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January 30, 2023

Jake Wise, P.E.
Construction Engineering Group
2651 W. Eau Gallie Blvd. Suite A
Melbourne, FL 32935

Re: Palm Coast RV & Self Storage
502-526 Martin Road SE
Palm Bay, Florida
KSM Project #: 2300359-p

Dear Mr. Wise:

As requested, KSM Engineering & Testing has performed a subsurface investigation at the referenced site. Presentation of the data gathered during the investigation, together with our geotechnical related opinions, are included in this report.

Site Description:

Location & Physiography – The project site was located in Palm Bay, Florida. At the time of drilling, the site was found to be fairly flat. Surface elevation data available via Google Earth indicates that the land surface was approximately 28 to 32 feet NGVD across the site. Vegetation on the site consisted mostly of light surface ground cover vegetation and a few trees.

NRCS Surficial Soil Information – Mapping of this area of Florida that was performed by the USDA, Natural Resources Conservation Service (NRCS) indicates that the following USDA soil mapping units were identified:

- 7—Basinger sand, 0 to 2 percent slopes
- 17—EauGallie sand, 0 to 2 percent slopes.

For additional information, please refer to the attached soil survey map.

Project Description:

The following information is based, in part, on our review of the Preliminary Site plan sheet, which was provided to KSM by GHA Gallo Herbert Architects, dated December 12, 2022. If this document has been superseded, or if any changes have been made to this plan sheet, please contact KSM to submit the current plan sheets, so we can make any adjustments and revise this report, if and as necessary. Brief summaries of the developmental features shown on the plans are described below.

Building - It is our understanding that a four-story building is planned to be constructed on the site. Performing a subsurface investigation for this structure was not within the scope of this project.

Pavements – The site development will include the installation of pavement to provide vehicle parking, driving, and connection pathways into and around the property.

Stormwater Retention – A dry retention basin area is proposed to be installed in the northwestern quadrant of the site.

Grading – The provided documents did not include existing or proposed grading plan information. Given the topographic trends of the land surface indicated by the available information, as discussed herein above, it is expected that fill may be added to the site. For purposes of this evaluation, KSM has assumed that the rough graded pavement covered areas may lie up to approximately 2 feet above the existing land surface.

The scope of our study consisted of the following tasks:

1. Performed soil borings in the area of the locations indicated by the client.
2. Measured the groundwater level at each boring.
3. Performed an in-field “Usual Open Hole Test” experiment at the indicated testing location.
4. Collected soil samples necessary to estimate aquifer parameters.
5. Reviewed the soil samples and field soil boring logs (by a geotechnical engineer) in our laboratory and assigned analytical laboratory testing to selected samples.
6. Performed the assigned analytical laboratory tests on the selected soil samples.
7. Performed a review of the publicly available USDA Soil Survey information.
8. Evaluated the discovered subsurface conditions with respect to the proposed project and prepared recommendations delineating recommended estimated aquifer parameters and pavement design recommendations.

Site Investigation:

Subsurface Testing – KSM’s site investigation program consisted of performing the following exploration operations and field tests:

- One (1) Standard Penetration Test (SPT) boring, denoted as PB, which was terminated at an approximate depth of 20 feet below the existing ground surface. The boring was performed within the approximate limits of the footprint of the dry retention basin area.

- Three (3) Hand Auger (HA) borings with corresponding Static Cone Penetrometer (SCP) Soundings, which were terminated at an approximate depth of 6 feet below the existing ground surface. The borings were performed within the limits of the proposed pavement covered areas.

SPT Borings – The SPT borings were performed in general accordance with procedures described in ASTM D-1586.

HA Borings – The HA borings were performed using a bucket auger tool to advance the borehole and to return disturbed samples of the soils. The drilling was performed in general accordance with the procedures delineated in ASTM D1452.

