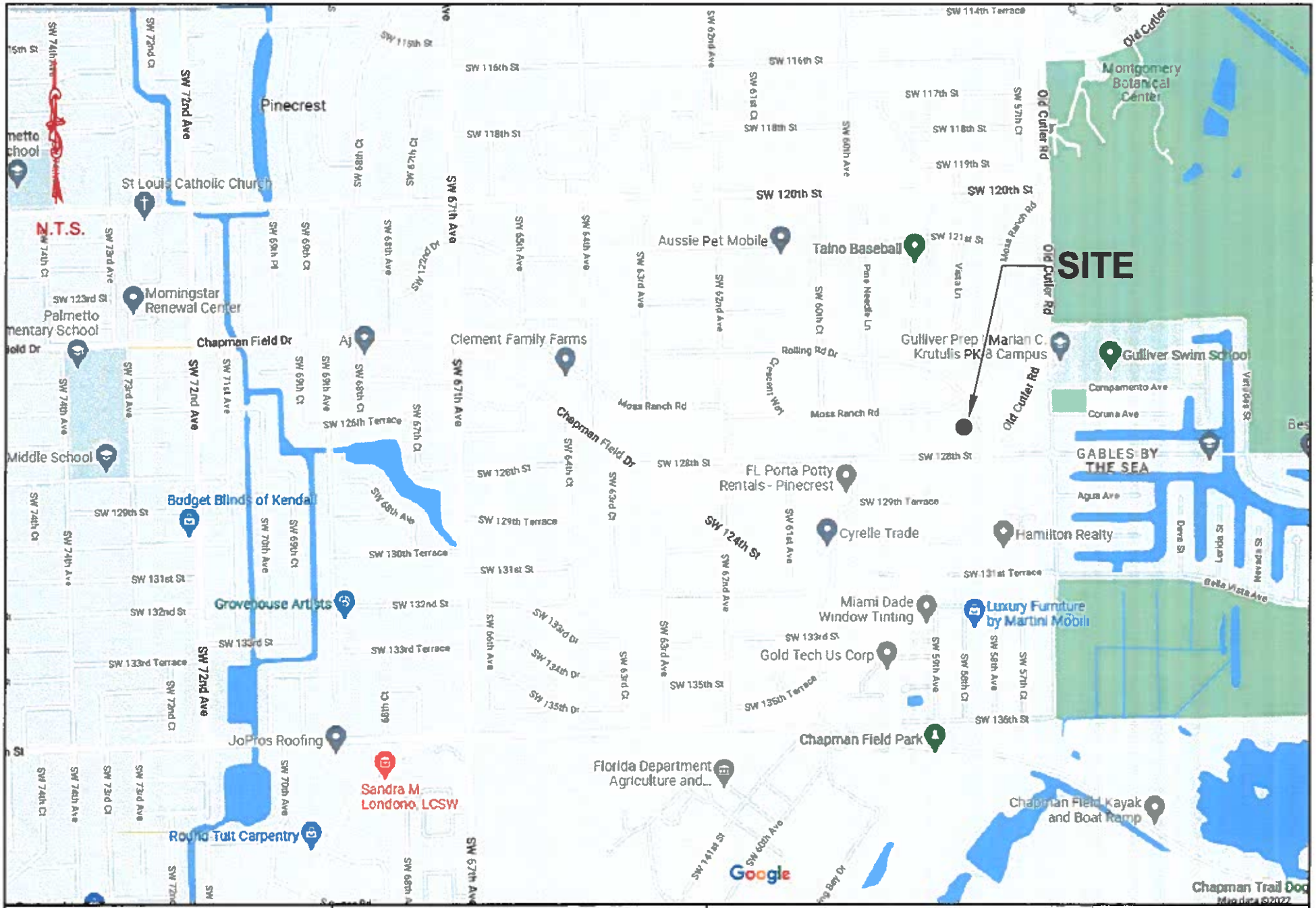
Evelio Horta Jr. MSCE, P.E.
Senior Project Engineer
FL Reg. No. 82209

