REPORT OF
GEOTECHNICAL EXPLORATION

BHANGWANSINGH RESIDENCE
8100 SW 120TH STREET
PINECREST, FLORIDA 33156

FOR

CLEVER CONSTRUCTION
1319 NORTH UNIVERSITY STREET
PINECREST, FLORIDA 33156

PREPARED BY

NUTTING ENGINEERS OF FLORIDA, INC.
9851 NW 58TH STREET, SUITE 113
MIAMI, FLORIDA 33178

ORDER NO. 2950.1

OCTOBER 2024

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October 17, 2024

Mr. Michael Toth
Clever Construction
1319 North University Street
Coral Springs, Florida 33071
Phone: (888) 354-5556/ Direct: (954) 707-1479 Email: mike@cleverconstructionfl.com

Subject: Report of Geotechnical Exploration
Bhangwansingh Residence
8100 SW 120th Street
Pinecrest, Florida 33156

Dear Mr. Toth:

Nutting Engineers of Florida, Inc. (NE), has performed a Geotechnical Exploration for the proposed residence at the above referenced site in Pinecrest, Florida. This exploration was performed in accordance with the written authorization to proceed provided by Clever Construction dated September 16, 2024. This evaluation was performed to develop information regarding subsurface soil conditions at specific test locations which along with proposed construction information provided was used to develop opinions regarding foundations for support of the existing construction. This report presents our findings and recommendations based upon the information examined at the time of this evaluation.

PROJECT INFORMATION

Per your email dated September 9, 2024 and review of the survey and plan provided, we understand that plans for this project include constructing a one-story residence with possible future pool at the referenced site. The site was formerly occupied by a residence that has been previously demolished.

NE should be notified in writing by the client of any changes in the proposed construction along with a request to amend our foundation analysis and/or recommendations within this report as appropriate.

GENERAL SUBSURFACE CONDITIONS

Soil Survey Maps

As part of the geotechnical exploration, we have reviewed available Soil Conservation Service (SCS) survey maps for Miami-Dade County. These SCS maps provide qualitative information about potential general shallow soil conditions in the project vicinity. This information was

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derived from approximately 6 ft. deep manual auger borings, aerial photo and surface feature interpretation at some point in the past (mid 1980's to early 1970's). The SCS data may or may not reflect actual current site conditions. A review of the Soil Survey for Dade County revealed that at the time the survey was conducted, the soils at the site were described as Udorthents, limestone substratum-Urban land complex. About 40 to 70 percent of this map unit consists of Udorthents in open areas, and 25 to 60 percent consists of Urban land, or areas covered by concrete and buildings. The Udorthents consist of fill material that is light gray and white extremely stony loam about 55 inches thick. The fill material is underlain by hard, porous limestone bedrock. We note that the maximum depth of the survey is approximately 6 feet.

Subsurface Exploration

NUTTING ENGINEERS OF FLORIDA, INC. performed five (5) Standard Penetration Test (SPT) borings (ASTM D-1586) that were planned to a depth of fifteen feet below land surface. Boring B-5 was extended beyond the planned depth to a depth of twenty feet due to the presence of very loose soils. In addition, one (1) exfiltration test was performed in general accordance with South Florida Water Management District specifications to a depth of fifteen feet. The locations of the tests are indicated on the attached Approximate Test Location Plan, presented in the Appendix. The test boring and exfiltration testing reports are also presented in the Appendix. The test locations were established in the field using approximate methods; namely, a measuring wheel and available surface controls. Therefore, the locations should be considered approximate.

Test Boring Results

In general, a surficial layer of topsoil was encountered at Boring B-4 to a depth of about 4 inches, while no discernible topsoil layer was encountered at the rest of the locations. Below the topsoil at B-4 and extending from the surface at the rest of the locations, very loose to medium dense light brown, brown, or dark brown limestone fragments with fine sand or fine sand with limestone was encountered to depths of about two to six feet. It should be noted that concrete debris was encountered at Boring B-2, beginning a depth of two feet and ending at a depth of six feet. Below the fine sand and limestone fragments, soft light brown limestone with fine sand was encountered to a depth of about twelve feet. The limestone was underlain by very loose to medium dense light brown fine sand, with or without limestone fragments, to fifteen to twenty feet, the maximum depths explored. Please see the enclosed soil classification sheet in the Appendix of this report for additional important information regarding these descriptions, the field evaluation and other related information.

