MAGNUM ENGINEERING INC
GEOTECHNICAL ENGINEERING CONSULTANTS

GEOTECHNICAL ENGINEERING REPORT

PROPOSED VINEYARD VILLAGE
CRESTVIEW, FLORIDA

PREPARED FOR:

ALDAY HOWELL ENGINEERING, INC.
4100 S. FERDON BOULEVARD, SUITE B2
CRESTVIEW, FLORIDA 32536

429 FLORIDA AVENUE
LYNN HAVEN, FLORIDA 32444
TELEPHONE (850) 258.0994

MAGNUM ENGINEERING INC
GEOTECHNICAL ENGINEERING CONSULTANTS

August 21, 2022

Alday Howell Engineering, Inc.
ATTN: John Feeney, P.E.
4100 S. Ferdon Boulevard
Suite B2
Crestview, FL 32536

SUBJECT: Proposed Vineyard Village Development – Geotechnical Services
Crestview, Florida
MEI Project No. M122-105-052

Dear Mr. Feeney:

This letter forwards the results of our Geotechnical exploration for the proposed development. Our exploration consisted of Five (5) 25-feet deep Standard Penetration (SPT) borings in the proposed building footprint, six (6) 5-feet deep hand auger borings in the proposed pavement areas and stormwater management area, and One (1) Double Ring Infiltrometer (DRI) test in the proposed stormwater retention area.

The subsurface exploration was conducted to provide information needed in the design of an effective foundation system, stormwater area(s), and pavement area(s) for the referenced development. The following report presents the results of our study as well as our evaluation and recommendations pertaining to the geotechnical aspects of the project.

Project Information

The subject site is located northeast of W. Field Avenue and southwest of W. Bowers Avenue in Crestview, Florida. At the time of our exploration, the site was currently undeveloped and covered with surficial grasses and light to medium dense undergrowth. The site previously had single story residences that were razed prior to our mobilization. Based upon visual observations, the site appeared relatively level with less than 3 feet of grade change. At the time of writing this report, no structural or grading information was available, however; we anticipate less than 3 feet of cut/fill will be required to obtain finished floor elevation. Additionally, for engineering purposes, we have estimated max wall loads to be less than 2 kips per linear feet and column loads to be less than 30 kips.

If any of the above information is incorrect, please inform Magnum Engineering, Inc. (MEI) so that we can review and update our recommendations, as needed.

Subsurface Conditions

Figure #1 show the Boring Location Plan and Figure #2 shows the Logs of Borings for Standard Penetration Test borings B-1 through B-5 and hand auger borings HA-1 through HA-6. The test locations were established in the field using the provided site plan with LAT/LONG coordinates and our hand-held GPS unit. Therefore, the borings should be considered only as accurate as the GPS unit (+/- 9 feet).

Upon completion of our field testing, the samples were brought back to the office for visual inspection, classification, and analysis by our engineering staff.

The building borings (B-1 through B-5) generally encountered very loose to loose slightly silty fine sands and silty fine sands from the existing ground surface to roughly 4 feet to 6 feet below existing grade underlain by loose to medium dense clayey fine sands to depth of 13 feet to 18 feet below existing grade underlain by medium dense to dense slightly silty fine sands to the boring termination depth of 25 feet below existing grade.

The pavement and stormwater borings generally encountered slightly silty, silty, and clayey fine sands throughout the depth of the 5 feet deep augers.

The above subsurface descriptions are of a generalized nature, provided to highlight the major soil strata encountered. The Logs of Boring should be reviewed for specific subsurface conditions at each boring location. The stratifications shown on the Logs of Boring represent the subsurface conditions at the actual boring locations only, and variations in the subsurface conditions can and may occur between boring locations and should therefore be expected. The stratifications represent the approximate boundary between subsurface materials, and the transitions between strata may be gradual.

Please refer to the attached logs of borings presented as Figure #2 for a more detailed description of the soils encountered in each borings.

Groundwater Conditions

Groundwater was encountered at approximately 18.0 feet below existing grade at the time of drilling (August 10, 2022), which was during a period of normal seasonal rainfall. Groundwater levels will fluctuate with rainfall and could vary several feet during typical seasonal fluctuations. Larger fluctuations are possible under severe weather conditions. We recommend that the Contractor verify the actual groundwater levels at the time of construction to determine potential impacts groundwater will have on construction procedures.

CONCLUSIONS AND RECOMMENDATIONS

General

The following geotechnical related design recommendations have been developed on the basis of the previously described project characteristics and subsurface conditions encountered. If there are any changes in these project criteria, including project location on the site, a review should be made by MEI to determine if modifications to the recommendations are warranted.