Evelio Horta, PhD, P.E. G.E.
Principal Engineer
FL Reg. No. 46625

This item has been digitally signed and sealed by Evelio Horta, PhD P.E., G.E on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies

SITE PLAN
AND
BORING LOGS

Ardaman & Associates, Inc. Geotechnical, Environmental and Materials Consultants	SUBSURFACE EXPLORATION REPORT PROPOSED RESIDENCE 12700 ROLLING ROAD DRIVE, MIAMI MIAMI DADE COUNTY, FLORIDA	SITE VICINITY MAP Figure No 1.	File No: 22-2609 Prepared By: JQ Date: 10/27/2022



Ardaman & Associates, Inc. Geotechnical, Environmental and Materials Consultants	SUBSURFACE EXPLORATION REPORT PROPOSED RESIDENCE 12700 ROLLING ROAD DRIVE, MIAMI MIAMI DADE COUNTY, FLORIDA	SITE VICINITY MAP Figure No 1.	File No: 22-2609 Prepared By: JQ Date: 10/27/2022

APPENDIX

STANDARD PENETRATION TEST BORING LOGS

Our borings describe subsurface conditions only at the locations drilled and at the time drilled. They provide no information about subsurface conditions below the bottom of the boreholes. At locations not explored, surface conditions that differ from those observed in the borings may exist and should be anticipated.

The information reported on our boring logs is based on our drillers' logs and on visual examination in our laboratory of disturbed soil samples recovered from the borings. The distinction shown on the logs between soil types is approximate only. The actual transition from one soil to another may be gradual and indistinct.

The groundwater depth shown on our boring logs is the water level the driller observed in the borehole when it was drilled. These water levels may have been influenced by the drilling procedures, especially in borings made by rotary drilling with bentonitic drilling mud. An accurate determination of groundwater level requires long-term observation of suitable monitoring wells. Fluctuations in groundwater levels throughout the year should be anticipated.

The absence of a groundwater level on certain logs indicates that no groundwater data is available. It does not mean that no groundwater will be encountered at the boring location.

STANDARD PENETRATION TEST BORINGS

The standard penetration test is a widely accepted test method of *in situ* testing of soils (ASTM D 1586), and Ardaman & Associates generally follows this test method. A 2-foot long, 2-inch O.D. split-barrel sampler attached to the end of a string of drilling rods is driven 18 or 24 inches into the ground by successive blows of a 140-pound hammer freely dropping 30 inches. The number of blows needed for each 6 inches of penetration is recorded. The sum of the blows required for penetration of the second and third 6-inch increments of penetration constitutes the test result or N-value. After the test, the sampler is extracted from the ground and opened to allow visual examination and classification of the retained soil sample. The N-value has been empirically correlated with various soil properties.

The tests are usually performed at 5-foot intervals. The test holes are advanced to the test elevations by rotary drilling with a cutting bit, using circulating fluid to remove the cuttings and hold the fine grains in suspension. The circulating fluid, which is a bentonitic drilling mud, is also used to keep the hole open below the water table by maintaining an excess hydrostatic pressure inside the hole. In some soil deposits, particularly highly pervious ones, flush-coupled casing must be driven to just above the testing depth to keep the hole open and/or prevent the loss of circulating fluid.

Representative split-spoon samples from the soils are brought to our laboratory in air-tight jars for further evaluation and testing, if necessary.