Rock Formation Note:

Generally, rock in the South Florida area may include limestone or sandstone which has irregularities and discontinuities including vertical and horizontal solution features, varying surface and bottom elevations, and varying degrees of hardness. The rock features may also contain intervening sand and other material filled lenses. The standard penetration test borings executed in this evaluation were performed in accordance with the normal standard of care in this area. Despite this, this process may sometimes fail to detect the presence of rock strata by passing through solution features. Solution features can be very common in rock strata in Southeast

Florida. Also given the brittle nature of some rock strata, rocks may readily shatter when hit by the split spoon resulting in low blow counts. However, these strata may present significant resistance to excavation. Appropriate care shall be exercised by contractors performing excavation operations in this area, utilizing local experience.

Exfiltration Results

One (1) 'Usual Open-Hole' exfiltration test was performed in accordance with South Florida Water Management District (SFWMD) specifications to a depth of fifteen feet below the existing ground surface. The test was performed in order to determine the hydraulic conductivity of the in situ subsurface soils to evaluate drainage requirements for the project. The hydraulic conductivity value was determined to be approximately 9.37×10^{-4} cubic feet per second, per square foot, per foot of head at the specific location tested. Detailed soil descriptions and flow rate are presented in the Appendix.

Groundwater Information

The immediate groundwater level was measured at the boring locations at the time of drilling. The groundwater level was encountered at approximate depths of six to seven feet below the existing ground surface at the time of drilling.

The immediate depth to groundwater measurements presented in this report will not provide a reliable indication of stabilized or more long-term depth to groundwater at this site. Water table elevations can vary dramatically with time through rainfall, droughts, storm events, flood control activities, nearby surface water bodies, tidal activity, pumping and many other factors. For these reasons, this immediate depth to water data **should not** be relied upon alone for project design considerations.

ANALYSIS AND RECOMMENDATIONS

The borings performed for this project suggest that the soils encountered are suitable for support of the proposed residence using a shallow foundation system. Once the site is successfully prepared in accordance with the recommendations presented in this report, the site may be developed with the proposed new residence using a shallow foundation system designed for an allowable soil bearing pressure of 3,000 pounds per square foot. Once plans are finalized for the proposed construction, a copy should be provided to Nutting Engineers for review to determine whether additional details or changes to our recommendations are warranted. All work should be completed in accordance with applicable building codes, other regulations as appropriate, and good standard local practice.

We recommend a minimum width of 16 inches for continuous footings and 24 inches for individual footings, even though the soil bearing pressure may not be fully developed in all cases. We recommend that the bottom of footings be at least 12 inches below the lowest adjacent finished grade.

It is our opinion that the floor slab system may be constructed as a slab on grade. We recommend that a vapor barrier be placed between the soil and concrete. We also recommend that the reinforcing steel mesh be placed at the approximate center of the slab for tensile support.

Settlement Analysis

We performed a settlement evaluation based upon an improved soil profile following completion of the clearing, backfilling, and compaction using a moderately sized vibratory compactor for the construction. This method should improve the soils to provide an allowable bearing capacity of 3,000 pounds per square foot. It was estimated that upon proper completion, long-term total settlements should be on the order of approximately one inch. Differential settlements should be approximately one-half of the total settlement. Most of this settlement should occur upon the application of the dead load during construction.

In order to maintain the calculated settlement throughout the life of the structures it would be necessary to grade the site such that stormwater is directed away from the foundations. Any ponding nearby/adjacent to walls and foundations should be avoided.

Site Preparation

The surficial organic soils, debris from the clearing operations, and any unsuitable soils as determined by the Geotechnical Engineer will need to be completely removed within the construction area and to a lateral distance of at least 5 feet beyond the footprint limits. We note that there may have been a structure previously located in the area of Boring B-2, where concrete debris was encountered beginning at a depth of two feet and ending at a depth of six feet. This area should be explored with excavation equipment as part of the earthwork operations to ensure the area is properly cleared for support of the new structure. A Nutting Engineer's representative should be present to observe that the stripping and compaction operations are performed as we have discussed herein.

Upon approval by the geotechnical engineer, the surface should then be compacted with a self-propelled vibratory roller until densities equivalent to at least 98 percent of the modified Proctor maximum dry density are uniformly obtained.