Once final design plans and specifications are available, a general review by MEI is recommended as a means to check that the evaluations made in preparation of this report are correct and that earthwork and foundation recommendations are properly interpreted and implemented

Site Preparation

The site should be cleared and grubbed of surface vegetation. As a minimum, it is recommended the clearing operations extend at least five feet beyond the development perimeters.

The subgrade soils should be compacted to at least 95 percent of the Modified Proctor (ASTM D-1557) maximum dry density to a depth of 24 inches below footing and floor slab bottoms.

Engineered Fill

All fill used to raise the building area and pavement areas to final grades should consist of sandy soils with less than 15 percent passing the No. 200 sieve. These soils should be free of rubble, organics, clay, debris and other unsuitable material. Fill should be placed in lifts on the order of 12 inches or less (in loose thickness) and compacted to 95 percent of the soil's Modified Proctor maximum dry density, per ASTM D-1557.

Foundations

With proper subgrade preparation and compaction/densification as described herein, the site soils should be capable of supporting the proposed structure on shallow foundations. The existing near surface soils and fill soils should be prepared as previously recommended to improve foundation support and reduce total and differential settlements.

Based on the anticipated construction and site preparation requirements recommended herein, it is our opinion that the building can be supported on shallow foundations designed for a net maximum allowable bearing pressure of 2,000 pounds per square foot (psf). The following geotechnical related recommendations should be used for design and construction of the foundations.

- The foundation and floor slab should bear on properly improved existing subgrade or on properly placed and compacted cohesionless (sand) fill.
- The soils to a depth of one foot below the footings and floor slabs and all new fill should be compacted to 95 percent of the soil's Modified Proctor (ASTM D-1557) density.
- Exterior footings should be embedded so that the bottom of the foundation is a minimum of 18 inches below the adjacent compacted grades.
- Strip or wall footings should be a minimum of 18 inches wide and pad or column footings should be a minimum of three feet wide. The minimum footing sizes should be used regardless of whether or not the foundation loads and allowable bearing pressures dictate a smaller size.
- All footings should be constructed in a "dry" fashion.
- Structural elements should be centered on the footings such that the load is transferred evenly unless the footings are proportioned for eccentric loads.

Settlement

The settlement of shallow foundations supported on sandy soils should occur rapidly after loading. The majority of expected settlement should occur during construction as dead loads are imposed. Total settlements of footings are estimated to be less than 1 inch, with differential settlement on the order of 50 percent of the total settlements. Total and differential settlements of these magnitudes are usually considered tolerable for the anticipated construction; however, the tolerance of the proposed structures to the predicted total and differential settlements should be confirmed by the structural engineer.

Pavements

Initially, the pavement areas should be cleared, grubbed, and stripped of topsoil and other deleterious material (i.e. concrete pavement, previous building foundation remnants). Special care should be taken to insure that all stumps, root systems, and peaty soils are removed from beneath the proposed pavement areas.

Prior to placing fill soils, where applicable, the top of the ground surface should be compacted to a minimum soil density of 95% of the Modified Proctor Test (ASTM D1557). Structural fill soils should be placed in maximum 12-inch lifts and compacted to a minimum soil density of 95% of the Modified Proctor Test (ASTM D1557). The top 12 inches of subgrade should be compacted to a minimum soil density of 98% of the Modified Proctor Test (ASTM D1557). The top 12 inches of subgrade should have a minimum LBR value of 40. We recommend that structural fill soils, where planned, have a minimum LBR of 40.

Based on the subsurface conditions encountered in the test borings, we recommend using a graded aggregate base (i.e. limerock or crushed concrete). The base course should be compacted to a minimum soil density of 98% of the Modified Proctor Test (ASTM D1557) and have a minimum LBR of 100.

Without benefit of traffic loads, volumes, and serviceability parameters, a pavement section cannot be designed. However, typical parking lots in the local area generally consist of a minimum of 1½ inches of FDOT Superpave Mix SP-12.5 or SP-9.5 asphaltic concrete and a minimum of 6 inches of base. Moderate duty traffic areas (e.g. main entrance areas) typically have a minimum pavement section consisting of 2 inches of FDOT Superpave Mix SP-12.5 asphaltic concrete and 8 inches of base.

Preparation of the subgrade soils for the parking and drive lanes should be prepared in general accordance with the site soil preparation recommendations described for the building area. While specific traffic loads and volumes for the project have not been provided, we are providing recommended light-duty and medium-duty pavement sections, which have been successfully utilized for this type of commercial development in the Northwest Florida area with similar traffic loadings.