STANDARD PENETRATION TEST BORING LOG

BORING 1

PROJECT: Proposed Residence 12700 Rolling Road Drive, Miami, FL

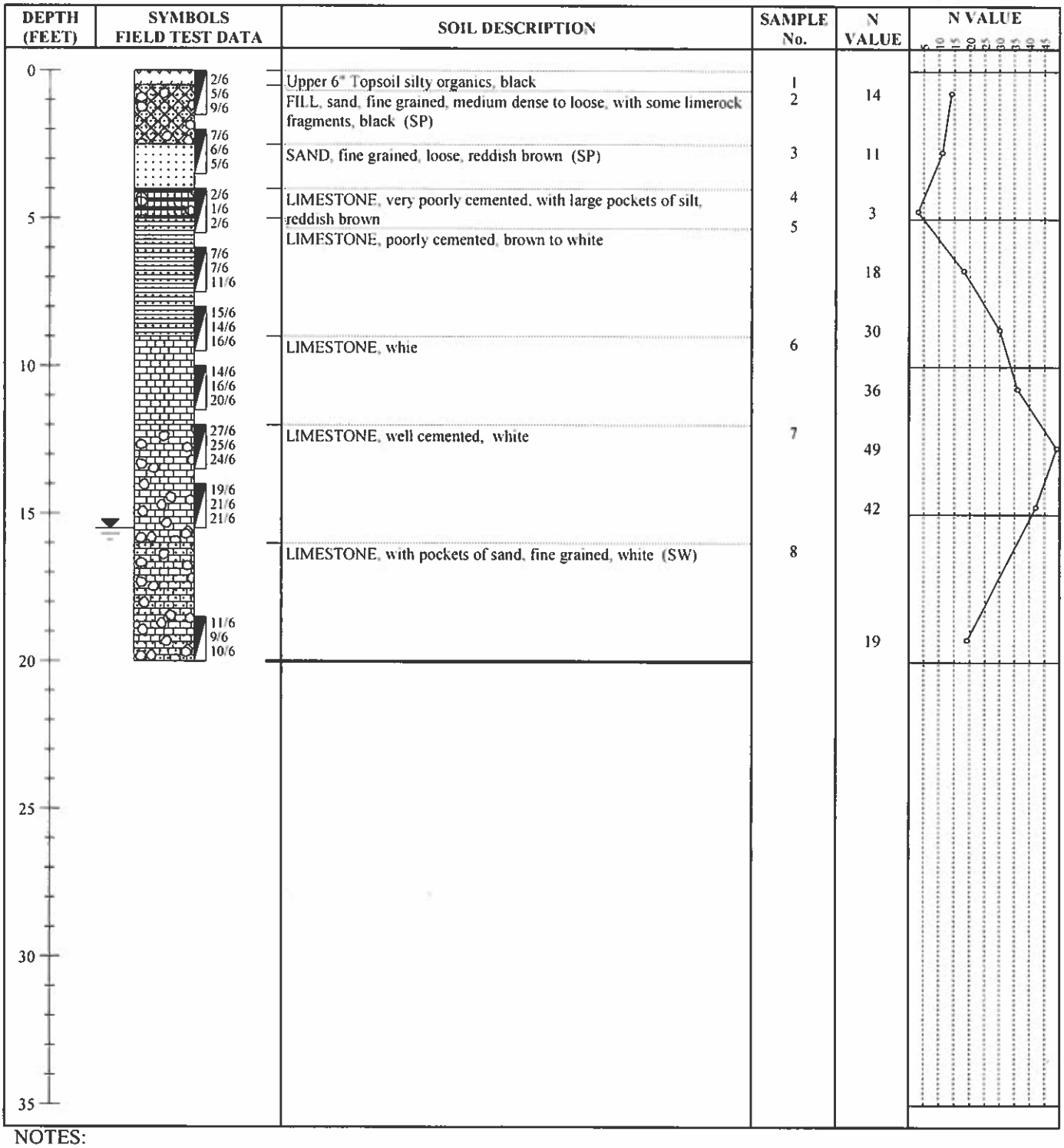
FILE No.: 22-2609

BORING LOCATION: See Plan

DRILL CREW: EG/FCH

WATER OBSERVED AT DEPTH 15.5'

DATE DRILLED: 10/25/2022



NOTES:

FIELD TEST DATA ARE "BLOWS"/"INCHES DRIVEN" 140-LB HAMMER, 30-INCH FALL. (ASTM D-1586)