Any structural fill needed to bring the site to construction grade may then be placed in lifts not exceeding twelve inches in loose thickness. Each lift should be thoroughly compacted until densities equivalent to at least 98 percent of the modified Proctor maximum dry density are uniformly obtained. Fill should consist of granular soil, with less than 10% passing the No. 200 sieve, free of rubble, organics (5% or less) clay, debris, and other unsuitable material. The fill should have ASTM designation (D-2487) of GP, GW, SP, or SW, with a maximum particle size of no more than 3 inches or as otherwise approved by Nutting Engineers.

Following site and building pad construction as discussed above, the foundation area should be excavated, and the footings formed.

The bottom of foundation excavations should be compacted after excavation to develop a minimum density requirement of 98 percent of the maximum modified Proctor dry density, for a minimum depth of one (1) foot below the bottom of the footing depth, as determined by field density compaction tests. The floor slab area should also be compacted in the same manner.

Proposed Pool

The bottom of the pool foundation will most likely be located within the limestone formation. The pool area should be excavated appropriately to allow for the bottom of the pool to rest directly on the limestone formation or on twelve inches of DOT No. 57 stone. Hard excavation should be anticipated and the pool contractor should prepare for this accordingly.

We consider the existing soils to be suitable for support of the proposed pool using conventional construction methods. The contractor should take measures to ensure that the side slopes are protected and will not affect surrounding existing structures. Any backfill placed within the zone of influence of foundations (2 horizontal to 1 vertical) should be compacted to a minimum of 95 percent of the modified proctor maximum dry density (ASTM D-1557).

Based on the level of the groundwater level at the time of the field work, (six to seven feet below the existing ground surface) temporary dewatering may not be needed in order to construct the pool. The pool contractor is responsible for determining the best methods of dewatering for the project, if needed.

The pool deck may be constructed on compacted existing soils or approved fill. The soils should be compacted to a minimum of 95 percent of the modified proctor maximum dry density to a depth of 12 inches below the compacted surface.

The pool deck shall be designed by a structural engineer or other qualified professional with adequate expansion joints, bond breakers, reinforcement, and other appropriate measures during concrete placement to reduce the potential for shrinkage crack development.

The annular space between the pool shell and excavation could be carefully consolidated in 12-inch lifts avoiding impacting the pool shell while minimizing settlement potential in this area. NE could perform probes in the annular area to verify compaction upon request.

GENERAL INFORMATION

Our client for this geotechnical evaluation was:

Mr. Michael Toth
Clever Construction
1319 North University Street
Coral Springs, Florida 33071

The contents of this report are for the exclusive use of the client, the client's design & construction team and governmental authorities for this specific project exclusively. Information conveyed in this report shall not be used or relied upon by other parties or for other projects without the expressed written consent of Nutting Engineers of Florida, Inc. This report discusses geotechnical considerations for this site based upon observed conditions and our understanding of proposed construction for foundation support. Environmental issues including (but not limited to), soil and/or groundwater contamination are beyond our scope of service for this project. As such, this report should not be used or relied upon for evaluation of environmental issues.

Prior to initiating compaction operations, we recommend that representative samples of the structural fill material to be used and acceptable in-place soils be collected and tested to determine their compaction and classification characteristics. The maximum dry density, optimum moisture content, gradation and plasticity characteristics should be determined. These tests are needed for compaction quality control of the structural fill and existing soils, and to determine if the fill material is acceptable. If conditions are encountered which are not consistent with the findings presented in this report, or if proposed construction is moved from the location investigated, this office shall be notified immediately so that the condition or change can be evaluated, and appropriate action taken.

The vibratory compaction equipment may cause vibrations that could be felt by persons within nearby buildings and could potentially induce structural settlements. Additionally, preexisting settlements may exist within these structures that could be construed to have been caused or worsened by the proposed vibratory compaction after the fact. Pre- and post-conditions surveys of these structures along with the vibration monitoring during vibratory compaction could be performed to better evaluate this concern. The contractor should exercise due care during the performance of the vibratory compaction work with due consideration of potential impacts on existing structures. If potential vibrations and impacts are not considered tolerable, then alternate foundation modification techniques should be considered.

Nutting Engineers of Florida, Inc. (NE), recommends that we be contracted to provide input to the design team and owner during the foundation and earthwork design process and that we review final foundation drawings and specifications to verify that our report recommendations and design intent have been properly implemented. NE shall also perform testing and inspections during the earthwork and foundation construction as recommended in this report.