Light Duty (Automobile Parking)

- 1 ½ inches Asphalt Concrete (FDOT Superpave Mix SP-12.5 or SP-9.5)
- 6 inches Crushed Limerock or Graded Aggregate Base (minimum LBR 100)
- 12 inches stabilized subgrade (minimum LBR 40)

Medium Duty (Entrance Lanes)

- 2 inches Asphaltic Concrete (FDOT Superpave Mix SP-12.5)
- 8 inches Crushed Limerock or Graded Aggregate Base (minimum LBR 100)
- 12 inches Stabilized Subgrade (minimum LBR 40)

A rigid pavement section merits consideration for areas to receive relatively high concentrated sustained loads such as dumpsters and loading/storage areas. A rigid concrete pavement of 6 inches in minimum thickness will distribute concentrated loads over a greater area, hence reducing the possibility of high stress concentrations to the subgrade. The concrete used for rigid pavement should have a minimum 28-day flexural strength of 650 psi and a maximum slump of 4 inches. The subgrade should consist of a near uniform soil of equivalent moisture content and density. Pavement joints, reinforcing, and details should be designed in accordance with applicable American Concrete Institute (ACI) standards.

The above recommended pavement sections represent minimum design thicknesses and, as such, periodic maintenance should be anticipated. Also, these recommended pavement sections should be confirmed or modified by your Civil Engineer, based on actual traffic and the owner's requirements. The pavement section materials and construction should comply with the Florida DOT and local municipality requirements.

Double Ring Infiltrometer Test

One (1) Double Ring Infiltrometer (DRI) test was performed in the field in general accordance with the procedures outlined in ASTM D-3385, ``Infiltration Rate of Soils in Field using Double Ring Infiltrometers". Testing consisted of initially clearing all surface vegetation and topsoil from within the test area. The Infiltration test was performed approximately 2-feet below existing grade at test location DRI-1. The outer ring, which is approximately 24 inches in diameter, was then driven to a depth of 6 inches below the exposed ground surface. The inner ring, approximately 12 inches in diameter, was then centrally located within the outer ring and driven to a depth of 2 inches. The two rings were then simultaneously filled with water to a height of 4 inches above the exposed ground surface test soils. The water level was maintained at this height throughout the test period, with the required amount of water added to maintain this level in both rings recorded at time intervals of ten minutes. After reaching a stabilized inflow of water, the test was continued in order to verify that a sustained infiltration rate has been achieved. The infiltration rate for the inner ring and the annular space between the rings is determined by dividing (a) the water volume used (within each specific area) during the stabilized flow period of the test, by (b) the specific area and (c) the time interval. Infiltration rates are generally converted to units of inches per hour. The infiltration rate for the inner ring, if different than the infiltration rate of the annular area between the rings, according to ASTM, should be used as the infiltration rate for the soils. **The test yielded a measured sustained infiltration rate of 10.4 in/hr**.

Environmental Resource Permitting (ERP) Design Parameters

DESCRIPTION	LOCATION	DESIGN PARAMTER
SUSTAINED INFILTRATION RATE	DRI-1	10.4 IN/HR*
TEST DEPTH	DRI-1	2 FT BELOW EXISTING GRADE
FILLABLE POROSITY	DRI-1	30%
DEPTH TO EXISTING GROUNDWATER TABLE	DRI-1	18 FT BELOW EXISTING GRADE
DEPTH TO ESTIMATED SEASONAL HIGH GROUNDWATER TABLE	DRI-1	16 FT BELOW EXISTING GRADE

***** The above infiltration rate has not been factored and it is up to the designer to apply an appropriate factor of safety. We recommend using a transformation ratio of 1 horizontal to 1 vertical.

Warranty and Limitations of Study

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied. MEI is not responsible for the independent conclusions, opinions or recommendations made by others based on the field exploration and laboratory test data presented in this report.

Soil conditions at other locations may differ from those encountered in the test borings, and the passage of time may cause the soils conditions to change from those described in this report.

This report is intended for use by the designers of this project. While we have no objections to it being provided for review by parties to this project, it is not a specification document and is not to be used as a part of the specifications. If desired, we can assist in the development of specifications for this project based upon our exploration.

The nature and extent of variation and change in the subsurface conditions at the site may not become evident until the course of construction. Construction monitoring by the geotechnical engineer or his representative is therefore considered necessary to verify the subsurface conditions and to check that the soils connected construction phases are properly carried out. If significant variations or changes are in evidence, it may be necessary to reevaluate the recommendations in this report.

