

**BOARD OF COUNTY COMMISSIONERS
PALM BEACH COUNTY, FLORIDA
ENGINEERING & PUBLIC WORKS
ROADWAY PRODUCTION DIVISION**

Project Name: **Hagen Ranch Rd, Smith Farm Blvd to Lantana Rd**

Project Number: **2019603**

ADDENDUM NO. 1

Date of Issuance: **December 13, 2024**

BID DUE DATE HAS BEEN CHANGED TO DECEMBER 18, 2024

SPECIFICATIONS:

Delete	Insert	Add
A	A-A	
C	C-A	
		SP-37 thru SP-43
		GP-2.1
GP-87 & GP-88	GP-87A & GP-88A	
P-1 thru P-6	P-1A thru P-6A	

PLANS:

Delete	Insert	Add
		<u>Signing and Pavement Marking Plans:</u> Pages S-1 thru S-7 (<i>dated 8/28/24</i>)
<u>Roadway Plans:</u> Pages 1,3,4, 19, 23,27, 28, 31 (<i>dated 8/28/24</i>)	<u>Roadway Plans:</u> Pages 1,3,4, 19,23,27, 28, 31 (<i>Rev. dated 12/24</i>)	

For Information Only: Geotechnical Report added for information only.

It is required that **ADDENDUM NO. 1** be acknowledged in the space provided on the **PROPOSAL FORM**.

APPROVED BY:



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ADVERTISEMENT FOR BID

Sealed Bids will be received by the Board of County Commissioners, Palm Beach County, Florida, in the Office of Palm Beach County Engineering & Public Works Department, Roadway Production Division, located at 2300 North Jog Road, Third Floor Room 3W-33, West Palm Beach, Florida, 33411-2745, up to 2:00 P.M., local time, and opened in the Third Floor Conference Room (3W-12) on **Wednesday, December 18, 2024**, for furnishing all Materials, labor, Equipment and supplies necessary for the Construction of:

HAGEN RANCH RD, SMITH FARM BLVD TO LANTANA RD PALM BEACH COUNTY PROJECT NO. 2019603

All conditions and requirements for Bid submission, consideration, and award are contained in the Contract Documents, which are posted on the following Palm Beach County web site:

<https://pbcvssp.pbc.gov/vssprd/Advantage4>

To review the Contract Documents for this project, go to the above URL and click on the project hyperlink. Contractors may then download and print the Contract Documents (Plans, Specifications, Excel Proposal Forms, check list “with required forms” and any other related documents).

Hard copy documents will be available at the Department for a non-refundable service fee of **\$50**. The Contractor shall contact Palm Beach County Roadway Production Division at (561) 684-4150 in advance to arrange for hard copies.

All Bids shall be submitted in accordance with the Bid Documents, including but not limited to the General Provision Section 2 and accompanied by the documentation referenced therein.

The NON-MANDATORY Pre-Bid Meeting will be held on Thursday, December 5, 2024 at 2:00 P.M., in the Third Floor Main Conference Room (3W-12) in the Palm Beach County Building at 2300 North Jog Road, West Palm Beach, Florida. *Webex Option* – <https://pbc.gov.webex.com/meet/Eng-RoadwayBids>. Attendance at this pre-bid meeting is not mandatory but is highly recommended and strongly encouraged. To the extent you are unable to attend the pre-bid meeting, you may request and obtain an audio recording of the meeting by contacting Palm Beach County Roadway Production Division at (561) 684-4150.

The Board of County Commissioners reserves the right to reject any or all Bids. By order of the Board of County Commissioners, Palm Beach County, Florida.

ATTEST:
JOSEPH ABRUZZO, CLERK OF THE CIRCUIT COURT
& COMPTROLLER

PALM BEACH COUNTY, a political
subdivision of the State of Florida, by and
through its Board of County Commissioners