STANDARD PENETRATION TEST BORING LOG

BORING 2

PROJECT: Proposed Residence 12700 Rolling Road Drive, Miami, FL

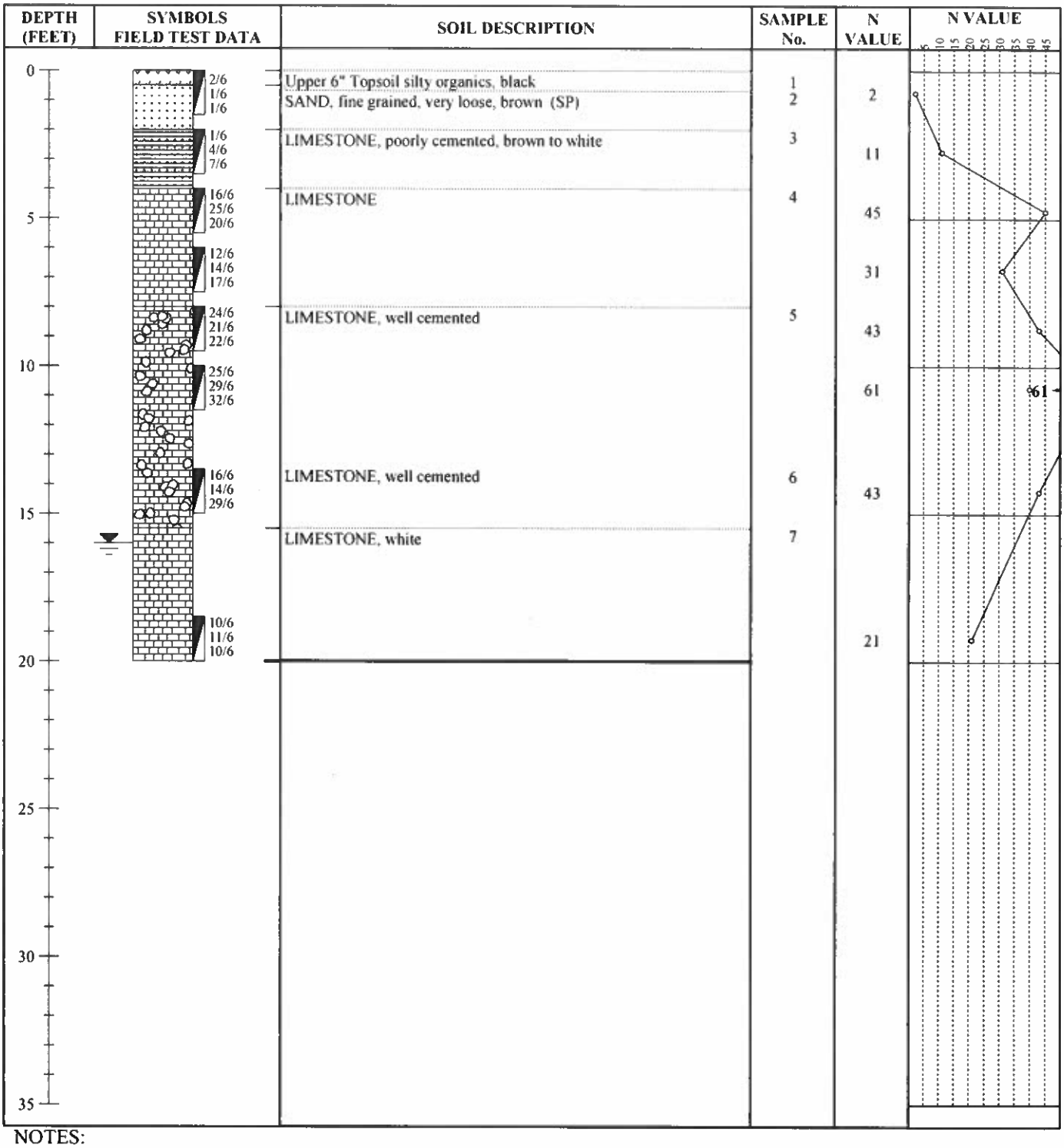
FILE No.: 22-2609

BORING LOCATION: See Plan

DRILL CREW: EG/FCH

WATER OBSERVED AT DEPTH 16'