Furthermore, if the project characteristics are altered significantly from those discussed in this report, if the project information contained in this report is incorrect or if additional information becomes available, a review must be made by this office to determine if any modifications in the recommendations will be necessary.

We hope this letter provides sufficient information for the present. If you have any questions or comments, please feel free to call.

Sincerely,
MAGNUM ENGINEERING. INC.

JAMES T. VICKERS, P.E.
Sr. Geotechnical Engineer
Florida Registration # 56813

James T. Vickers, P.E.
Digitally signed by James T. Vickers, P.E.
Date: 2022.08.21 12:21:41 -05'00'

Attachments: Figure #1 – Boring Location Plan
Figure #2 – Logs of Borings
Figure #3 – Double Ring Infiltrometer Test Results

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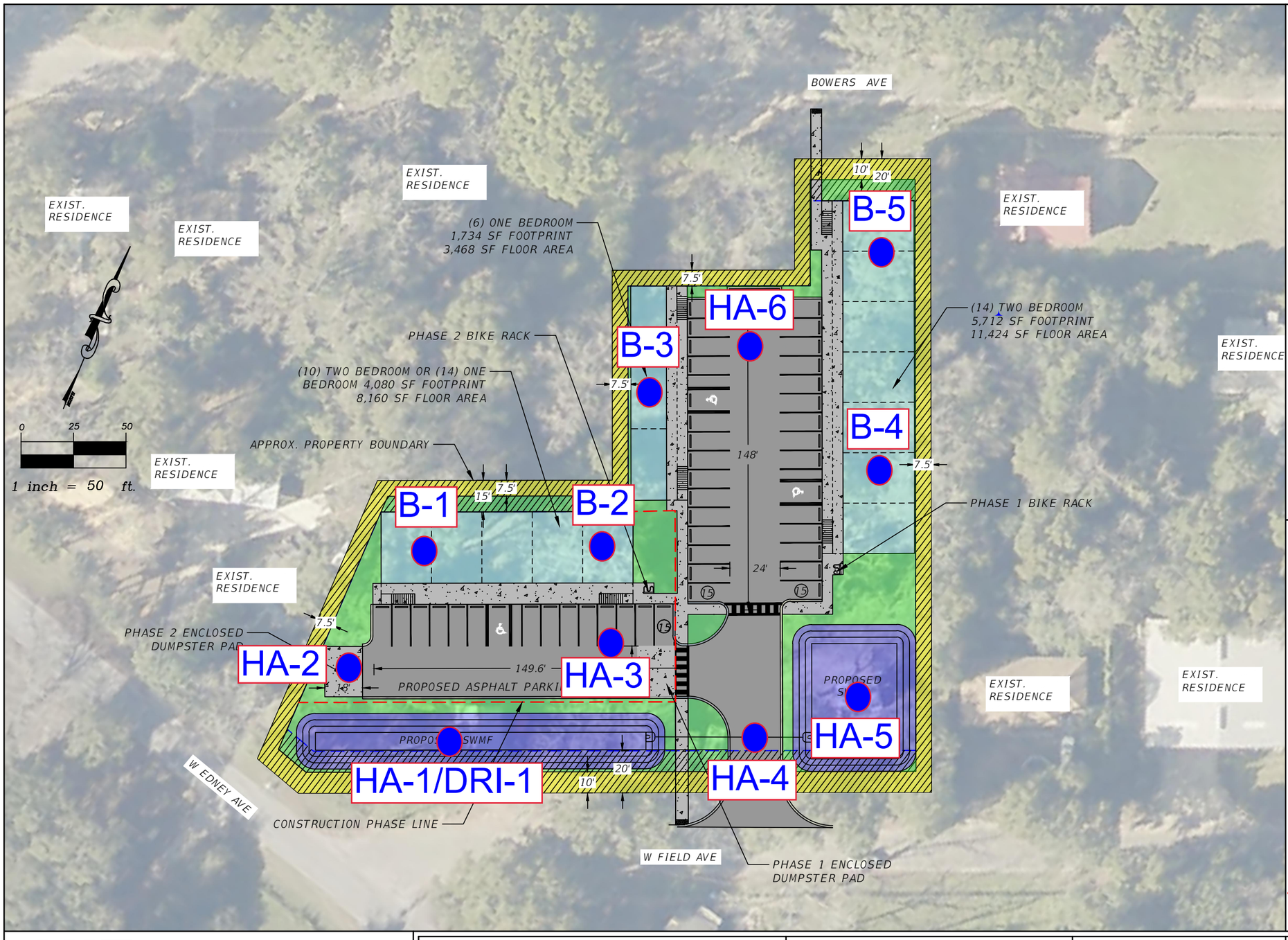
BORING LOCATION PLAN