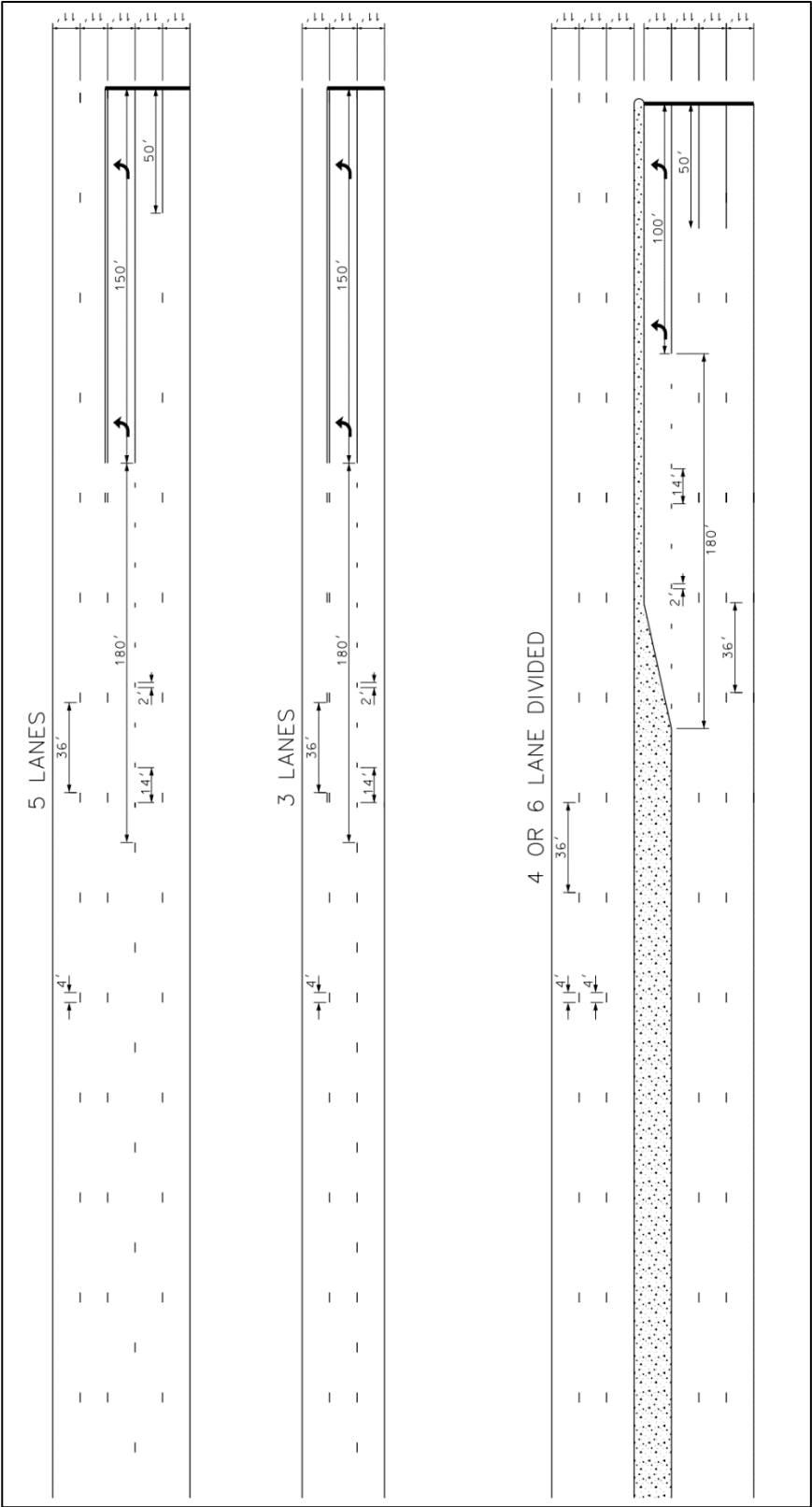
DAVID RICKS, P.E., COUNTY ENGINEER

BY: Maria Sachs, Mayor

PUBLISH: PALM BEACH POST
SUNDAY: NOVEMBER 17, 2024
SUNDAY: NOVEMBER 24, 2024

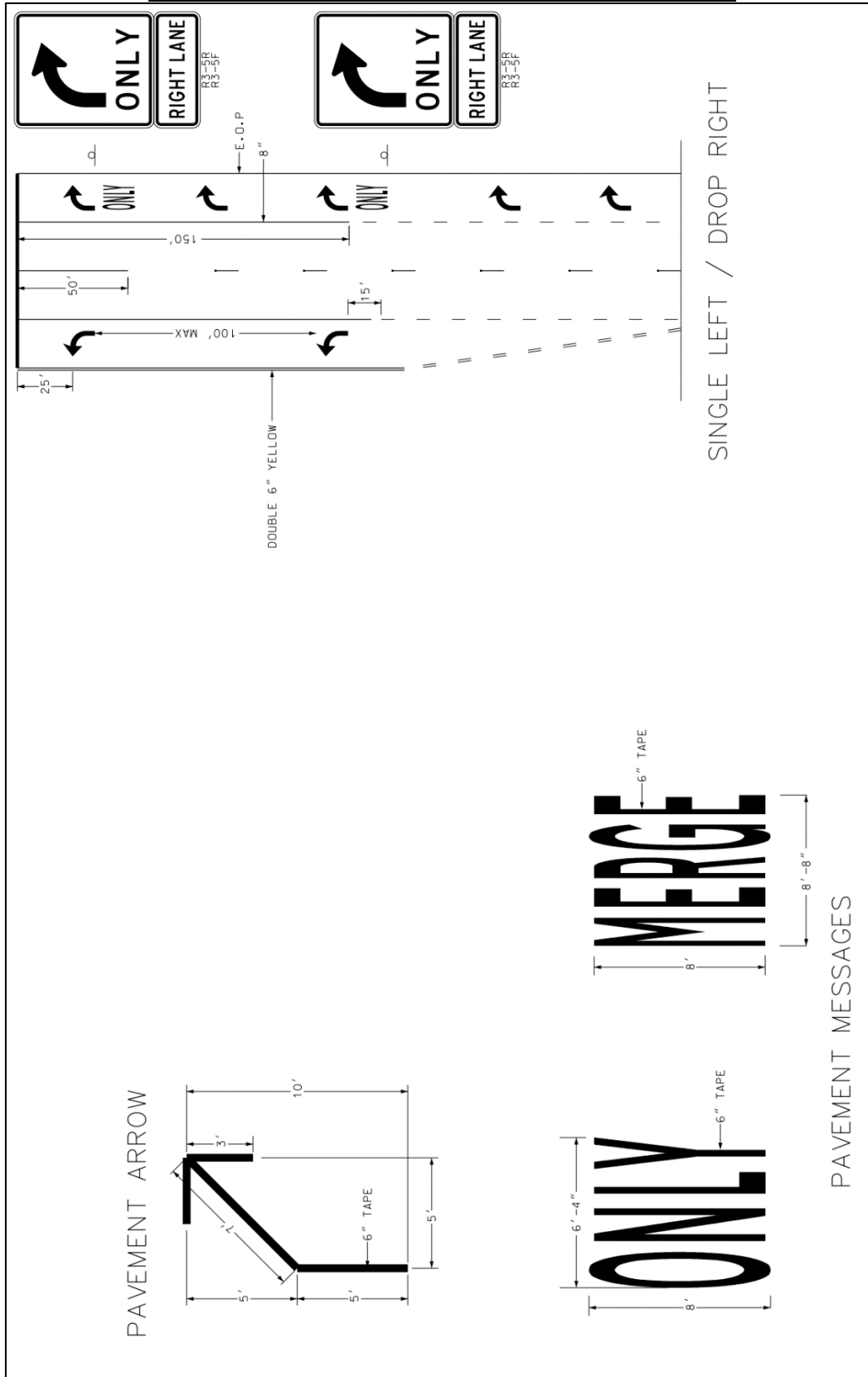
SPECIAL PROVISIONS

Temporary Pavement Markings for Three or More Lanes



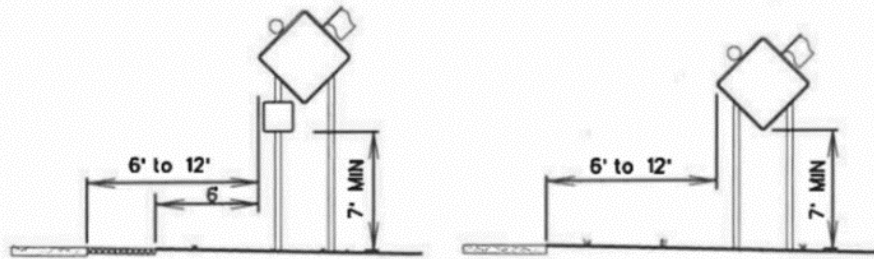
SPECIAL PROVISIONS

Temporary MERGE or ONLY Pavement Markings



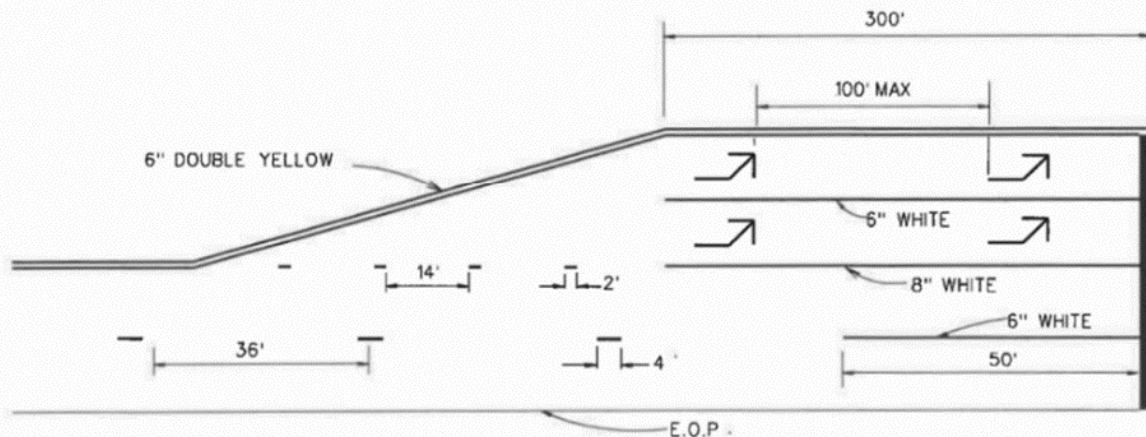
SPECIAL PROVISIONS

Signing for Long Term Stationary Projects



- 1.) If a separator is to be signed it shall be a minimum of 6 feet wide. The signs shall be erected in such a way that they also conform with the 7 foot minimum.
- 2.) Other types of operation may be able to use the standard tri-pod or FDOT approved portable traffic control device as long as there is a minimum of 1 foot from the bottom of the sign to the ground.

DUAL LEFTS



SPECIAL PROVISIONS

RESPONSE TO CONTRACTORS REQUESTS FOR INFORMATION

Date, Time: Wednesday, December 11, 2024 9:30 AM

Company: R&D Paving

Contact email: stevec@randdpaving.com

QUESTION: ITEM # 20 REMOVE EX. INLET & 18" RCP (INCLUDING ROAD RESTORATION). Would it be acceptable to grout the existing 18" RCP from Inlet E-30 to E 30A to avoid the additional cost of road restoration plus the disturbance of the traffic flow?

RESPONSE: No. The existing drainage inlet and 18" RCP shall be removed in accordance with the construction plan.

QUESTION: ITEM # 26 TRAFFIC CONTROL OFFICER (NON MOT). In the past this item has been paid for by the HR. If we are to be paid by ED how many hours would it be for ED?

RESPONSE: See revised P-Pages.

QUESTION: ITEM # 27 CHANGEABLE (VARIABLE MESSAGE) SIGN (NON MOT). In the past this item has been paid for by ED. If we are to be paid by HR how many hours can we anticipate to be paid in one workday?

RESPONSE: See revised P-Pages.

Date, Time: Wednesday, December 11, 2024 8:41 AM

Company: Johnson-Davis Inc.

Contact email: cjohnson@johnsondavis.com

QUESTION: Item 20, Remove 18" RCP & Inlet – can we grout the 18" RCP instead of removing it, why dig across the road? Why not utilize the pipe and extend the run and put a new inlet in the new curb for additional drainage on the east side of the road?