SCP Soundings – Execution of a SCP sounding consists of pushing a thin steel shaft, with an attached 60˚-conical point, by hand through the soil. The capacity of this tool to measure the relative density of the soil is directly related to the weight that is applied on the shaft by the technician that operates the tool. The thrust required to push the cone tip is measured by an attached proving ring with a calibrated gauge. The value of the bearing pressure exerted by the cone point has been correlated with the relative soil density. The relationship of the SCP reading to the relative density is listed in the table below:

Static Cone Penetrometer	
Relative Density	**Static Penetrometer Reading**
Very Loose or Soft	<15
Loose	15-40
Medium Dense	40-70
Dense	>70

Soil Classification – The field soil boring logs and recovered soil samples were transported to KSM's office from the project site. Following the completion of the field exploration activities, visual and tactile examination of the soil samples was performed by a geotechnical engineer to identify the engineering classification of the soil samples that were obtained in the field exploration. The visual classification of the samples was performed in general accordance with the current United Soil Classification System (ASTM D 2487).

General Subsurface Soil Classification Summary – The following table outlines the general subsurface conditions that were encountered during our investigation. Refer to the boring logs and location map for specific information regarding our interpretation of the field boring logs.

Generalized Soil Profile	
Approximate Depth Below Grade (Feet)	**Discovered Subsurface Conditions**
0 to 4	Loose to medium-dense fine sand and fine sand with traces of roots
4 to 8	Medium-dense clayey and slightly clayey fine sand
8 to 20	Very loose to medium-dense slightly silty fine sand and slightly silty fine sand with traces of shell

Groundwater Surface Depths – Following the completion of each soil boring, the groundwater contained in the borehole was allowed to attain an equilibrium level, and the approximate depth to the surface of the groundwater was measured from existing ground surface. The measured depth was recorded in the field log. The depth to the surface of the groundwater was encountered at approximate depths ranging from 2.8 to 3.7 feet below existing grade. The variation of the depth to the surface of the groundwater is partly attributed to the variation of the land surface altitudes on the site. We anticipate that the water table will rise approximately 1.5 feet or less during the wet season in borings HA-1, HA-2, and HA-3.

The records of the soils encountered, the penetration resistances, and groundwater levels are documented on the attached boring logs.

Estimated Aquifer Parameters:

Factor of Safety – KSM has not applied a factor of safety to the estimated aquifer parameters within this report. The Engineer of Record is responsible for applying the appropriate factor(s) of safety to the estimated aquifer parameters contained within this report for use in their design. For any stratum where the estimated flow rate exceeds 10 inches per hour (20 feet per day), we recommend that a design flow rate equal to 10 in/hr (20 ft/day) is used.

Seasonal Groundwater Fluctuation – The following table indicates the recorded measurement taken from the existing grade to the encountered groundwater table for each test location along with our estimated depth normal wet season water table and normal dry season water table depths (below existing grade) for the test location. The measurements were taken after the borings were performed and the groundwater table was allowed to stabilize.

Estimated Normal Season Groundwater Table Fluctuation			
Test Location (See Location Plan)	Depth (feet,') Below Existing Grade		
	Measured Encountered Groundwater Table	Estimated Normal Wet Season Water Table	Estimated Normal Dry Season Water Table
PB-1	2.8'	1.3'	4.3'

In-Field Testing – At the test location, Usual Condition Test was performed in general conformance with the South Florida Water Management District described procedures for the 'Usual Open-Hole Test' method.

Estimated Aquifer Parameters – In-Field Testing		
Test Location (See Location Plan)	Approximate Test Depth (ft)	Estimated Hydraulic Conductivity (CFS/SF- Ft Head)
P-1	5'	3.0×10^{-4}

Laboratory Testing and Professional Judgement – Selected samples obtained from our site investigation were tested in our laboratory in general accordance with ASTM D2434, ASTM D1140-17 and ASTM C136.