If NE is NOT engaged to perform these services as detailed herein, the Client agrees that NE shall not be the Geotechnical Engineer of Record and shall bear no liability for the interpretation, implementation of our reports recommendations and/or inspection and testing services as described in our reports. Further, NE will be unable to provide ongoing Geotechnical Engineering consulting on the subject project as that role has been assumed by another firm.

Excavations of five feet or more in depth should be sloped or shored in accordance with OSHA and State of Florida requirements.

The Geotechnical Engineer warrants that the findings, recommendations, specifications, or professional advice contained herein, have been presented after being prepared in accordance with general accepted professional practice in the field of foundation engineering, soil mechanics and engineering geology. No other warranties are implied or expressed.

We appreciate the opportunity to provide these services for you. If we can be of any further assistance, or if you need additional information, please feel free to contact us.

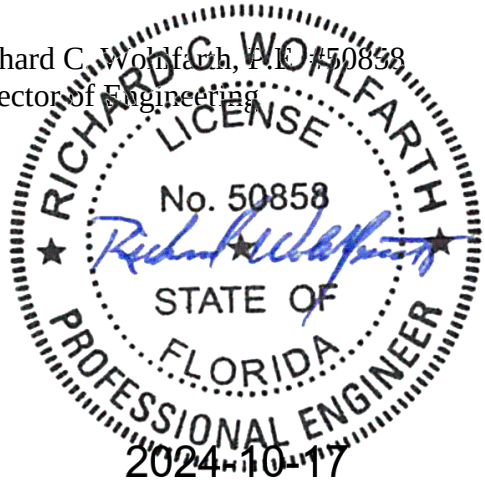
Sincerely,
NUTTING ENGINEERS OF FLORIDA, INC.

This item has been digitally signed and sealed by Richard C. Wohlfarth on the date adjacent to the seal.

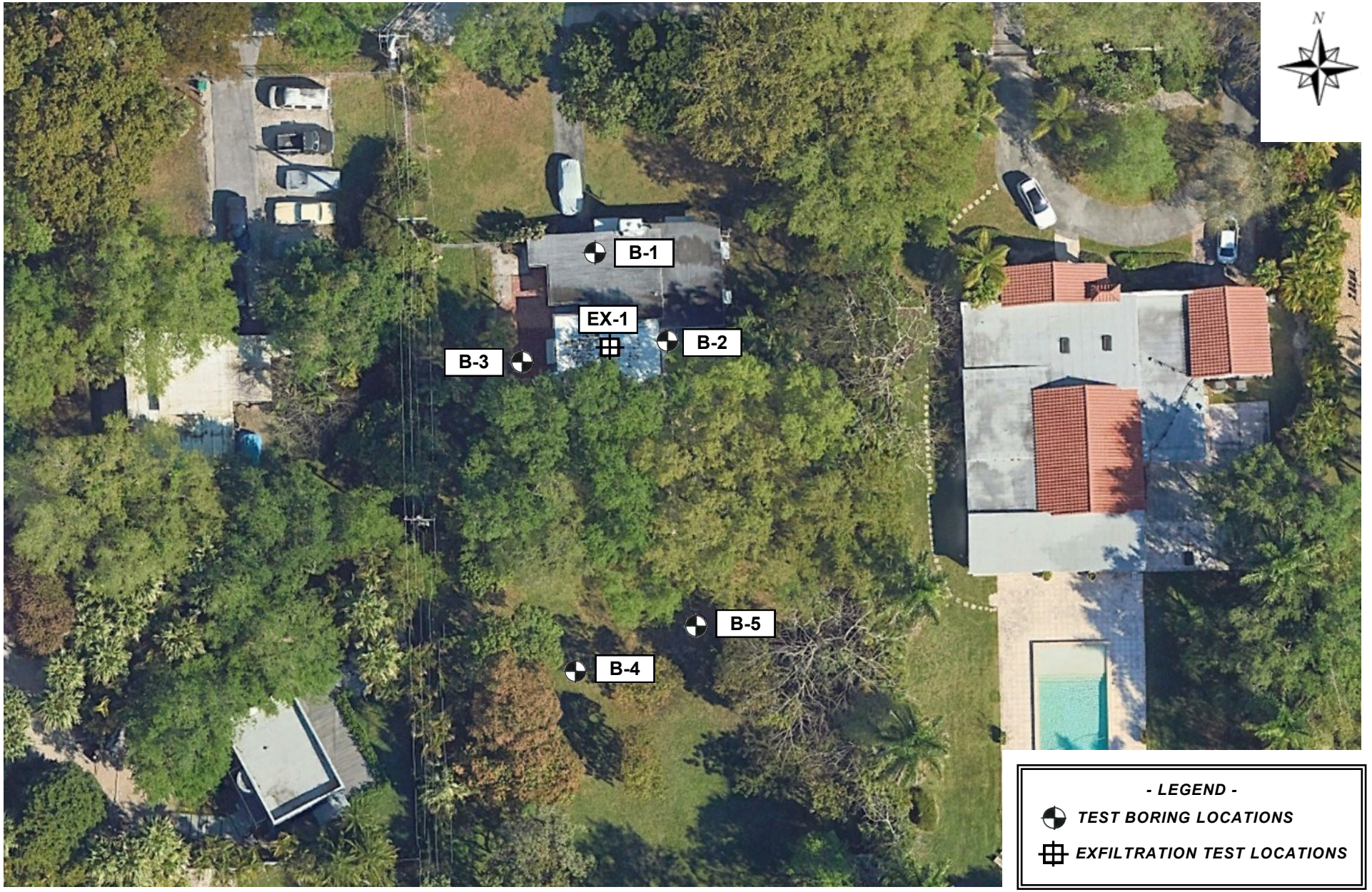
Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Colin T. Henderson, P.E. #96283
Project Engineer