RESPONSE: The existing drainage inlet and 18" RCP shall be removed in accordance with the construction plans.

Date, Time: Monday, December 9, 2024 3:28 PM

Company: Ranger Construction Industries, Inc.

Contact email: andrew.mcmurray@rangerconstruction.com

QUESTION: Confirming the 3% of the 20% SBE goal is to be MBE?

RESPONSE: Yes.

SPECIAL PROVISIONS

RESPONSE TO CONTRACTORS REQUESTS FOR INFORMATION

QUESTION: Confirming temporary striping is to be foil back tape and to be incidental to MOT item?

RESPONSE: Yes.

QUESTION: Are striping plans going to be provided for reference?

RESPONSE: Yes. See Signing and Pavement Marking Plan in this addendum.

QUESTION: Confirming all stabilization is compacted subgrade only?

RESPONSE: A note has been added to sheet 4 stating, "Optional Base Group 13 includes 12" Compacted Subgrade per FDOT standards." See revised plan and P-Pages in this addendum.

QUESTION: Is there boring reports available? If so, please provide.

RESPONSE: See the Geotechnical Engineering Report in this addendum.

Date, Time: Friday, December 6, 2024 9:32 AM

Company: Ranger Construction Industries, Inc.

Contact email: andrew.mcmurray@rangerconstruction.com

QUESTION: This is a 6' high galvanized chain link fence using the Old School District code. Are we to match the old code or the new codes?

RESPONSE: Please match the existing 6' high galvanized fence.

QUESTION: The 4' wide gate at the sidewalk. Is this going to match the existing standard chain link gate or will this gate require panic hardware?

RESPONSE: The existing 4' wide pedestrian gate will be replaced with 6' wide gate. See revised plan and P-Pages.

QUESTION: The 14' LWDD vehicle access gate with the chain link fence panel. The LWDD gate is usually supplied and installed by the LWDD and then we supply and install the chain link fence panel along with the fence. Just confirming that this is the case here?

RESPONSE: The contractor will replace the access gate and chain link fence in accordance with the plans.

Date, Time: Thursday, November 21, 2024 11:09 AM

Company: Rosso Site Development, Inc.

Contact email: Joe3@rossositedevelopment.com

SPECIAL PROVISIONS

RESPONSE TO CONTRACTORS REQUESTS FOR INFORMATION

QUESTION: Plan Sheet 5 Note C states compacted subgrade. Bid item 6 is for a stabilized subgrade. Which portion of work is the stabilized subgrade used in?

RESPONSE: A note has been added to sheet 4 stating, "Optional Base Group 13 includes 12" Compacted Subgrade per FDOT standards." See revised plan and P-Pages in this addendum.

QUESTION: Sta. 157+06, 31.5' LT. Whose responsibility is it to relocate the school zone flasher?

RESPONSE: The school zone flasher will be relocated to the back of sidewalk by PBC Traffic Division. The contractor should give at least 3 work days' notice and schedule the relocation with PBC Traffic Division.

QUESTION: Pay Item 22 4' Wide Pedestrian Gate. The sidewalk that goes through this gate is 6' wide ped gate instead?

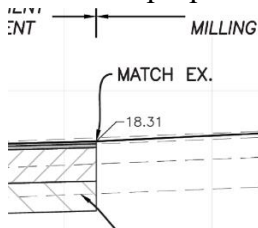
RESPONSE: The existing 4' wide pedestrian gate will be replaced with 6' wide gate. See revised plan and P-Pages.

Date, Time: Thursday, November 21, 2024 7:41 AM

Company: Rosso Site Development, Inc.

Contact email: Joe3@rossositedevelopment.com

QUESTION: Please confirm there is no variable depth milling or overbuild required to achieve proposed grades. At multiple cross sections a note status "match existing", but the existing line doesn't match the proposed line for widening. I have copied station 137+50 as an example.



RESPONSE: Variable depth milling or overbuild are not required. See revised plan in this addendum.

QUESTION: Plan Sheet 5, Note 4. The note states "compaction of base material". Is this existing base material, or are we to install new base? If we are to install new base can a sidewalk section showing subgrade and base be provided?

SPECIAL PROVISIONS

RESPONSE TO CONTRACTORS REQUESTS FOR INFORMATION

RESPONSE: No, new base material is not anticipated. The existing asphalt wearing surface shall be removed at the areas specified on the construction plans and the existing base material shall remain in place. Note that the exposed base material will need to be reconditioned, compacted, and sloped towards the curb or adjusted/cut as necessary per the typical section. Additional pavement thickness may be used to achieve the specified cross slope.

QUESTION: Since this project is directly in front of a school is it safe to assume this project will be done over the summer break?

RESPONSE: The intent is for the bulk of construction to occur during summer break.

GENERAL PROVISIONS

ADD THE FOLLOWING DEFINITION:

Substantial Completion - The point at which the project is complete such that it can be safely and effectively used by the public without further delays, disruption, or other impediments. For conventional bridge and highway work, the point at which bridge deck, parapet, pavement structure, shoulder, drainage, sidewalk, major demolition, roadway obliteration, permanent signing and markings, traffic barrier, safety appurtenance, utility, and lighting work is complete.

END OF SECTION

GENERAL PROVISIONS

- a. The Department reserves the right to remove any unhealthy, substandard, damaged, or dead plant material with prior notification to the Contractor, however, the Contractor shall replace such trees as per these specifications.
2. Fallen or leaning trees shall be removed (if damaged or otherwise substandard) or uprighted/restaked (if apparently healthy and meeting Florida Grade No. 1).
 - a. Those trees requiring removal shall be removed within two (2) working days of written notification by the Department. Planting holes of removed trees shall be immediately filled with soil to finish grade level.
 - b. The Department, without prior notification to the Contractor, reserves the right to remove, reposition, any fallen or leaning tree encroaching into a vehicular travel lane or creating any other situation affecting public health, safety, welfare.
3. Plant material showing clear evidence of being damaged or knocked down by vehicular accidents will be removed by the Department and replaced by the Contractor on a unit cost basis within thirty (30) calendar days after the written notification occurring at quarterly inspections.
4. The Contractor shall notify the Department by written fax of each successfully completed plant material removal and/or replacement and each shall be identified by station number location shown on the planting plans.
5. All replacement plant material shall become guaranteed for a minimum of twelve (12) months from the date of their initial acceptance for replacement installation, and follow the same maintenance/guarantee period requirements specified herein for originally planted trees.

C Final Acceptance:

1. Final Acceptance shall follow General Provision 5-10.2.
2. Notwithstanding the above, the Department reserves the right to accelerate the date of any final acceptance (thereby ending the maintenance/guarantee period) when the Department deems such action is in the Department's best interest.
3. Earth berm rings utilized to retain water within the saucer area of each tree (located at the perimeter of the 6'-wide planting hole) must be maintained throughout the entire guarantee period, but are to be knocked down to level grade just before the

GENERAL PROVISIONS

entire guarantee period, but are to be knocked down to level grade just before the semi-final inspection for each tree. To accommodate mowing patterns, the previously circular mulched area for each tree shall be reshaped by the Contractor into an oblong eye-shaped area running lengthwise down the median 8' wide x 16' long as per project details. The grassed areas affected by the reshaped mulched areas shall be treated with an herbicide as per manufacturer's specifications for weed-removal before applying mulch. A 3" layer of mulch shall be applied by the Contractor to the entire eye-shaped area before final acceptance. The mulch area of trees that are clustered in tight groupings may be merged to form one mulch bed if approved in writing by the Department.