Estimated Aquifer Parameters – Laboratory Testing & Professional Judgement							
Test Location	**Stratum Depth Range (ft)**	**Horizontal Saturated Flow Rate (in/hr)**	**Vertical Saturated Flow Rate (in/hr)**	**Cu**	**Cc**	**Fines Content (%)**	**Fineness Modulus**
P-1	0 – 3.3	13.6	11.6	0.60	0.76	4.7	0.715
	3.3 – 4.2	1 *	0.4	5.41	1.61	11.7	1.493
	4.2 – 8	3 *	2.3	3.01	1.11	5.0	1.631
	8 – 13	10 *	7 *	3.41	1.06	4.2	1.452
	13 – 20	1 *	0.5 *	1.66	0.94	11.6	0.38

*Estimation; based, in part, on our review of the retrieved samples and our interpretation of laboratory results and *SJWMD Special Publication SJ93-SP10, Correlation of Hydraulic Conductivity with Fraction by Weight Passing the U.S. No. 200 Sieve (Poorly Graded Fine Sands).*

Restrictive Stratum – Based on the results of our soil borings and laboratory testing, in boring P-1, we encountered a stratum which we estimate exhibits restrictive flow rates relative to the overlying stratum, and are described below:

- Deposits of gray clayey sand that were encountered at approximate depths of 3.3 to 4.2 feet below existing grade in the tested location.

- Deposits of gray sand, slightly silty with traces of shell that were encountered from an approximate depth of 13 feet below existing grade to the boring terminus at approximately 20 feet below existing grade.

Hydrologic Soil Group Classification – The hydrologic soil group classification was estimated based on our interpretation of the estimated aquifer parameters and guidance provided by the USDA National Engineering Handbook.

Estimated Aquifer Parameters – Hydrologic Soil Group Classification	
Test Location	**Estimated Hydrologic Soil Group**
P-1	A/D

Fillable Porosity – KSM estimates a fillable porosity of approximately 20%, can be used for the test location.

Drives and Parking Areas:

Pavement Opinions and Analysis : Limitations – We recommend that the proposed pavement section is designed for the anticipated loads and frequencies by an appropriate professional.

Pavement Opinions and Analysis: Subsurface Conditions, Site Preparation, Design Parameters and Minimum Section – Based on the subsurface conditions we believe that the site may be prepared to support a flexible pavement or rigid concrete pavement. Refer to the table below for the minimum pavement section. The minimum pavement design for standard duty asphalt should include the following:

- Clear the roadway area of any surface debris, including vegetation, roots, organic matter, and existing pavement. Stumps shall be removed entirely. The cleared areas should be graded level and proof rolled. Any soft yielding areas shall be excavated and replaced with clean compacted fill.

- Sufficient passes of the roller should be made during compaction operations to produce a density no less than 98 percent of its modified dry Proctor value (AASHTO T180) to a depth of two feet. In-place density tests should be performed at a frequency of once every 10,000 square feet or less, to confirm that the subgrade has been compacted to the recommended level. Additional fill shall consist of clean sand deposits containing less than 10% material passing the U.S. Standard No. 200 mesh sieve, which is placed in loose lifts not exceeding 12 inches and compacted to the above specified density.

- A minimum of 16 inches of separation should be maintained between the bottom of the base and the high seasonal groundwater table.

- Pavement surfaces should be sloped and designed to allow adequate drainage of surface water. Failure to achieve proper drainage may lead to saturation of the pavement subgrade and subsequent deterioration of the pavement. The implementation of periodic maintenance should slow the rate of deterioration over time.

- Where a concrete pavement section is used, concrete reinforcement should be designed to withstand the design traffic loads and saw cuts constructed for crack control.

Minimum Pavement Section			
Pavement Type	**Material**	**Layer Thickness (in)**	
		Standard Duty	**Heavy Duty**
Flexible	Florida DOT Asphalt Type 3	1.5	2.5
	Cemented Coquina Rock (LBR of 100)*-or-Limerock* Base Course	6	8
	Stabilized Subgrade (LBR of 40)*	12	12
Rigid	Portland Cement Concrete (4,000 psi)	5	7
	Stabilized Subgrade (LBR of 40)*	12	12

* Compacted to minimum 98 percent of its modified dry Proctor value (AASHTO T180)

Closure:

Recommendations and Opinions – The Designated Engineer of Record should attach this report to the Final Report that is part of the Permit.