Richard C. Wohlfarth, P.E. #50858
Director of Engineering



Appendix: Approximate Test Location Plan
Test Boring Results
Exfiltration Test Result
Limitations of Liability
Soil Classification Criteria



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Clever Construction
Bhagwansingh Residence
8100 SW 120th Street
Pinecrest, Florida 33156
PROJECT NO. 2950.1

APPROXIMATE TEST LOCATION PLAN

GEOTECHNICAL EXPLORATION

FIG. 1

Nutting Engineers of Fl., Inc.
2051 Nw 112th Avenue
Miami, Florida 33172
Telephone: (305) 557-3083
Fax: (561) 737-9975

BORING NUMBER B-1

PROJECT NUMBER 2950.1

CLIENT Clever Construction **PROJECT NAME** Bhagwansingh Residence

PROJECT LOCATION 8100 SW 120th Street, Pinecrest, FL 33156

DATE STARTED 10/14/24 COMPLETED 10/14/24 SURFACE ELEVATION REFERENCE Existing ground surface

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Henderson ▽ AT TIME OF DRILLING 6.1 ft

APPROXIMATE LOCATION OF BORING **As located on the approximate test location plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value	▲ SPT N VALUE ▲ 10 20 30 40 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		Lt. brown and brown fine SAND, some limestone fragments	SS 1	5-5-7-8	12	▲
		Lt. brown and tan LIMESTONE FRAGMENTS with fine SAND				
		Lt. brown LIMESTONE with fine SAND	SS 2	20-19-22-8	41	▲
5			SS 3	6-8-12-14	20	▲
		▽	SS 4	7-8-5-5	13	▲
			SS 5	5-8-8-4	16	▲
10						
		Lt. brown fine SAND with LIMESTONE FRAGMENTS	SS 6	2-3-4-6	7	▲
15		Bottom of hole at 15.0 feet.				

Nutting Engineers of Fl., Inc.
2051 Nw 112th Avenue
Miami, Florida 33172
Telephone: (305) 557-3083
Fax: (561) 737-9975

BORING NUMBER B-2

PROJECT NUMBER 2950.1

CLIENT Clever Construction **PROJECT NAME** Bhagwansingh Residence

PROJECT LOCATION 8100 SW 120th Street, Pinecrest, FL 33156

DATE STARTED 10/14/24 COMPLETED 10/14/24 SURFACE ELEVATION REFERENCE Existing ground surface

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Henderson ▽ AT TIME OF DRILLING 6.3 ft

APPROXIMATE LOCATION OF BORING **As located on the approximate test location plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value	▲ SPT N VALUE ▲ 10 20 30 40 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		Brown and dk. brown fine SAND with LIMESTONE FRAGMENTS	SS 1	4-4-3-2	7	▲
		Brown and lt. brown LIMESTONE FRAGMENTS fine SAND, some concrete debris	SS 2	2-4-6-14	10	▲
5			SS 3	19-14-9-5	23	▲
		▽ Lt. brown LIMESTONE with fine SAND	SS 4	6-7-5-4	12	▲
			SS 5	5-4-6-4	10	▲
10						
		Lt. brown fine SAND, little limestone fragments	SS 6	3-5-3-3	8	▲
15		Bottom of hole at 15.0 feet.				