585-2.00 PRODUCTS

585- 2.01 Landscape Maintenance Materials:

- A. Water: Use water free of elements toxic to plant and/or animal life. Contractor shall Provide (within the unit cost for each tree) labor and equipment necessary to distribute Water as required for all installed materials using hand-watering methods. Existing or

PROPOSAL FORM

(COMPANY NAME)

(COMPANY ADDRESS)

(COMPANY CITY & STATE)

(COMPANY ZIP CODE)

CONTACT NAME _____

PHONE NUMBER _____

FACSIMILE NUMBER _____

EMAIL ADDRESS _____

FEDERAL TAX I.D. #

DATE SUBMITTED

FOR THE CONSTRUCTION OF: **HAGEN RANCH RD, SMITH FARM BLVD TO**
LANTANA RD
PALM BEACH COUNTY PROJECT NO. 2019603

TO THE BOARD OF COUNTY COMMISSIONERS OF
PALM BEACH COUNTY, FLORIDA:

We, the undersigned (Contractor), hereby declare that no person or persons, firm or corporation, other than the undersigned, are interested in this Proposal as principals, and that this Proposal is made without collusion with any person, firm, or corporation, and that we are not on the Scrutinized Companies List as stated on page SC-1, and we have carefully and to our full satisfaction examined the Contract Documents, and that we have made a full examination of the location of the proposed Work and the source of supply of Materials, and we hereby agree to furnish and pay for all necessary labor, Equipment, Materials and services, fully understanding that the quantities shown herein are approximate only and that we will fully complete all Work in accordance with the Contract Documents and the requirements under them of the Engineer, within the time limit specified in this Proposal for the following unit prices, to wit:

PROPOSAL FORM

BID PROPOSAL HAGEN RANCH RD, SMITH FARM BLVD TO LANTANA RD CONTRACT PBC PROJECT #2019603						
#	FDOT ITEM NUMBER	ITEM DESCRIPTION	QTY	UNITS	UNIT PRICE	AMOUNT
ROADWAY ITEMS						
1	0101 1	Mobilization	1	LS		
2	0102 1	Maintenance of Traffic (including Pedestrian MOT)	1	LS		
3	0110 1 1	Clearing and Grubbing	1	LS		
4	0120 1	Regular Excavation	1,686	CY		
5	0120 6	Embankment (Compacted in Place)	62	CY		
6	0285713	Optional Base Group 13	3,234	SY		
7	0327 70 1	Mill Existing Asphalt Pavement (1" Avg. Depth)	16,618	SY		
8	0339 1	Asphalt Sidewalk (1-1/2" Thick)	31.10	TN		
9	0334 1 13	Superpave Asphalt Concrete (1.5") (Traffic Level C)	226.36	TN		
10	0337 7 80	Asph Concrete Friction Course (1.0") (FC-9.5) Rubber	1,064.88	TN		
11	0425 1369	Adjust Inlet Type P-6 Curb Inlet	2	EA		
12	0425 5	Adjust Manhole	4	EA		
13	0425 6	Adjust Valve Box	2	EA		
14	0520 1 10	Concrete Curb & Gutter (Type F)	1,765	LF		
15	0522 1	Concrete Sidewalk (4' Thick)	1,087	SY		
16	0522 2	Concrete Sidewalk (6" Thick)	123	SY		
17	0570 1 2	Sodding	36	SY		
18	N/A	Variable Height Sidewalk Curb (0-9") at Back of Walk	663	LF		
19	N/A	Remove Ex. Inlet & 18" RCP (including road restoration)	1	EA		
20	0550 10220	6' Height Chain Link Fence	65	LF		
21	0550 60211	6' Wide Pedestrian Gate (6' Height Chain Link)	1	EA		
22	N/A	6' Height x 50' Wide Chain Link Double Swing Vehicle Gate	1	EA		
23	N/A	LWDD Vehicle Access Gate with Chain Link Panel	1	EA		
SUBTOTAL (ROADWAY)						
CONTINGENCY ITEMS						
24	0121 70	Flowable Fill	50	CY		
25	0102 14	Traffic Control Officer (Non MOT)	20	HR		
26	0102 74 7	Changeable (Variable Message) Sign (Non MOT)	10	ED		
27	N/A	Storm Sewer Cleaning (Exist) (24" or Less) (See SP's)	500	LF		
28	N/A	Storm Sewer Cleaning (Exist) (> 24" to 48") (See SP's)	500	LF		
29	N/A	Storm Sewer Pumping (Exist) (24" or Less) (See SP's)	500	LF		
30	N/A	Storm Sewer Pumping (Exist) (> 24" to 48") (See SP's)	500	LF		
31	N/A	Temporary Fence	100	LF		
32	N/A	Protect and Support Conduit	200	LF		
SUBTOTAL (CONTINGENCY)						
TOTAL BID						

PROPOSAL FORM

THE COUNTY DOES NOT GUARANTEE THE ACCURACY OF THE FORMULAS AND EXTENSIONS USED IN THIS SPREADSHEET.

THE ITEMS AND QUANTITIES ABOVE, SHALL GOVERN OVER THE PLANS.

PAY ITEM FOOTNOTES IN CONSTRUCTION PLANS SHALL ALSO BE INCLUDED IN ITEM UNIT PRICE.

Note #	FDOT Item #	PAY ITEM FOOTNOTES
1	All	All items shall include cost to furnish and install unless otherwise noted.
2	All	FDOT Item numbers are for information only.
3	0101 1	NPDES erosion control measures are to be included in the mobilization pay item.
4	0102 1	All costs for Maintenance of Traffic (MOT) and mobilization shall be considered incidental to, and shall be included in, unit prices for the pay items.
5	0110 1 1	Removal and disposal of pavement, concrete, curb and gutter, trees, signs, irrigation, etc. Within the limits of the project are to be included in the clearing & grubbing pay item.
6	0425 1369	Excavation and backfill for structures including cost of any select bedding material that may be necessary for satisfactory installation as directed by palm beach county is considered incidental to the cost of the structures.
7	0520 1 10	The cost of breaking into existing structures is incidental to the cost of pipe.
8	0520 1 10	Includes connection to existing drainage line.
9	0520 1 10	Curb & gutter pay items include base and subgrade for the curb pad.
10	0522 1, 0522 2	Concrete sidewalk item includes stabilized subgrade.
11	0570 1 2	Sodding shall be in accordance with section 575 of the general provisions of this specification and shall include the costs for fertilizer and water until final acceptance.
12	0160 4, 0285713, 0327 70 1, 0339 1, 0334 1 13, 0337 7 80	Sawcut & butt joint cost shall be incidental to asphalt pay items.
13	161 4, 0285713, 0327 70 1, 0339 1, 0334 1 13, 0337 7 80	Prime and tack coats are considered incidental to asphalt construction.
14	0120 1, 0120 6	Berm construction, swale construction, re-grading of roadways, driveways, canal sections and all other rough & finish earthwork shall be considered incidental to excavation and embankment pay items.
15	All	All items shall include cost to furnish and install unless otherwise noted.
16	All	FDOT Item numbers are for use in determining eligibility for price adjustment per General Provision 9-2 only.
17	All	Contingency items may be increased, decreased or deleted as directed by the engineer.

PROPOSAL FORM

PROJECT NO. **2019603**

TOTAL BID

\$

IN FIGURES

The Contractor acknowledges that Addenda _____ thru _____ have been received and that related costs are reflected in the submitted bid. Contractor has committed to _____% ***SBE participation and _____% M/WBE participation (African American and/or Hispanic)*** as set forth on the Schedule 1 and Schedule 2 that are completed and submitted by Contractor. Contractor shall comply with said goal if awarded the Contract.

The Contractor hereby certifies and agrees that the following information is correct: In preparing its response to the Solicitation, the Contractor has considered all proposals submitted from qualified, potential Subcontractors and suppliers, and has not engaged in "discrimination" as defined in the County's Commercial Nondiscrimination Policy as set forth in Resolution 2017-1770 as amended, to wit: discrimination in the solicitation, selection or commercial treatment of any Subcontractor, vendor, supplier or commercial customer on the basis of race, color, national origin, religion, ancestry, sex, age, marital status, familial status, sexual orientation, gender identity or expression, disability, or genetic information, or on the basis of any otherwise unlawful use of characteristics regarding the vendor's, supplier's or commercial customer's employees or owners; provided that nothing in this policy shall be construed to prohibit or limit otherwise lawful efforts to remedy the effects of discrimination that have occurred or are occurring in the County's relevant marketplace of Palm Beach County. Without limiting the foregoing, "discrimination" also includes retaliating against any person or other entity for reporting any incident of "discrimination." Without limiting any other provision of the solicitation, it is understood and agreed that, if this certification is false, such false certification will constitute grounds for the County to reject the proposal submitted by the Contractor for this Solicitation, and to terminate any contract awarded based on the response. As part of its proposal, the Contractor shall provide to the County a list of all instances within the immediate past four (4) years where there has been a final adjudicated determination in a legal or administrative proceeding in the State of Florida that the Contractor discriminated against its Subcontractors, vendors, suppliers or commercial customers, and a description of the status or resolution of that complaint, including any remedial action taken. As a condition of submitting a proposal to the County, the Contractor agrees to comply with the County's Commercial Nondiscrimination Policy as described in Resolution 2017-1770, as amended.