FIGURE # 1



SITE DATA:

PARCEL ID NUMBERS:
17-3N-23-2490-0133-017B
17-3N-23-2490-0133-0160
17-3N-23-2490-0133-014A
17-3N-23-2490-0133-014B
17-3N-23-2490-0133-014D
17-3N-23-2490-0133-0150
17-3N-23-2490-0133-006A
17-3N-23-2490-0133-006C
17-3N-23-2490-0133-014E

TOTAL SITE AREA: 1.43 AC = 62,494 SF
FUTURE LAND USE: MIXED USE (MU)
ZONING: MIXED USE (MU)

PARKING REQUIREMENTS:
34 SPACES TOTAL PARKING REQUIRED FOR 30 UNITS
38 SPACES TOTAL PARKING REQUIRED FOR 34 UNITS
PARKING SPACE REQUIREMENTS PER ITE PARKING GENERATION MANUAL (5TH) EDITION LAND USE CODE 220 LOW RISE APARTMENT

TOTAL PARKING PROVIDED: 45 SPACES

IMPERVIOUS SURFACE RATIO (ISR):
MAXIMUM ALLOWED ISR: 0.80
PROPOSED ISR: 0.71

FLOOR AREA RATIO (FAR):
MAXIMUM ALLOWED FAR: 2.0
PROPOSED FAR: 0.37

OPEN SPACE RATIO (OSR):
MINIMUM ALLOWED OSR: 0.20
PROPOSED OSR: 0.29

LANDSCAPE BUFFER DIMENSIONS:
FRONT (R/W) = 10'
SIDE = 7.5'
REAR = 7.5'

BUILDING SETBACK DIMENSIONS:
FRONT (R/W) = 20'
SIDE = 7.5'
REAR = 15'

LEGEND:

- PROPOSED BUILDING FOOTPRINT
- LANDSCAPE BUFFER
- PROPOSED CONCRETE SIDEWALK
- PROPOSED ASPHALT PAVEMENT
- OPEN SPACE AREA
- BUILDING SETBACK
- CONSTRUCTION PHASE LINE

ALDAY-HOWELL ENGINEERING, INC.
4100 S. FERDON BLVD, STE B2
CRESTVIEW, FL 32536
PHONE (850) 634-6084 * FAX (850) 526-4740
E-MAIL : info@aldayhowell.com
FLORIDA CERTIFICATE OF AUTHORIZATION. NO. 26105

REVISIONS

DESCRIPTION	INT.	DATE

CLIENT : CITY OF CRESTVIEW

PROJECT : VINEYARD VILLAGE

SHEET TITLE : CONCEPTUAL SITE PLAN

NOT VALID UNLESS EMBOSSED

T.O. NO. 2022-02
DRAWN BY NMM, NCS
CHECKED BY JSF
DATE 08/01/22

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LOGS OF BORING

FIGURE # 2

Magnum Engineering, Inc.
1026 Pierson Drive
Lynn Haven, Florida 32444
Telephone: 8502658332

BORING NUMBER B-1

CLIENT Alday-Howell Engineering, Inc.
PROJECT NAME Vineyard Village
PROJECT NUMBER M122-105-052
PROJECT LOCATION Okaloosa County, Florida
DATE STARTED 8/10/22 **COMPLETED** 8/10/22
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Standard Penetration Test (SPT)
▽ **DEPTH TO GROUNDWATER AT TIME OF DRILLING** 18.0 ft
LOGGED BY J. Governale **CHECKED BY** J. Vickers
ESTIMATED SEASONAL HIGH GWT ---
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Brown Slightly Silty Fine SAND (SP-SM)	SS 1		2-2-2-2 (4)							
		Brown/Orange Silty Fine SAND with Trace of Clay (SM)	SS 2		1-1-2-2 (3)							
5			SS 3		3-3-3-3 (6)							
		Brown/Orange Clayey Fine SAND (SC)	SS 4		4-5-5-5 (10)							
			SS 5		4-5-7-9 (12)							
10												
		Brown/Orange Slightly Silty to Silty Fine SAND (SP-SM)	SS 6		7-10-12 (22)							
15		▽										
		Brown Slightly Silty Fine SAND (SP-SM)	SS 7		12-14-17 (31)							
20												
		Light Orange Fine SAND (SP)	SS 8		11-15-19 (34)							
25		Boring Termination Depth at 25.0 feet.										