Nutting Engineers of Fl., Inc.
2051 Nw 112th Avenue
Miami, Florida 33172
Telephone: (305) 557-3083
Fax: (561) 737-9975

BORING NUMBER B-3

PROJECT NUMBER 2950.1

CLIENT Clever Construction **PROJECT NAME** Bhagwansingh Residence

PROJECT LOCATION 8100 SW 120th Street, Pinecrest, FL 33156

DATE STARTED 10/14/24 COMPLETED 10/14/24 SURFACE ELEVATION REFERENCE Existing ground surface

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Henderson ▽ AT TIME OF DRILLING 6.4 ft

APPROXIMATE LOCATION OF BORING **As located on the approximate test location plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value	▲ SPT N VALUE ▲ 10 20 30 40 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		Brown and dk. brown fine SAND, some limestone fragments	SS 1	3-2-6-19	8	▲
		Lt. brown and brown LIMESTONE FRAGMENTS				
		Lt. brown LIMESTONE with fine SAND	SS 2	10-13-13-11	26	▲
5			SS 3	9-12-9-8	21	▲
		▽	SS 4	4-3-1-4	4	▲
			SS 5	6-4-4-3	8	▲
10						
		Lt. brown fine SAND with LIMESTONE FRAGMENTS	SS 6	1-2-1-3	3	▲
15		Bottom of hole at 15.0 feet.				

Nutting Engineers of Fl., Inc.
2051 Nw 112th Avenue
Miami, Florida 33172
Telephone: (305) 557-3083
Fax: (561) 737-9975

BORING NUMBER B-4

PROJECT NUMBER 2950.1

CLIENT Clever Construction **PROJECT NAME** Bhagwansingh Residence

PROJECT LOCATION 8100 SW 120th Street, Pinecrest, FL 33156

DATE STARTED 10/14/24 COMPLETED 10/14/24 SURFACE ELEVATION REFERENCE Existing ground surface

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Henderson ▽ AT TIME OF DRILLING 7.0 ft

APPROXIMATE LOCATION OF BORING **As located on the approximate test location plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value	▲ SPT N VALUE ▲ 10 20 30 40 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		TOPSOIL, trace limestone fragments (4" thick)				
		Lt. brown fine SAND	SS 1	3-1-WOH-1		
		Lt. brown fine SAND with LIMESTONE FRAGMENTS, trace silt	SS 2	2-3-2-5	5	▲
5		Lt. brown and brown LIMESTONE FRAGMENTS with fine SAND	SS 3	15-13-15-9	28	▲
		Lt. brown LIMESTONE with fine SAND ▽	SS 4	8-6-8-6	14	▲
			SS 5	6-5-7-6	12	▲
10						
		Lt. brown fine SAND with LIMESTONE FRAGMENTS				
			SS 6	3-4-5-5	9	▲
15		Bottom of hole at 15.0 feet.				

Nutting Engineers of Fl., Inc.
2051 Nw 112th Avenue
Miami, Florida 33172
Telephone: (305) 557-3083
Fax: (561) 737-9975

BORING NUMBER B-5

PROJECT NUMBER 2950.1

CLIENT Clever Construction **PROJECT NAME** Bhagwansingh Residence

PROJECT LOCATION 8100 SW 120th Street, Pinecrest, FL 33156

DATE STARTED 10/14/24 COMPLETED 10/14/24 SURFACE ELEVATION REFERENCE Existing ground surface

DRILLING METHOD Standard Penetration Boring GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Henderson ▽ AT TIME OF DRILLING 7.2 ft

APPROXIMATE LOCATION OF BORING **As located on the approximate test location plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value	▲ SPT N VALUE ▲ 10 20 30 40 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		Dk. brown and brown fine SAND with LIMESTONE FRAGMENTS	SS 1	3-5-2-1	7	▲
		Lt. brown LIMESTONE with fine SAND	SS 2	3-13-13-12	26	▲
5			SS 3	15-10-14-15	24	▲
		▽	SS 4	12-7-8-7	15	▲
			SS 5	3-5-7-5	12	▲
10						
		Lt. brown fine SAND with LIMESTONE FRAGMENTS	SS 6	3-1-WOH-1		
15		Lt. brown fine SAND	SS 7	1-1-1-1	2	▲
			SS 8	7-6-9-8	15	▲
20		Bottom of hole at 20.0 feet.				