The estimated aquifer parameters are based, in part, on our understanding of published peer reviewed resources and our interpretations and evaluations of the discoveries of our site investigation and lab results. If additional geotechnical parameters or recommendations are desired, please contact or office. Upon request KSM will provide a scope and fee for any requested additional services.

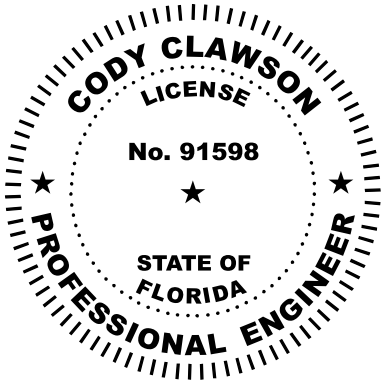
Standard of Care - This report has been prepared in accordance with generally accepted soil and foundation engineering practices based on the results of the test borings and the assumed loading conditions. The procedural standards noted in this report are in reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgement. No warranties, either expressed or implied, are intended or made. This report does not reflect any variations which may occur between the borings. If variations appear evident during the course of construction, it would be necessary to re-evaluate the recommendations of this project.

Limitations - Environmental conditions, wetland delineation, karst activity, water quality, and municipal requirements are not a part of this report.

We are pleased to have been of assistance to you in this phase of your project. When we may be of further service to you or should you have any questions, please feel free to contact the office.

Respectfully,

Robert T. Maxwell



This item has been electronically signed and sealed by Cody Clawson, P.E. FL Lic. 91598 on the date stated directly to the right using a digital signature.

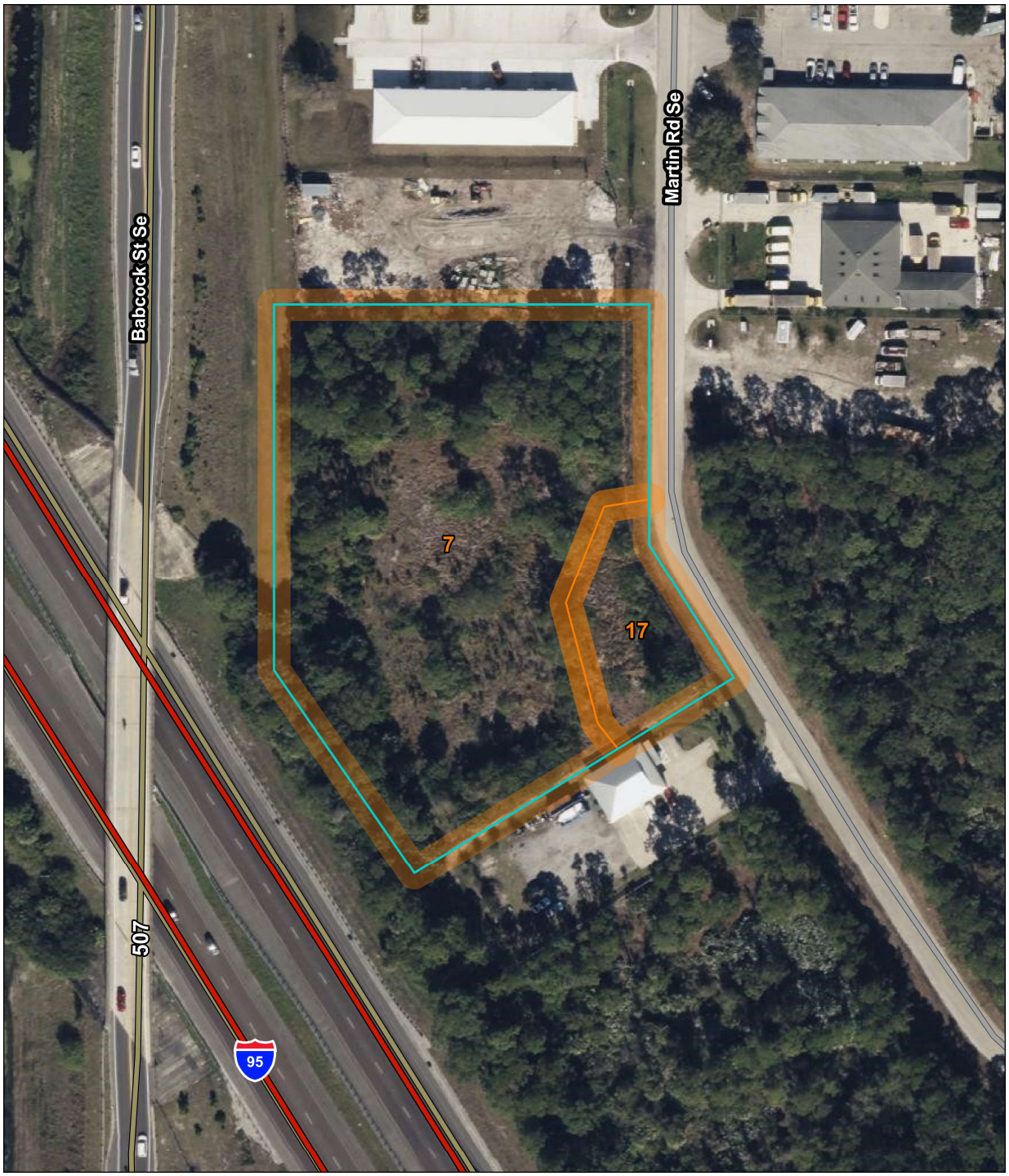
Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Digitally signed by Cody C Clawson
Date: 2023.02.01 12:11:54 -05'00'