The Contractor further agrees to perform all force account Work, as provided for in the General Provisions, and to execute the Contract and return to the County, along with a Contract Bond and Certificate of Insurance within fourteen (14) Working Days of the date of the Letter of Intent to Award and to commence Work with adequate forces and Equipment within fourteen (14) Calendar Days of the date set forth in the Notice to Proceed and to fully complete all contracted Work under

PROPOSAL FORM

the same in accordance with Contract Documents within the Contract Time.

THE TIMELY COMPLETION OF THIS PROJECT IS CRITICAL TO THE HEALTH, SAFETY AND WELFARE OF THE TRAVELING PUBLIC. It is the desire of Palm Beach County to expedite the construction and opening to traffic of the project. The Contractor shall be required to work such hours, weekends and/or Holidays to meet the required Contract schedules.

The Contractor shall complete in full all Work under this Contract within not more than one hundred and sixty days (160) Calendar Days (Contract Time). It is further agreed that should the Contractor fail to complete all Work under this Contract within the Contract Time; then, due to the criticalness of the timely completion of this project, liquidated damages for failure to meet these provisions shall be in accordance with Section 8 of the General Provisions.

The Contractor further agrees to furnish a sufficient and satisfactory Bond, on the form herein provided, in the sum of not less than 100% of the Contract price of the Work as indicated by the approximate quantities shown herein.

The Contractor further agrees to bear the full cost of maintaining all Work until the final acceptance, as provided in the Contract Documents.

Accompanying this Proposal is a Proposal Guaranty (Bid Bond) made payable to Palm Beach County, a Political Subdivision of the State of Florida, in the sum of 5% of amount Bid which is to be forfeited as liquidated damages if, in case this Proposal is accepted, the undersigned should fail to execute the attached Contract under the conditions of this Proposal. Otherwise, the Bid Bond is to be returned to the Contractor upon the delivery of a satisfactory Contract Bond.

Company Name: _____ Authorized Officer: _____
(Print)

Address: _____ Signature: _____

PROPOSAL FORM

CONTRACTOR CERTIFICATION

PALM BEACH COUNTY

ENGINEERING AND PUBLIC WORKS DEPARTMENT

NPDES GENERAL PERMIT FOR STORM WATER DISCHARGES

FROM

ROADWAY CONSTRUCTION SITES

HAGEN RANCH RD, SMITH FARM BLVD TO LANTANA RD

PALM BEACH COUNTY PROJECT NO. 2019603

“I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.”

Name of Contracting Firm: _____

By: _____ Date: _____

Name and Title: _____

Address or P.O. Box: _____

City State Zip Code

Telephone: _____
Area Code Number



November 20, 2020

Keshavarz & Associates

711 North Dixie Highway, Suite 201
West Palm Beach, FL 33401

Attn: Mr. Randy Wertepny, P.E.

Phone: 561-689-8600

Email: randy@keshavarz.com

**RE: Geotechnical Engineering Services Report
Hagen Ranch Road from Smith Farm Boulevard to Lantana Road
Roadway Soil Survey
Palm Beach County, Florida
RADISE Project No: 200923
Palm Beach County Project No.: 2019603**

Dear Mr. Wertepny,

RADISE International, L.C. (RADISE) is pleased to submit this Geotechnical Engineering Services Report for the above referenced project. The services were performed in general accordance with our scope of work dated July 12, 2020.

We appreciate the opportunity to be of service to Keshavarz & Associates and Palm Beach County on this project. Should you have any questions regarding the report, or if we can be of further assistance as this project develops, please contact us at (561) 841-0103.

Sincerely,

RADISE International, LC

Florida Certificate of Authorization No.8901

Akash Bissoon, P.E.

Senior Project Engineer

Florida Registration No. 74582

Andrew Nixon, State of Florida, Professional Engineer, License No. 71458. This document has been digitally signed and sealed by Andrew Nixon, P.E. on the date indicated here.

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

Andrew Nixon, P.E.

Operations Manager

Florida Registration No. 71458



561.841.0103



4152 W. Blue Heron Blvd. Suite 1114,
Riviera Beach, FL 33404



www.RADISE.com

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ATTACHMENTS

Sheet 1: Vicinity Map
Sheets 2A & 2B: Boring Location Plan
Sheets 3A to 3D: Roadway Soil Profiles
Sheet 4: Roadway Soil Survey
Sheets 5A & 5B: Pavement Core and Base Photographs
Table A-1: Summary of Laboratory Test Results
Grain Size Distributions
Limerock Bearing Ratio Report
Summary of Exfiltration Test Results

1.0 INTRODUCTION

This report has been prepared to aid in the evaluation and design of the proposed roadway improvements for the Hagen Ranch Road from Smith Farm Boulevard to Lantana Road Project located in Palm Beach County, Florida. This report includes the results of the geotechnical field exploration and testing program, subsurface groundwater information, visual classification, construction considerations and other site-specific geotechnical information that may be of a value to this project.

The information presented in this report are based upon our interpretation of the subsurface information revealed by the performance of test borings. The report does not reflect variations in subsurface conditions that may exist between or beyond these borings. Variations in soil and groundwater conditions should be expected, the nature and extent of which might not become evident until construction is undertaken. If variations are encountered, and/or if the scope of the project altered, we should be consulted for additional or revised recommendations.

2.0 PROJECT DESCRIPTION

We understand that Palm Beach County has retained Keshavarz & Associates for the Hagen Ranch Road from Smith Farm Boulevard to Lantana Road Project. The project consist of roadway and drainage improvements. See the site *Vicinity Map*, Sheet 1 in the Attachments for more information about the project location.

Should any of the above information or reiterated statements made by RADISE be inconsistent with the planned construction, we request that you contact us promptly to allow us to make any necessary modifications to the recommendations in this project.

3.0 PROJECT PURPOSE AND SCOPE OF WORK

The scope and purpose of this study was to perform a limited exploration of the pavement and subsurface conditions at Hagen Ranch Road from Smith Farm Boulevard to Lantana Road, to aid in the planning and design of the project.

More specifically, the purpose of the work included the following:

- Development of the anticipated pavement and underlying soil profiles and subsurface conditions within the depth of influence of the anticipated improvements.
- Identification of important and critical geotechnical design recommendations and construction considerations for the project design and construction based on the pavement, soil and groundwater conditions encountered in the borings.

RADISE performed the following services in accordance with the proposed scope of work:

1. Performed a site visit to field mark (paint or/and stake) the planned pavement core and soil boring locations and to observe existing site conditions.

2. Contacted Sunshine 811 as per Florida Statutes, to provide identification and clearance of underground utilities in the areas of the proposed borings.
3. Set up Temporary Traffic Control (TTC) safety controls prior to and during the field coring and drilling operations.
4. Mobilized drilling and TTC equipment to the site to perform four (4) asphalt pavement cores with auger soil borings. The auger borings were drilled to a depth of six (6) feet below the existing pavement surface. Also, performed two (2) Standard Penetration Test (SPT) borings and seven (7) auger borings to depths of 10 feet.
5. Performed two (2) Percolation tests to depths of 10 feet in accordance with the usual open-hole exfiltration test method described in the South Florida Water Management District (SFWMD) Permit Information Manual, Volume IV.
6. Collected one bulk sample of subgrade material for Limerock Bearing Ratio (LBR) determination.
7. Samples of the subsurface soils encountered were obtained and the depth to the encountered groundwater level was measured, if encountered, in each of the borings. Following completion of the field drilling, testing and sampling activities, the boreholes were backfilled with neat cement grout and the asphalt pavement surface patched with asphalt cold patch, where appropriate.
8. Visually classified the soil samples retrieved from the roadway borings using the American Association of State Highway and Transportation Officials (AASHTO) Soil Classification System in general accordance with the American Society of Testing and Materials (ASTM) test method D 3282, *Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes*.
9. Performed a limited laboratory testing program for soil index property determinations on selected samples to aid in the final classification process.
10. Prepared this geotechnical report to summarize the field exploration and laboratory testing results, and present our geotechnical evaluation and design recommendations.