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www.nuttingengineers.com info@nuttingengineers.com

Report of Exfiltration Test

Client:	Clever Construction	Order No	2950.1
Project:	Bhagwansingh Residence	Report No	1
Location:	8100 SW 12oth Street	Date:	10/14/24
	Pinecrest, FL 33156		
Test:	Usual Open Hole Exfiltration Test		
Surface Elevation:	Existing ground surface	Water table from ground surface:	6.33'
Casing Diameter:	6"		
Tube Depth:	15'		

Hydraulic Conductivity (K) = 9.37 x 10^{-4} cfs/ft^2ft.head

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EXFIL NO. 1

Sample Location: Approx. as located on site plan.

Material:		
	0'- 2'	Brown to lt. brown fine SAND with LIMESTONE FRAGMENTS
	2'- 4'	Tan to lt. brown LIMESTONE FRAGMENTS with fine SAND
	4'- 11'	Lt. brown LIMESTONE with fine SAND
	11'- 15'	Lt. brown fine SAND with LIMESTONE

One Minute Increme	Pump Rate in Gal/Min
1	50
2	50
3	50
4	50
5	50
6	50
7	50

LIMITATIONS OF LIABLILITY

WARRANTY

We warranty that the services performed by Nutting Engineers of Florida, Inc. are conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession in our area currently practicing under similar conditions at the time our services were performed. ***No other warranties, expressed or implied, are made***. While the services of Nutting Engineers of Florida, Inc. are a valuable and integral part of the design and construction teams, we do not warrant, guarantee or insure the quality, completeness, or satisfactory performance of designs, construction plans, specifications we have not prepared, nor the ultimate performance of building site materials or assembly/construction.

SUBSURFACE EXPLORATION

Subsurface exploration is normally accomplished by test borings; test pits are sometimes employed. The method of determining the boring location and the surface elevation at the boring is noted in the report. This information is represented in the soil boring logs and/or a drawing. The location and elevation of the borings should be considered accurate only to the degree inherent with the method used and may be approximate.

The soil boring log includes sampling information, description of the materials recovered, approximate depths of boundaries between soil and rock strata as encountered and immediate depth to water data. The log represents conditions recorded specifically at the location where and when the boring was made. Site conditions may vary through time as will subsurface conditions. The boundaries between different soil strata as encountered are indicated at specific depths; however, these depths are in fact approximate and dependent upon the frequency of sampling, nature and consistency of the respective strata. Substantial variation between soil borings may commonly exist in subsurface conditions. Water level readings are made at the time and under conditions stated on the boring logs. Water levels change with time, precipitation, canal level, local well drawdown and other factors. Water level data provided on soil boring logs shall not be relied upon for groundwater based design or construction considerations.

LABORATORY AND FIELD TESTS

Tests are performed in *general* accordance with specific ASTM Standards unless otherwise indicated. All criteria included in a given ASTM Standard are not always required and performed. Each test boring report indicates the measurements and data developed at each specific test location.

ANALYSIS AND RECOMMENDATIONS

The geotechnical report is prepared primarily to aid in the design of site work and structural foundations. Although the information in the report is expected to be sufficient for these purposes, it shall not be utilized to determine the cost of construction nor to stand alone as a construction specification. Contractors shall verify subsurface conditions as may be appropriate prior to undertaking subsurface work.

Report recommendations are based primarily on data from test borings made at the locations shown on the test boring reports. Soil variations commonly exist between boring locations. Such variations may not become evident until construction. Test pits sometimes provide valuable supplemental information that derived from soil borings. If variations are then noted, the geotechnical engineer shall be contacted in writing immediately so that field conditions can be examined and recommendations revised if necessary.

The geotechnical report states our understanding as to the location, dimensions and structural features proposed for the site. ***Any significant changes of the site improvements or site conditions must be communicated in writing to the geotechnical engineer immediately*** so that the geotechnical analysis, conclusions, and recommendations can be reviewed and appropriately adjusted as necessary.

CONSTRUCTION OBSERVATION

Construction observation and testing is an important element of geotechnical services. The geotechnical engineer's field representative (G.E.F.R.) is the "owner's representative" observing the work of the contractor, performing tests and reporting data from such tests and observations. ***The geotechnical engineer's field representative does not direct the contractor's construction means, methods, operations or personnel.*** The G.E.F.R. does not interfere with the relationship between the owner and the contractor and, except as an observer, does not become a substitute owner on site. The G.E.F.R. is responsible for his/her safety, but has no responsibility for the safety of other personnel at the site. The G.E.F.R. is an important member of a team whose responsibility is to observe and test the work being done and report to the owner whether that work is being carried out in general conformance with the plans and specifications. The enclosed report may be relied upon solely by the named client.