Robert T. Maxwell, E.I.
Geotechnical Engineer
Florida E.I. No. 1100024249

Cody C. Clawson, P.E.
Geotechnical Engineer
Florida Lic. No. 91598

CCC/cv/RTM
Email to: jwise@cegengineering.com



USDA SOILS SURVEY

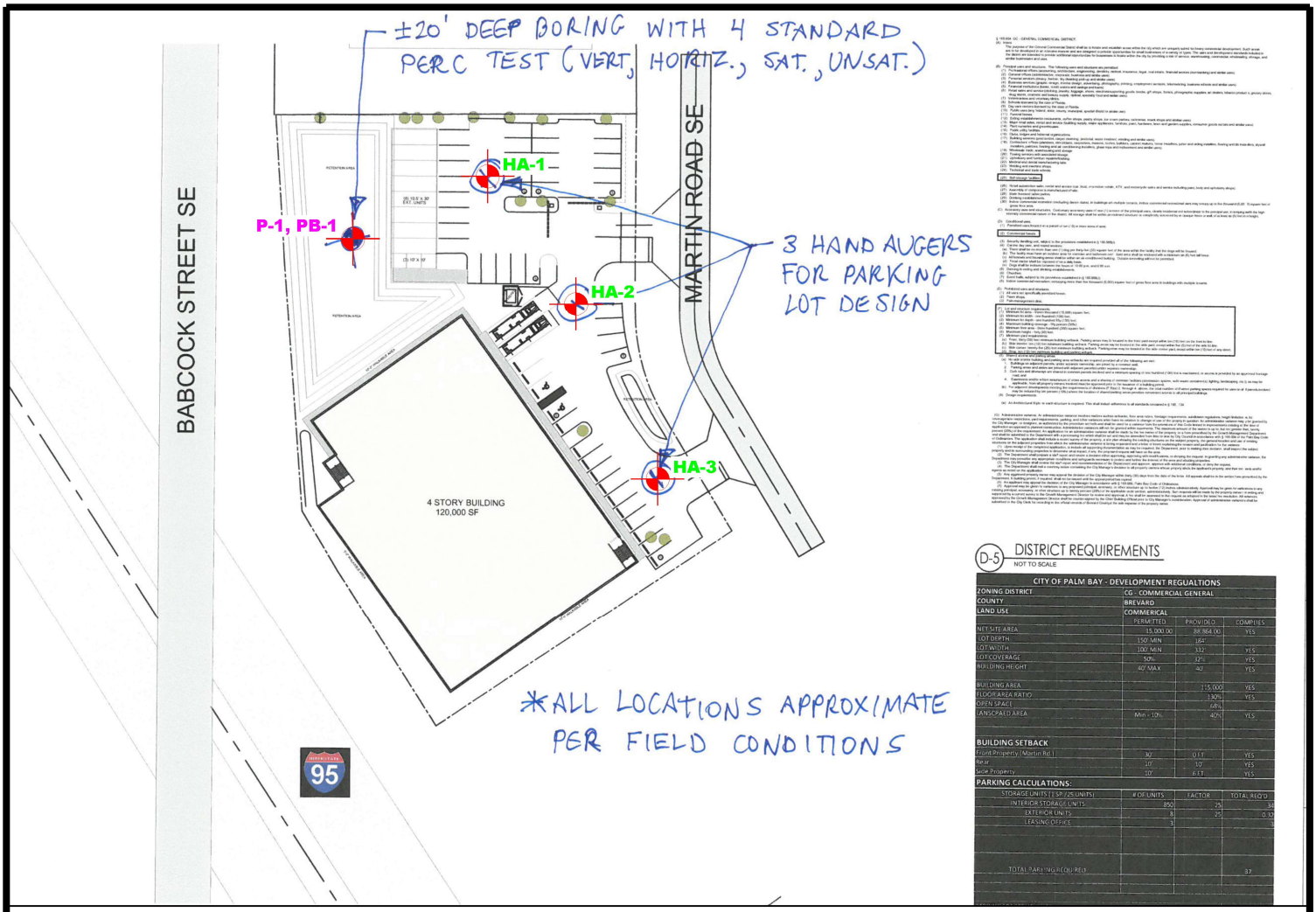
7—Basinger sand, 0 to 2 percent slopes
17—EauGallie sand, 0 to 2 percent slopes