4.0 FIELD EXPLORATION

RADISE personnel visited the project site prior to drilling to observe and mark the locations of the planned soil borings. Sunshine 811 was then contacted for field location of underground utilities in the area of the planned borings as per Florida Statutes. The boring locations were determined in the field by RADISE after the underground utility locations were determined. The boring locations are depicted on the attached *Boring Location Plans*, Sheet 2A and 2B. TTC was used in the vicinity of our field work efforts to protect from our field crew and the general public from damage or injury. The TTC system and components was designed and set up in accordance with the FDOT Standard Plans.

On November 6, 2020, RADISE performed the following:

- Four (4) pavement cores with 6 feet deep auger borings to determine the thickness of the asphalt and base material and the composition of the subgrade.
- Two (2) SPT borings to depths of 10 feet near the edge of the existing pavement of Hagen Ranch Road.
- Seven (7) auger borings to depths of 10 feet near the edge of the existing pavement of Hagen Ranch Road.
- Two (2) Percolation tests to depths of 10 feet in accordance with the usual open-hole exfiltration test method described in the South Florida Water Management District (SFWMD) Permit Information Manual, Volume IV.
- Collected one bulk sample of subgrade material for Limerock Bearing Ratio (LBR) testing.

The auger borings were performed in general accordance with ASTM D 1452, *Standard Practice for Soil Exploration and Sampling by Auger Borings*.

The asphalt pavement was cored at the four locations PC-1 to PC-4 using a 6-inch diameter diamond tipped core drill bit. Upon removal of the asphalt core, a hand-held power auger and a hand operated bucket-type auger were used to loosen the base course material and to clean out the borehole. Subsequent down-hole field measurements were made using a surveyor's tape to document the approximate thickness and composition of the encountered pavement base course materials. Representative samples of the base course, obtained from the hand bucket-type auger, were placed in moisture proof bags and transported to our laboratory. The samples were then examined by a geotechnical engineer in the lab to confirm the field classifications. Photographs of the asphalt cores and base materials are included on the attached *Pavement Core and Base Photographs*, Sheets 5A and 5B.

Two Open-hole Exfiltration tests were performed in accordance with the South Florida Water Management District (SFWMD) procedures. The tests were performed in 10-feet deep boreholes at locations EX-1 and EX-2.

The SPT boring procedures were conducted in general conformance with ASTM D 1586, *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils*. The SPT borings were drilled using a CME-45 truck mounted drilling rig equipped with an automatic hammer. The SPT boring samples of the in-place materials were obtained at frequent vertical intervals using a standard split-barrel sampler driven with a 140-pound hammer freely falling 30 inches. After seating the SPT sampler 6 inches, the number of successive blows required to drive the sampler an additional 12 inches deeper in the soil constitutes the SPT test result, commonly referred to as the SPT N-value. Continuous SPT's were performed to a depth of 10 feet and at 5 feet intervals thereafter. The field SPT "N"-values should be corrected for hammer efficiency in accordance with the recommended relationship presented in the FDOT Soils and Foundations Handbook ($N_{\text{safety}} = 1.24 * N_{\text{automatic}}$). The N-value has been empirically correlated with various soil properties and is considered to be indicative of the denseness of cohesionless soils and the consistency of cohesive soils.

The depth at which groundwater was encountered was measured within the borings at the time of drilling. Following completion of the drilling and testing, the boreholes were backfilled with grout and the pavement patched with asphalt “cold patch”.

5.0 LABORATORY TESTING

5.1 General

At the time of drilling in the field, the soil samples obtained from the soil borings were visually classified by our drilling crew chief, in general accordance with the AASHTO soil classification system for the roadway borings (ASTM D 3282). Field classifications were subsequently confirmed by a RADISE geotechnical engineer in the laboratory. Selected soil samples were then subject to testing for index properties to aid in their classification.

5.2 Laboratory Test Results

The following list summarizes the types and numbers of laboratory tests performed.

- Three (3), Moisture Content Tests (ASTM D 2216).
- One (1), Organics Content Test (ASTM D 2974).
- Two (2) mechanical sieve analysis (ASTM D 422)

Test assignments were provided by a geotechnical engineer during the laboratory inspection of procured soil samples. Laboratory assignments were made to supplement and confirm visual field soil classification at each general boring location.

All the laboratory test results are presented on the attached *Roadway Soil Profiles*, Sheets 3A and 3B, and *Table A-1: Summary of Laboratory Test Results*.

5.3 Limerock Bearing Ratio (LBR) Testing

LBR testing was performed in our laboratory on a bulk subgrade sample obtained near boring AB-1. The bulk sample was collected from approximately 1 to 2 feet below the existing ground surface. The LBR of the bulk sample was tested by Florida Method 5-515. The results of the LBR test is summarized below in Table 1 and the laboratory report is attached.

Table 1 – LBR Results

LBR No.	LBR Result
AB-1	50

6.0 SUMMARY OF SURFACE AND SUBSURFACE EXPLORATION

6.1 Stratigraphy

Stratification of the explored soils is based on visual examination of the recovered soil samples by a geotechnical engineer in accordance with the AASHTO Soil Classification System. Subsurface profiles showing the soil stratification at the boring locations were developed and are presented on the attached *Roadway Soil Profiles*, Sheets 3A to 3D. Stratification lines represent approximate boundaries between soil types, but the actual transition between layers may be gradual or abrupt. Additionally, soil and groundwater conditions will vary between boring locations.

The soil borings performed generally encountered fine sand with traces of silt and organics from the ground surface to the boring termination depths of 6 and 10 feet.

Generalized descriptions of the soil stratigraphy are provided in the following Table 2:

Table 2: Stratigraphy

Stratum No.	Description	AASHTO Class.
1	Brown and gray, fine sand, trace gravel	A-3
2	Brown and gray, fine sand	A-3
3	Dark brown, fine sand, trace organics	A-3

The materials from Strata 1, 2 and 3 appear to be satisfactory for use in embankment when utilized in accordance with the FDOT Standard Plans Index 120-001.

6.2 Groundwater Levels

At the time of our field testing (November 2020) groundwater was encountered at depths ranging between 6.0 and 7.0 feet below the existing ground surface. Groundwater was not encountered in any of the auger borings performed in pavement core locations (PC-1 to PC-4). Groundwater levels will fluctuate with the seasons and variations of precipitation.

6.3 Exfiltration Test

Two (2) Exfiltration Tests EX-1 and EX-2 were performed to evaluate the hydraulic conductivity of the subsurface soils within the project area. The approximate location of the tests are depicted on Sheet 2A and 2B, *Boring Location Plans*. The exfiltration tests were performed in general accordance with the usual open-hole exfiltration test method described in the SFWMD Permit Information Manual, Volume IV procedures in 10 feet deep boreholes. The result of the exfiltration tests are presented in the following Table 3 and in the attachments.