SOIL AND ROCK CLASSIFICATION CRITERIA

SAND/SILT

N-VALUE (bpf)	RELATIVE DENSITY
0 – 4	Very Loose
5 – 10	Loose
11 – 29	Medium
30 – 49	Dense
>50	Very dense
100	Refusal

CLAY/SILTY CLAY

N-VALUE (bpf)	UNCONFINED COMP. STRENGTH (tsf)	CONSISTENCY
<2	<0.25	v. Soft
2 – 4	0.25 – 0.50	Soft
5 – 8	0.50 – 1.00	Medium
9 – 15	1.00 – 2.00	Stiff
16 – 30	2.00 – 4.00	v. Stiff
>30	>4.00	Hard

ROCK

N-VALUE (bpf)	RELATIVE HARDNESS	ROCK CHARACTERISTICS
N≥ 100	Hard to v. hard	Local rock formations vary in hardness from soft to very hard within short vertical and horizontal distances and often contain vertical solution holes of 3 to 36 inch diameter to varying depths and horizontal solution features. Rock may be brittle to split spoon impact, but more resistant to excavation.
25≤ N ≤ 100	Medium hard to hard	
5≤ N ≤ 25	Soft to medium hard	

PARTICLE SIZE

Boulder	>12 in.
Cobble	3 to 12 in.
Gravel	4.76 mm to 3 in.
Sand	0.074 mm to 4.76 mm
Silt	0.005 mm to 0.074 mm
Clay	<0.005 mm

DESCRIPTION MODIFIERS

0 – 5%	Slight trace
6 – 10%	Trace
11 – 20%	Little
21 – 35%	Some
>35%	And

Major Divisions			Group Symbols	Typical names	Laboratory classification criteria
Coarse-grained soils (More than half of material is *larger* than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gavels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than five percent……GW, GP, SW, SP More than 12 percent……GM, GC, SM, SC 5 to 12 percent……*Borderline* cases requiring dual systems**
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	
		Gravels with fines (Appreciable amount of fines)	GW* d / u	Silty gravels, gravel-sand-silt mixtures	
			GC	Clayey gravels, gravel-sand-clay mixtures	
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	
			SP	Poorly graded sands, gravelly sands, little or no fines	
		Sands with fines (Appreciable amount of fines)	SM* d / u	Silty sands, sand-silt mixtures	
			SC	Clayey sands, sand-clay mixtures	
Fine-grained soils (More than half of material is *smaller* than No. 200 sieve size)	Silts and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy, clays, silty 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 diatomaceous fine sandy or silty soils, elastic silts	
			CH	Inorganic clays or high plasticity, fat clays	
			OH	Organic clays of medium to high plasticity, organic silts	
	Highly organic soils		PT	Peat and other highly organic soils	

$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_z = \frac{(D_{30})^2}{D_{10} x D_{60}}$ between 1 and 3

Not meeting all gradation requirements for GW

Atterberg limits below "A" line or P.I. less than 4

Atterberg limits above "A" line with P.I. greater than 7

Above "A" line with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols.

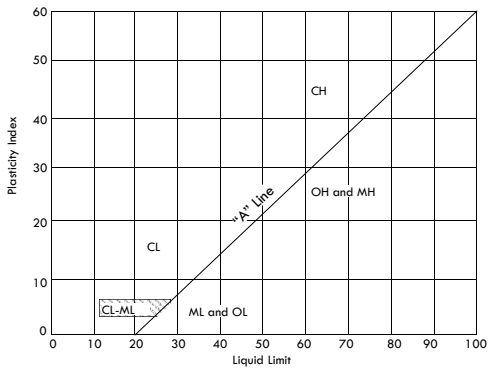
$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_z = \frac{(D_{30})^2}{D_{10} x D_{60}}$ between 1 and 3

Not meeting all gradation requirements for SW

Atterberg limits below "A" line or P.I. less than 4

Atterberg limits above "A" line with P.I. more than 7

Limits plotting in hatched zone with P.I. between 4 and 7 are *borderline* cases requiring use of dual system.



Plasticity Chart