PROJECT: Palm Coast RV & Self Storage, 502-526 Martin Road SE, Palm Bay, Florida

SHEET 2 OF 2
PERMIT #:
PROJECT #: 2300359-soils

KSM ENGINEERING AND TESTING

DRAWN BY: C.V.
DESIGNED BY: C.C.C.
DATE: 20230120
SCALE: NOT TO SCALE



D-5 DISTRICT REQUIREMENTS
NOT TO SCALE

CITY OF PALM BAY - DEVELOPMENT REGULATIONS			
ZONING DISTRICT	CG - COMMERCIAL GENERAL		
COUNTY	BREVARD		
LAND USE	COMMERICAL		
	PERMITTED	PROVIDED	COMPLIES
NET SITE AREA	15,000.00	86,864.00	YES
LOT DEPTH	150' MIN	164'	YES
LOT WIDTH	100' MIN	332'	YES
LOT COVERAGE	50%	12%	YES
BUILDING HEIGHT	40' MAX	40'	YES
BUILDING AREA		115,000	YES
FLOOR AREA RATIO		130%	YES
OPEN SPACE		68%	
LANSCPAED AREA	Min - 10%	40%	YES
BUILDING SETBACK			
Front Property: Martin Rd	30'	0 FT	YES
Rear	10'	10'	YES
Side Property	10'	6 FT	YES
PARKING CALCULATIONS:			
STORAGE UNITS (SP/25 UNITS)	# OF UNITS	FACTOR	TOTAL REQ'D
INTERIOR STORAGE UNITS	850	25	34
EXTERIOR UNITS	8	25	0.32
LEASING OFFICE	3		3
TOTAL PARKING REQUIRED			37

LOCATION OF SOIL TESTING

PROJECT: Palm Coast RV & Self Storage, 502-526 Martin Road SE, Palm Bay, Florida

SHEET 1 OF 2
PERMIT #:
PROJECT #: 2300359-p

KSM ENGINEERING AND TESTING

DRAWN BY: C.V.
DESIGNED BY: C.C.C.
DATE: 20230120
SCALE: NOT TO SCALE

KSM Engineering & Testing
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BORING NUMBER PB-1