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Magnum Engineering, Inc.
1026 Pierson Drive
Lynn Haven, Florida 32444
Telephone: 8502658332

BORING NUMBER B-2

CLIENT Alday-Howell Engineering, Inc.
PROJECT NAME Vineyard Village
PROJECT NUMBER M122-105-052
PROJECT LOCATION Okaloosa County, Florida
DATE STARTED 8/10/22 **COMPLETED** 8/10/22
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Standard Penetration Test (SPT)
▽ **DEPTH TO GROUNDWATER AT TIME OF DRILLING** 18.0 ft
LOGGED BY J. Governale **CHECKED BY** J. Vickers
ESTIMATED SEASONAL HIGH GWT ---
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Brown Slightly Silty Fine SAND (SP-SM)	SS 1		1-1-1-1 (2)							
			SS 2		1-1-1-1 (2)							
5		Brown/Orange Silty Fine SAND (SM)	SS 3		2-2-2-2 (4)							
		Brown/Orange Clayey Fine SAND (SC)	SS 4		2-2-3-3 (5)							
			SS 5		3-4-5-5 (9)							
10												
			SS 6		4-6-7 (13)							
15		▽										
		Brown/Orange Slightly Silty Fine SAND (SP-SM)	SS 7		11-11-12 (23)							
20												
		Light Orange Slightly Silty Fine SAND (SP-SM)	SS 8		11-10-10 (20)							
25		Boring Termination Depth at 25.0 feet.										

Magnum Engineering, Inc.
1026 Pierson Drive
Lynn Haven, Florida 32444
Telephone: 8502658332

BORING NUMBER B-3

CLIENT Alday-Howell Engineering, Inc.
PROJECT NAME Vineyard Village
PROJECT NUMBER M122-105-052
PROJECT LOCATION Okaloosa County, Florida
DATE STARTED 8/10/22 **COMPLETED** 8/10/22
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Standard Penetration Test (SPT)
▽ **DEPTH TO GROUNDWATER AT TIME OF DRILLING** 18.0 ft
LOGGED BY J. Governale **CHECKED BY** J. Vickers
ESTIMATED SEASONAL HIGH GWT ---
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Tan Silty Fine SAND (SM)	SS 1		1-2-1-2 (3)							
		Brown/Orange Silty Fine SAND (SM)	SS 2		2-2-2-2 (4)							
5		Brown/Orange Clayey Fine SAND (SC)	SS 3		3-2-3-3 (5)							
			SS 4		4-4-5-6 (9)							
10			SS 5		4-6-6-8 (12)							
15		Brown/Orange Slightly Silty Fine SAND (SP-SM)	SS 6		8-10-13 (23)							
		▽	SS 7		30-50							
20												
25			SS 8		15-17-18 (35)							
		Boring Termination Depth at 25.0 feet.										

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Magnum Engineering, Inc.
1026 Pierson Drive
Lynn Haven, Florida 32444
Telephone: 8502658332

BORING NUMBER B-4

CLIENT Alday-Howell Engineering, Inc.
PROJECT NAME Vineyard Village
PROJECT NUMBER M122-105-052
PROJECT LOCATION Okaloosa County, Florida
DATE STARTED 8/10/22 **COMPLETED** 8/10/22
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Standard Penetration Test (SPT)
▽ **DEPTH TO GROUNDWATER AT TIME OF DRILLING** 18.0 ft
LOGGED BY J. Governale **CHECKED BY** J. Vickers
ESTIMATED SEASONAL HIGH GWT ---
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Brown Slightly Silty Fine SAND (SP-SM)	SS 1		2-3-4-3 (7)							
		Brown/Orange Silty Fine SAND with Trace of Clay (SM)	SS 2		3-4-3-3 (7)							
5			SS 3		3-2-3-3 (5)							
		Brown/Orange Clayey Fine SAND (SC)	SS 4		3-3-4-6 (7)							
			SS 5		3-4-6-7 (10)							
10												
		Brown/Orange Slightly Silty to Silty Fine SAND (SP-SM)	SS 6		4-6-7 (13)							
15		▽										
		Brown/Orange Slightly Silty Fine SAND (SP-SM)	SS 7		13-15-17 (32)							
20												
		Light Orange Slightly Silty Fine SAND (SP-SM)	SS 8		8-10-11 (21)							
25		Boring Termination Depth at 25.0 feet.										