DATE DRILLED: 10/25/2022



NOTES:

FIELD TEST DATA ARE "BLOWS"/"INCHES DRIVEN" 140-LB HAMMER, 30-INCH FALL. (ASTM D-1586)

STANDARD PENETRATION TEST BORING LOG

BORING 3

PROJECT: Proposed Residence 12700 Rolling Road Drive, Miami, FL

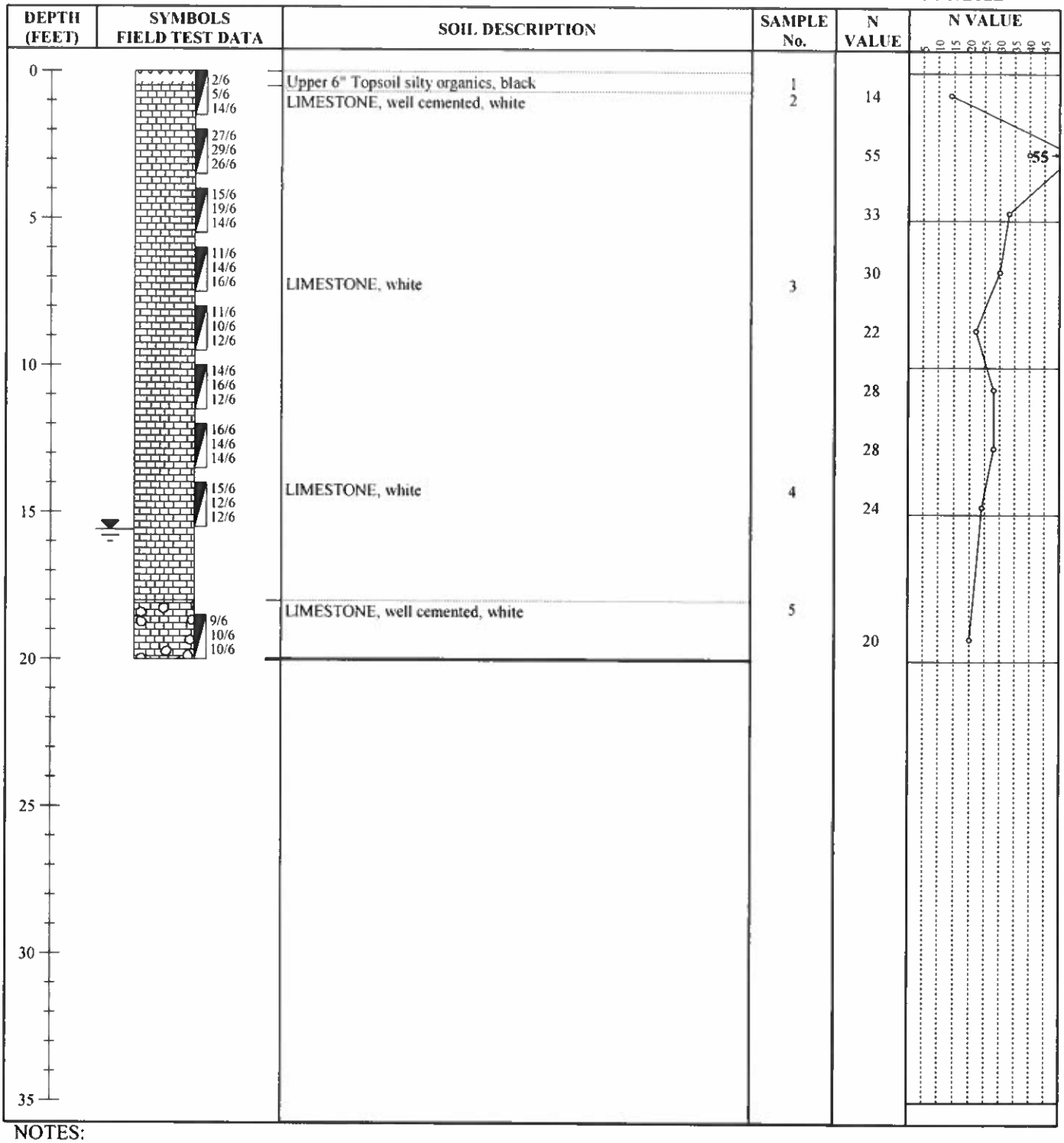
FILE No.: 22-2609

BORING LOCATION: See Plan

DRILL CREW: EG/FCH

WATER OBSERVED AT DEPTH 15.6'