CLIENT Construction Engineering Group
PROJECT NAME Palm Coast RV & Self Storage
PROJECT NUMBER 2300359-p
PROJECT LOCATION 502-526 Martin Road SE, Palm Bay, FL
DATE STARTED 1/18/23 **COMPLETED** 1/18/23
GROUND ELEVATION _____ **HOLE SIZE** inches
DRILLING CONTRACTOR _____
GROUND WATER LEVELS:
DRILLING METHOD Split Spoon Sample
▽ **AT TIME OF DRILLING** 2.8 ft
LOGGED BY PM/MH **CHECKED BY** CCC
AT END OF DRILLING ---
NOTES See Attached Location Plan
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)
0		Gray Sand with Traces of Roots	SS		1-2-2 (4)		
		Gray Slightly Clayey Sand	SS		2-4-7 (11)		
5		Brown Sand, Slightly Clayey	SS		4-7-7 (14)		
			SS		5-5-6 (11)		
		Gray Sand	SS		1-2-1 (3)		
10			SS		1-1-3 (4)		
		Gray Sand, Slightly Silty with Traces of Shell	SS		1-0-1 (1)		
15			SS		2-1-2 (3)		
			SS		2-3-5 (8)		
20			SS		3-1-1 (2)		

Bottom of borehole at 20.0 feet.

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER HA-1

CLIENT Construction Engineering Group
PROJECT NAME Palm Coast RV & Self Storage
PROJECT NUMBER 2300359-p
PROJECT LOCATION 502-526 Martin Road SE, Palm Bay, FL
DATE STARTED 1/18/23 **COMPLETED** 1/18/23
GROUND ELEVATION _____ **HOLE SIZE** inches
DRILLING CONTRACTOR _____
GROUND WATER LEVELS:
DRILLING METHOD _____
▽ **AT TIME OF DRILLING** 3.7 ft
LOGGED BY DP **CHECKED BY** CCC
AT END OF DRILLING ---
NOTES See Attached Location Plan
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		Brown Sand with Traces of Roots				31		
		Light Gray Sand				34		
						37		
		▽				38		
5		Brownish Gray Sand, Slightly Clayey				40		
						41		

Bottom of borehole at 6.0 feet.

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KSM Engineering & Testing
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Sebastian, FL 32978
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Fax: (772)-589-6469

BORING NUMBER HA-2

CLIENT Construction Engineering Group
PROJECT NAME Palm Coast RV & Self Storage
PROJECT NUMBER 2300359-p
PROJECT LOCATION 502-526 Martin Road SE, Palm Bay, FL
DATE STARTED 1/18/23 **COMPLETED** 1/18/23
GROUND ELEVATION _____ **HOLE SIZE** inches
DRILLING CONTRACTOR _____
GROUND WATER LEVELS:
DRILLING METHOD _____
▽ **AT TIME OF DRILLING** 3.5 ft
LOGGED BY DP **CHECKED BY** CCC
AT END OF DRILLING ---
NOTES See Attached Location Plan
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		Brown Sand with Traces of Roots				37		
						34		
		▽				38		
						41		
5		Brownish Gray Sand, Slightly Clayey				43		
						44		

Bottom of borehole at 6.0 feet.

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KSM Engineering & Testing
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Sebastian, FL 32978
Tel: (772)-589-0712
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BORING NUMBER HA-3

CLIENT Construction Engineering Group
PROJECT NAME Palm Coast RV & Self Storage
PROJECT NUMBER 2300359-p
PROJECT LOCATION 502-526 Martin Road SE, Palm Bay, FL
DATE STARTED 1/18/23 **COMPLETED** 1/18/23
GROUND ELEVATION _____ **HOLE SIZE** inches
DRILLING CONTRACTOR _____
GROUND WATER LEVELS:
DRILLING METHOD _____
▽ **AT TIME OF DRILLING** 3.5 ft
LOGGED BY DP **CHECKED BY** CCC
AT END OF DRILLING ---
NOTES See Attached Location Plan
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		Gray Sand with Traces of Roots				30		
						33		
		▽				35		
						34		
5		Brownish Gray Sand, Slightly Clayey				38		
						40		

Bottom of borehole at 6.0 feet.

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