Table 3 – Exfiltration Test Results

Test Number	Test Location Coordinates*	Test Depth (ft.)	Soil Profile	Hydraulic Conductivity, K (cfs/ft ² - ft. head)
EX-1	N 26.5871° W 80.1572°	10	0 to 3 feet - Brown, fine sand, trace gravel (A-3) 4 to 4.5 feet – Dark brown, fine sand (A-3) 4.5 to 7.0 feet – Gray, fine sand (A-3) 7.0 to 10.0 feet – Dark gray, fine sand (A-3)	6.10 x 10 ⁻⁵
EX-2	N 26.5880° W 80.1574°	10	0 to 2 feet - Brown, fine sand, trace gravel (A-3) 2 to 10.0 feet – Dark brown, fine sand (A-3)	2.24 x 10 ⁻⁴

*Latitude and Longitude Coordinates in degrees

6.4 Pavement Cores

Asphalt pavement cores were cut at locations PC-1 to PC-4, using a 6-inch diameter diamond tipped core drill bit. The measured asphalt section thicknesses and the base thicknesses are presented in the following Table 2. Photographs of the pavement core and base materials are included on Sheets 5A and 5B in the Attachments. Upon completion of the pavement coring, asphalt "cold patch" was placed and compacted within the pavement core hole. The top of the asphalt patch was leveled flush with the pavement surface upon completion. The following *Pavement Coring Data*, Table 4, presents a summary of the measured asphalt section thickness, the base thickness and composition, and estimated existing structural numbers (S_{NE}) for the asphalt and base. The structural number (SN) for the subgrade based on laboratory testing is also provided in Table 4.

Table 4 – Pavement Coring Data

Core No.	Core Location Latitude & Longitude	Asphalt		Base Course		Base Course Composition	Subgrade SN
		Thickness (in.)	S _{NE}	Thickness (in.)	S _{NE}		
PC-1	N 26.5826° W 80.1558°	3.0	1.0	6.0	1.0	Gray Limerock	1.0
PC-2	N 26.5840° W 80.1556°	3.0	1.0	6.0	1.0	Gray Limerock	1.0
PC-3	N 26.5842° W 80.1558°	11.0	3.7	0	0	Gray Limerock	1.0
PC-4	N 26.5883° W 80.1577°	3.0	1.0	6.0	1.0	Gray Limerock	1.0

The cores physically measured between 3.0 and 11.0 inches thick as listed in Table 4 and shown on the photographs in the attached *Pavement Core and Base Photographs*, Sheets 5A and 5B. The encountered base coarse material typically consisted of 6 inches of gray Limerock. Photographs of the base coarse materials are also presented on Sheets 5A and 5B. The estimated total Equivalent Structural Number (SN_E) for the existing pavement section encountered ranged from approximately 3.0 to 4.7, as follows:

- The estimated Asphalt pavement SN_E is approximately 1.0 to 3.7.
- The estimated base course material SN_E is approximately 0 to 1.0.
- The subgrade SN is approximately 1.0.

7.0 DISCUSSIONS AND RECOMMENDATIONS

The findings from the subsurface exploration indicate that the general subsurface conditions along the roadway alignment consist of sands that will be suitable for the support of the roadway and drainage improvements. The following sections present our conclusions and recommendations for the site preparation and related construction for the roadway. The recommendations discussed herein are based on our interpretation and understanding of the project needs, site conditions, and on the results of our engineering analyses. If subsurface conditions encountered during the construction differ from those disclosed by the borings, we should be notified immediately, so that we can review our recommendations.

Project construction may cause vibration and noise impacts to the adjacent residences. Noise and vibration monitoring will be required during construction; see Section 8.0.

7.1 Pavement Design Considerations

During our reconnaissance field visits to Hagen Ranch Road, the existing pavement was observed to be in good condition. Minor cracking and rutting were observed. The minor cracks and rutting are suspected to be caused by normal traffic wearing and weathering.

Typical roadway pavement standards for new construction include the following:

1. 12 inches of Type B stabilized subgrade (LBR 40 or (SN 0.96))
2. Optional Base Group 7 (SN of at least 1.5).
3. 1.5 inches of Type SP structural course (Traffic C) asphalt (SN 0.66).
4. 1 inch of friction course FC-9.5 asphalt (SN 0.44).
5. Total SN should be at least 3.56

Typical roadway pavement standards for widening projects include the following:

1. Optional Base Group 13 (SN ranging between 2.35 and 2.45).
2. 1.5 inches of Type SP structural course (Traffic C) asphalt (SN 0.66).
3. 1 inch of friction course FC-9.5 asphalt (SN 0.44).
4. Total SN should be at least 3.50

The measured asphalt thicknesses range between approximately 3.0 to 11.0 inches and the SN_E ranges between 1.0 and 3.7. The existing asphalt layer does not meet the typical thickness and SN standards for a combined asphalt structural course and friction course in the areas of pavement cores PC-1, PC-2, and PC-4.

The base course is a brown, limerock and was found to be approximately 6.0 inches thick in the pavement core locations and with an SN_E of approximately 1.0. The gray, limerock base does not meet the SN requirements.

The subbase (prepared subgrade) material was determined to be comprised of a brown, fine sand. The LBR testing results indicate the SN value of the subgrade soils is approximately 1.0. The subgrade would be acceptable since the roadway pavement standards and typical FDOT pavement design criteria require a minimum LBR value of 40 (SN of 0.96).

We would generally recommend the reconstruction of the pavement since the asphalt and base material thickness in this roadway segment does not meet the typical roadway pavement standards. Milling and resurfacing to achieve a new asphalt thickness that meets the minimum pavement standard is acceptable; however, this will result in site grade changes.

These recommendations are based solely on the data obtained from the pavement cores and the observed conditions of the existing pavements in the field. Traffic loadings and frequencies were not provided nor taken into account when preparing this report. Such loadings and frequencies will need to be taken into account and addressed by the roadway designer during the final decision process whether to repair or replace the pavement as well as during preparation of roadway pavement sections during the final pavement design process.

7.2 Clearing and Grubbing

The site preparation for the drainage and roadway improvements should consist of clearing and grubbing in accordance with Section 110 of the FDOT Standard Specifications for Road and Bridge Construction. Topsoil needs to be stripped, removed and replaced with embankment or roadway fill in accordance with FDOT Standard Plans Index 120-002. Buried organic soils (Strata 4), debris or other unsuitable materials per FDOT Standard Plans Index 120-002 that are encountered during the construction, which are not disclosed by the borings, should be removed and replaced with a backfill material as described in Section 7.8.

7.3 Underground utilities and structures

Existing underground utilities and structures are present in the proposed construction area. Any such utilities will need to be properly identified/marked, excavated, trenched, and the existing utilities removed as necessary to construct the project. The excavation bottoms should be cleaned of any undesirable materials prior to placing any engineered backfill. We recommend that a Geotechnical Engineer be present to observe that the areas have been adequately stripped and prepared.

Site preparation, excavation, and backfilling for new utilities or re-aligned utilities should follow all of the applicable recommendations of this report.

7.4 Roadway Embankment

Roadway embankment should be constructed after the Clearing and Grubbing as described in the above section. Embankment soils should consist of sands or sand and gravel, with an AASHTO classification of A-3, A-2-4 or A-1. The embankment materials should be placed in accordance with FDOT Standard Plans Index 120-001 and Section 120 of Standard Specifications for Road and Bridge Construction. The materials from Strata 1, 2 and 3 appears to be satisfactory for use in embankment when utilized in accordance with the FDOT Standard Plans Index 120-001.

However, if buried organic soils, debris or other unsuitable materials per FDOT Standard Plans Index 120-002 are encountered during the construction, they should be removed and replaced with a backfill material as described in Section 7.8.

7.5 Excavations

The Contractor should be solely responsible for making temporary excavations in a safe manner and provide appropriate measures to retain side slopes to ensure that persons working in or near the excavation are protected. All excavations shall comply with the Occupational Health and Safety Administration (OHSA) stipulations for Trench Excavation Safety including all temporary design and safety requirements. Temporary and/or permanent structural retaining walls shall be designed and sealed by a structural engineer registered in the State of Florida.

The soils encountered in the borings generally consist of sand. OSHA 29 CFR part 1926 (Subpart P, Excavations) defines such sandy soils as Type C soils. As such, temporary side slopes in fully dewatered excavations could be made at a 1½H:1V inclination or flatter if sufficient area is available around the excavation. Adjustment to this inclination and/or the use of sheeting, shoring or trench boxes will be required where inadequate area/space is not available.

Excavations for drainage pipes should be performed in accordance with “Section 125, Excavation for Structures and Pipe” Division II Construction Details: Earthwork and Related Operations of the current FDOT Standard Specifications for Road and Bridge Construction.