DATE DRILLED: 10/25/2022



NOTES:

FIELD TEST DATA ARE "BLOWS"/"INCHES DRIVEN" 140-LB HAMMER, 30-INCH FALL. (ASTM D-1586)

STANDARD PENETRATION TEST BORING LOG

BORING 4

PROJECT: Proposed Residence 12700 Rolling Road Drive, Miami, FL

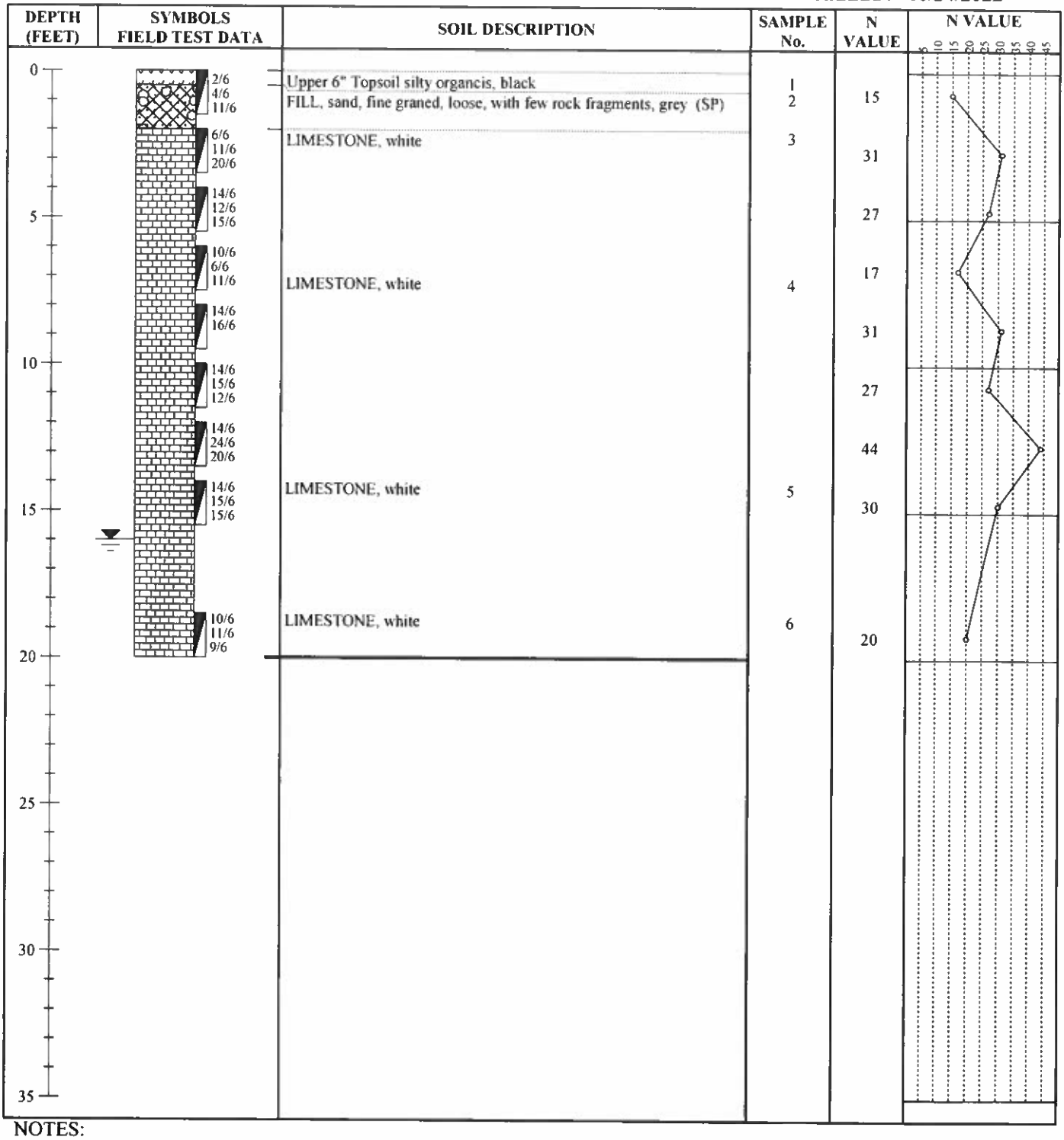
FILE No.: 22-2609

BORING LOCATION: See Plan

DRILL CREW: EG/FCH

WATER OBSERVED AT DEPTH 16'