Magnum Engineering, Inc.
1026 Pierson Drive
Lynn Haven, Florida 32444
Telephone: 8502658332

BORING NUMBER B-5

CLIENT Alday-Howell Engineering, Inc.
PROJECT NAME Vineyard Village
PROJECT NUMBER M122-105-052
PROJECT LOCATION Okaloosa County, Florida
DATE STARTED 8/10/22 **COMPLETED** 8/10/22
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Standard Penetration Test (SPT)
▽ **DEPTH TO GROUNDWATER AT TIME OF DRILLING** 18.0 ft
LOGGED BY J. Governale **CHECKED BY** J. Vickers
ESTIMATED SEASONAL HIGH GWT ---
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Tan Silty Fine SAND (SM)	SS 1		2-3-3-2 (6)							
			SS 2		2-2-2-2 (4)							
5		Brown/Orange Clayey Fine SAND (SC)	SS 3		2-3-2-3 (5)							
			SS 4		3-4-6-7 (10)							
			SS 5		4-6-7-9 (13)							
10												
		Brown/Orange Silty Fine SAND (SM)	SS 6		7-11-12 (23)							
15		▽										
		Brown/Orange Slightly Silty Fine SAND (SP-SM)	SS 7		18-19-22 (41)							
20												
			SS 8		16-17-19 (36)							
25		Boring Termination Depth at 25.0 feet.										

Magnum Engineering, Inc.
1026 Pierson Drive
Lynn Haven, Florida 32444
Telephone: 8502658332

BORING NUMBER HA-1

CLIENT Alday-Howell Engineering, Inc.
PROJECT NAME Vineyard Village
PROJECT NUMBER M122-105-052
PROJECT LOCATION Okaloosa County, Florida
DATE STARTED 8/10/22 **COMPLETED** 8/10/22
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger Boring
DEPTH TO GROUNDWATER AT TIME OF DRILLING ---
LOGGED BY J. Governale **CHECKED BY** J. Vickers
ESTIMATED SEASONAL HIGH GWT ---
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Brown/Orange Silty Fine SAND (SM)	AU									
2.5		Brown/Orange Clayey Fine SAND (SC)										
5.0		Boring Termination Depth at 5.0 feet.										

Magnum Engineering, Inc.
1026 Pierson Drive
Lynn Haven, Florida 32444
Telephone: 8502658332

BORING NUMBER HA-2

CLIENT Alday-Howell Engineering, Inc.
PROJECT NAME Vineyard Village
PROJECT NUMBER M122-105-052
PROJECT LOCATION Okaloosa County, Florida
DATE STARTED 8/10/22 **COMPLETED** 8/10/22
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger Boring
DEPTH TO GROUNDWATER AT TIME OF DRILLING ---
LOGGED BY J. Governale **CHECKED BY** J. Vickers
ESTIMATED SEASONAL HIGH GWT ---
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Tan Slightly Silty Fine SAND (SP-SM)	AU									
2.5		Brown/Orange Silty Fine SAND (SM)										
5.0		Boring Termination Depth at 5.0 feet.										

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Telephone: 8502658332

BORING NUMBER HA-3

CLIENT Alday-Howell Engineering, Inc.
PROJECT NAME Vineyard Village
PROJECT NUMBER M122-105-052
PROJECT LOCATION Okaloosa County, Florida
DATE STARTED 8/10/22 **COMPLETED** 8/10/22
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger Boring
DEPTH TO GROUNDWATER AT TIME OF DRILLING ---
LOGGED BY J. Governale **CHECKED BY** J. Vickers
ESTIMATED SEASONAL HIGH GWT ---
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Brown Slightly Silty Fine SAND (SP-SM)										
2.5		Brown/Orange Silty Fine SAND (SM)	AU									
5.0		Brown/Orange Clayey Fine SAND (SC)										
		Boring Termination Depth at 5.0 feet.										

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BORING NUMBER HA-4

CLIENT Alday-Howell Engineering, Inc.
PROJECT NAME Vineyard Village
PROJECT NUMBER M122-105-052
PROJECT LOCATION Okaloosa County, Florida
DATE STARTED 8/10/22 **COMPLETED** 8/10/22
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger Boring
DEPTH TO GROUNDWATER AT TIME OF DRILLING ---
LOGGED BY J. Governale **CHECKED BY** J. Vickers
ESTIMATED SEASONAL HIGH GWT ---
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Brown/Orange Silty Fine SAND (SM)	AU									
2.5		Brown/Orange Clayey Fine SAND (SC)										
5.0		Boring Termination Depth at 5.0 feet.										