DATE DRILLED: 10/24/2022



NOTES:

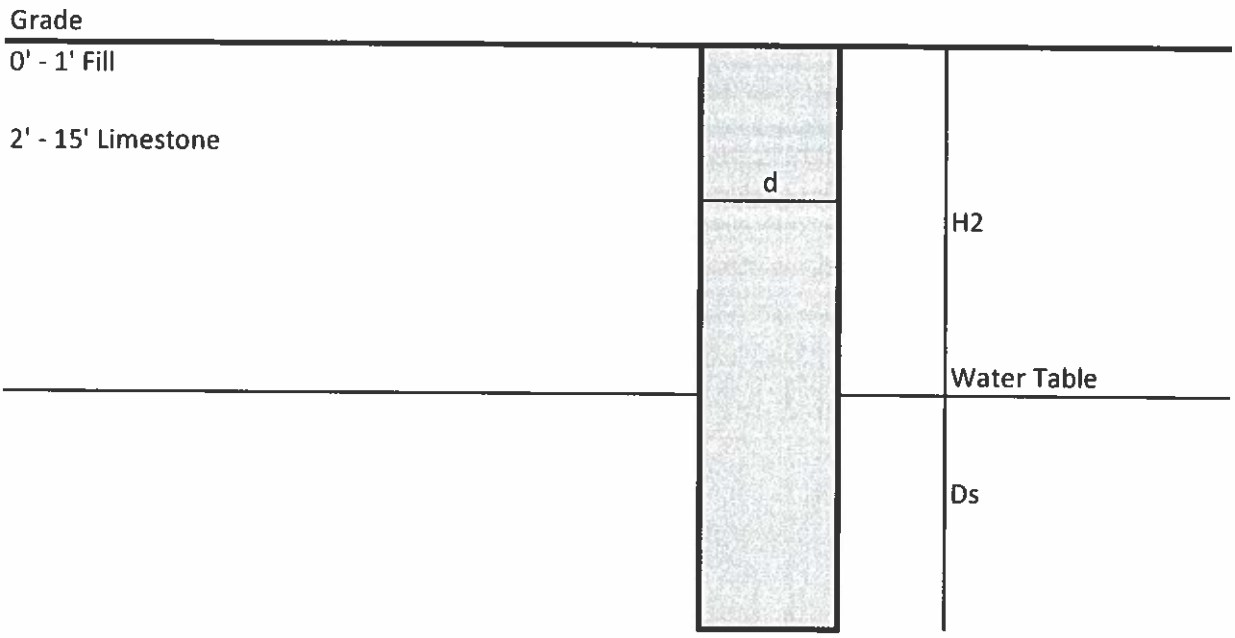
FIELD TEST DATA ARE "BLOWS"/"INCHES DRIVEN" 140-LB HAMMER, 30-INCH FALL. (ASTM D-1586)

SFWMD
CONSTANT HEAD
PERCOLATION TESTS

27-Oct-22
File No. 22-2609

PROPOSED RESIDENCE
12700 ROLLING ROAD DRIVE, MIAMI, FL
CONSTANT HEAD PERCOLATION TEST
SFWMD Usual Open Hole Test
Test 1, Location EX-1