Magnum Engineering, Inc.
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Telephone: 8502658332

BORING NUMBER HA-5

CLIENT Alday-Howell Engineering, Inc.
PROJECT NAME Vineyard Village
PROJECT NUMBER M122-105-052
PROJECT LOCATION Okaloosa County, Florida
DATE STARTED 8/10/22 **COMPLETED** 8/10/22
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger Boring
DEPTH TO GROUNDWATER AT TIME OF DRILLING ---
LOGGED BY J. Governale **CHECKED BY** J. Vickers
ESTIMATED SEASONAL HIGH GWT ---
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Brown/Orange Silty Fine SAND (SM)	AU									
2.5		Brown/Orange Clayey Fine SAND (SC)										
5.0		Boring Termination Depth at 5.0 feet.										

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BORING NUMBER HA-6

CLIENT Alday-Howell Engineering, Inc.
PROJECT NAME Vineyard Village
PROJECT NUMBER M122-105-052
PROJECT LOCATION Okaloosa County, Florida
DATE STARTED 8/10/22 **COMPLETED** 8/10/22
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger Boring
DEPTH TO GROUNDWATER AT TIME OF DRILLING ---
LOGGED BY J. Governale **CHECKED BY** J. Vickers
ESTIMATED SEASONAL HIGH GWT ---
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Tan Silty Fine SAND (SM)	AU									
2.5		Tan Slightly Silty Fine SAND (SP-SM)										
5.0		Boring Termination Depth at 5.0 feet.										

MAGNUM ENGINEERING INC
GEOTECHNICAL ENGINEERING CONSULTANTS

DOUBLE RING INFILTROMETER TEST RESULTS

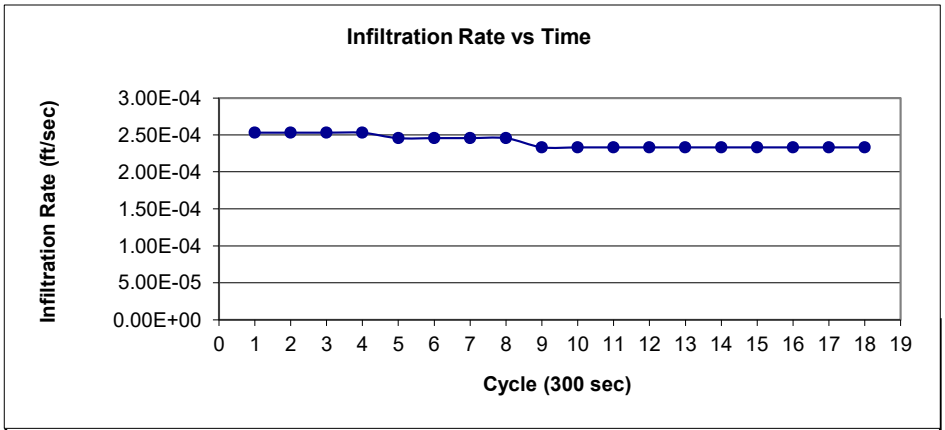
FIGURE # 3

MAGNUM ENGINEERING INC
GEOTECHNICAL ENGINEERING CONSULTANTS

Double-Ring Field Infiltration Test

Test Location:	DRI-1			
Project Name:	Vineyard Village			
Project Location:	Okaloosa County			
Test Depth:	>10.0	ft		
Depth to GWT:	8.5	ft		
Inner Ring Diameter:	12	in	0.3048	m
Outer Ring Diameter:	24	in	0.6096	m
Pre-Saturation	30	min		
Area Outer Ring:	3.1416	ft^2	0.00202683	m^2
Area Inner Ring:	0.7854	ft^2	0.00050671	m^2
Net Outer Ring Area:	2.3562	ft^2	0.00152013	m^2

	Inner Ring		
Cycle	ElapTime (sec)	Vol Used (in^3)	Infiltration Rate (ft/sec)
1	300	103	2.53E-04
2	300	103	2.53E-04
3	300	103	2.53E-04
4	300	103	2.53E-04
5	300	100	2.46E-04
6	300	100	2.46E-04
7	300	100	2.46E-04
8	300	100	2.46E-04
9	300	95	2.33E-04
10	300	95	2.33E-04
11	300	95	2.33E-04
12	300	95	2.33E-04
13	300	95	2.33E-04
14	300	95	2.33E-04
15	300	95	2.33E-04
16	300	95	2.33E-04
17	300	95	2.33E-04
18	300	95	2.33E-04
Results	Sustained Rate	98	2.40E-04



Infiltration Rate: **7.33E-03 cm/sec** **10.4 in/hr**