Location: See Plan



K= Hydraulic Conductivity (cfs/ft^2-ft head)	2.10E-04
Q= Stabilized Flow Rate (cfs)	3.77E-02
d= Diameter of Test Hole (ft)	0.5
H2= Depth of Water Table (ft)	15
Ds= Saturated Hole Depth (ft)	0
H= Test Hole Depth (ft)	15

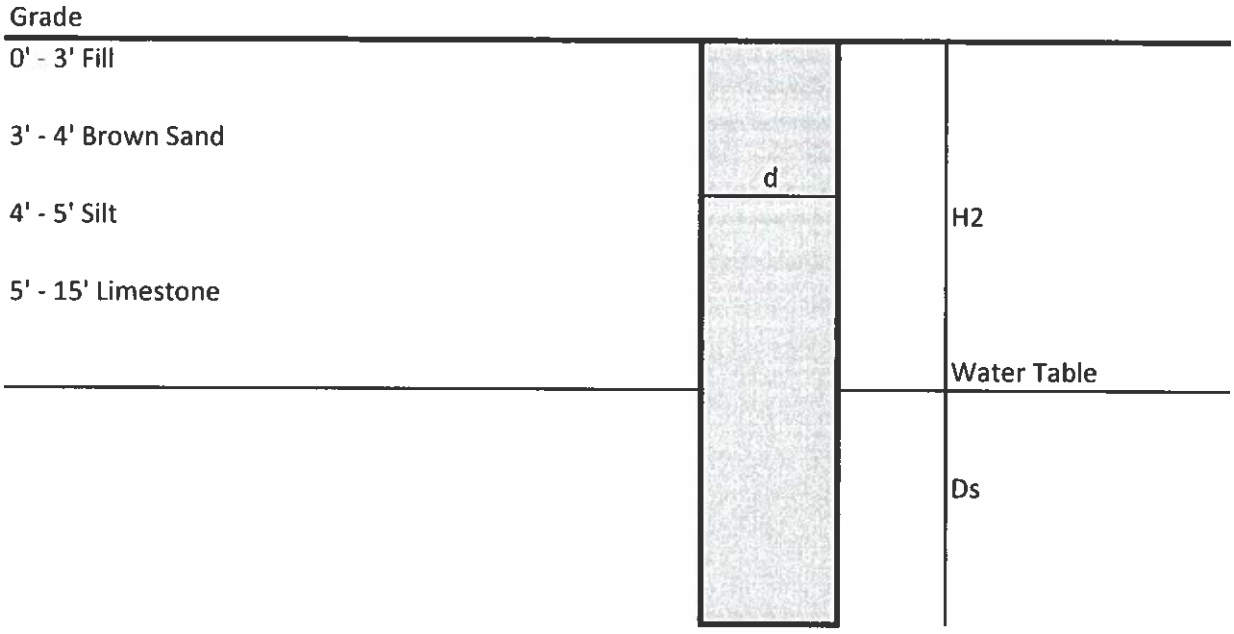
11/10/22

Evelio Horta, Jr., M.S.C.E., P.E.
Project Engineer
FL Reg. No. 82209

27-Oct-22
File No. 22-2609

PROPOSED RESIDENCE
12700 ROLLING ROAD DRIVE, MIAMI, FL
CONSTANT HEAD PERCOLATION TEST
SFWMD Usual Open Hole Test
Test 1, Location EX-2

Location: See Plan



K= Hydraulic Conductivity (cfs/ft^2-ft head)	2.33E-04
Q= Stabilized Flow Rate (cfs)	4.19E-02
d= Diameter of Test Hole (ft)	0.5
H2= Depth of Water Table (ft)	15.5
Ds= Saturated Hole Depth (ft)	-0.5
H= Test Hole Depth (ft)	15

11/10/22

Evelio Horta, Jr., M.S.C.E., P.E.
Project Engineer
FL Reg. No. 82209