7.6 Dewatering

At the time of drilling of the borings (November 2020), groundwater was encountered at depths ranging between approximately 6.0 and 7.0 feet below the existing ground surface. In-the-dry construction of deeper drainage pipes may require groundwater lowering via dewatering and control of groundwater seepage. Dewatering of the excavations may necessitate the use of sumps, wells, well-points or combinations thereof to be operated on a 24/7 basis until the drainage pipes are constructed and properly backfilled. Control of groundwater should be accomplished in a manner that preserves the integrity of the foundation bearing materials and does not cause instability of the excavation sidewalls. The dewatering system employed should be capable of

maintaining a pre-drained surface a minimum of 24 inches below the excavation bottoms. Dewatering measures should be controlled so that the groundwater is not lowered beneath any nearby structure.

7.7 Pipe Bedding

The sands encountered in the borings are expected to provide good support for utility pipelines without the need for bedding when the invert elevations are at least 24 inches above the groundwater level (natural or pre-drained by dewatering). Should organics or other deleterious materials be encountered at or below the pipe invert, such soils shall be considered compressible and unsuitable for pipe support. These soils should be over-excavated and replaced with compacted clean sand or FDOT No. 57 coarse aggregate.

The bedding surface should be uniformly compacted to a density of not less than 95 percent of the maximum dry density in accordance with ASTM D 1557, the Modified Proctor Method.

7.8 Trench Backfill and Compaction

Backfilling and compaction should be performed in accordance with “Section 125-8 Backfilling, Excavation for Structures and Pipe” Division II Construction Details: Earthwork and Related Operations of the current FDOT Standard Specifications for Road and Bridge Construction. Should unsuitable soils be present at or below the drainage pipes, such soils shall be considered compressible and unsuitable for pipe support. These soils should be over-excavated and replaced in accordance with the Index 120-002 of the FDOT Standard Plans and “Section 125-8 Backfilling, Excavation for Structures and Pipe” Division II Construction Details: Earthwork and Related Operations of the current FDOT Standard Specifications for Road and Bridge Construction.

Soils used for backfill should consist of relatively clean sands having no materials larger than two inches in size, not more than ten (10) percent passing the U.S. Standard No. 200 sieve. Such backfill shall not contain more than three (3) percent organics or other deleterious materials by weight in accordance with Section 125 of the FDOT Standard Specifications for Road and Bridge Construction.

Granular backfill should be placed at a moisture content within three (3) percent of its ASTM D 1557 determined optimum moisture and in level lifts whose thickness does not exceed eight (8) inches. Each fill lift should be stable, unyielding and uniformly compacted to at least ninety-five (95) percent of the maximum dry density in accordance with ASTM D 1557, the Modified Proctor Method. We recommend the use of only relatively light, hand-held compaction equipment in the densification operations around utilities to limit the potential damage to the pipelines and buried structures.

8.0 PROTECTION OF EXISTING STRUCTURES

Ground vibrations induced upon adjacent commercial, residential or other structures, primarily by heavy soil compaction equipment or any other heavy vibratory construction activities, should be monitored to assure that they do not reach levels which prove damaging to any adjacent/nearby structures. Vibration Monitoring should be performed in general accordance with “Section 108, Monitor Existing Structures” of the current FDOT Standard Specifications for Road and Bridge Construction or other similar local City/County regulations or ordinances.

Vibration levels on adjacent facilities should generally be maintained below or below a 0.25 ips peak particle velocity vibration level. However, more restrictive/lessor levels may be specified for highly sensitive residential or commercial areas at the discretion of the Designer or City. The construction Contractor should be required to inventory and provide a pre-construction inspection of adjacent structures and to monitor the adherence to suitable vibration monitoring impact limits for their construction activities.

9.0 LIMITATIONS

This report is intended for geotechnical purposes only, and not to document or detect the presence, or absence of any environmental conditions at the site, or to perform an environmental assessment of the site.

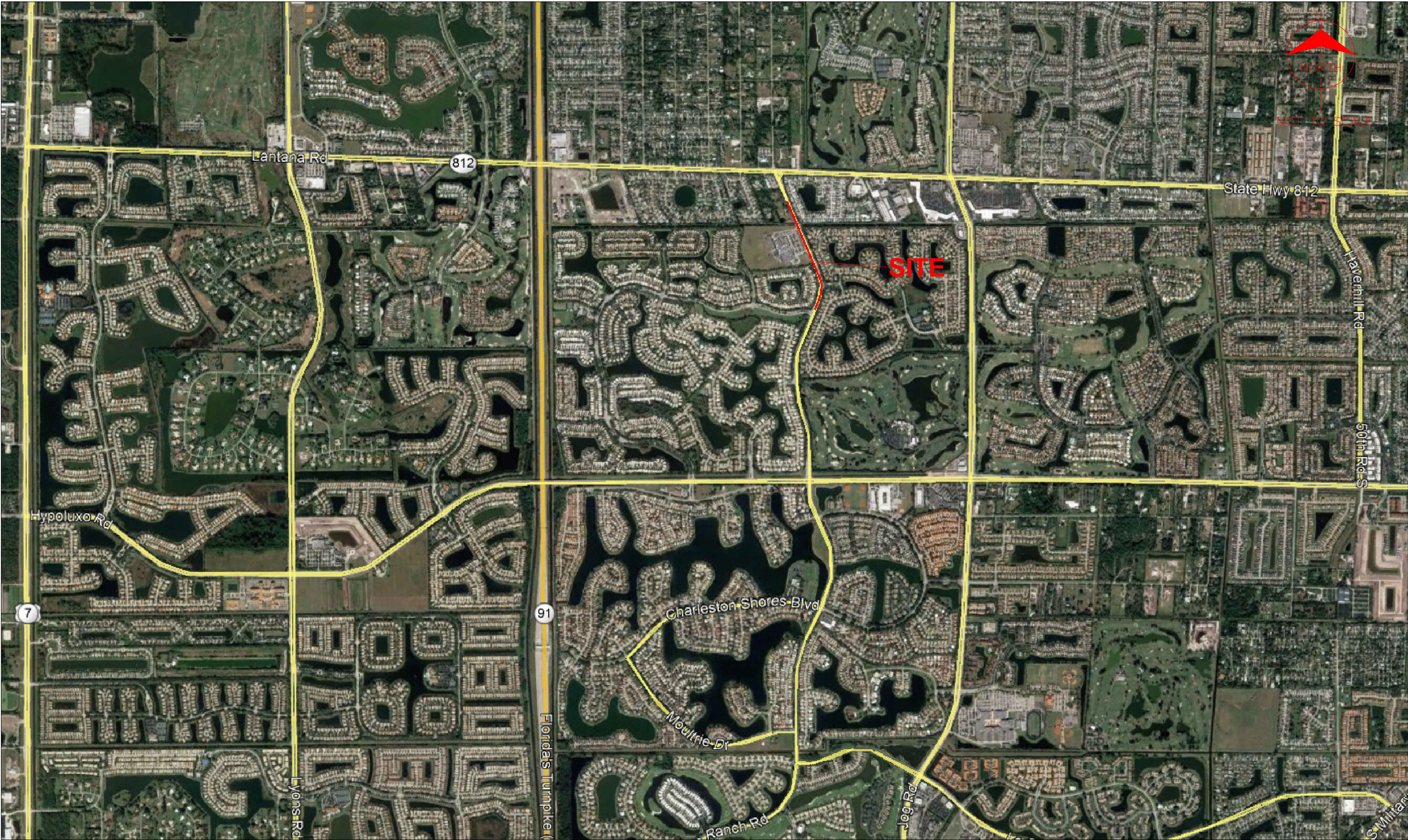
The analysis and recommendations presented in this report are based upon our interpretation of the subsurface information revealed by the test borings. The report does not reflect variations in subsurface conditions that may exist between or beyond these borings. Variations in soil and groundwater conditions should be expected, the nature and extent of which might not become evident until construction is undertaken. If variations are encountered, and/or the scope of the project altered, we should be consulted for additional recommendations.


RADISE warrants that the professional services performed and presented in this report are prepared for Keshavarz & Associates and are based upon typical standard of care recognized principles and practices in the discipline of geotechnical engineering and hydrogeology at this place and point in time, for this project site. No other warranties are expressed or implied.

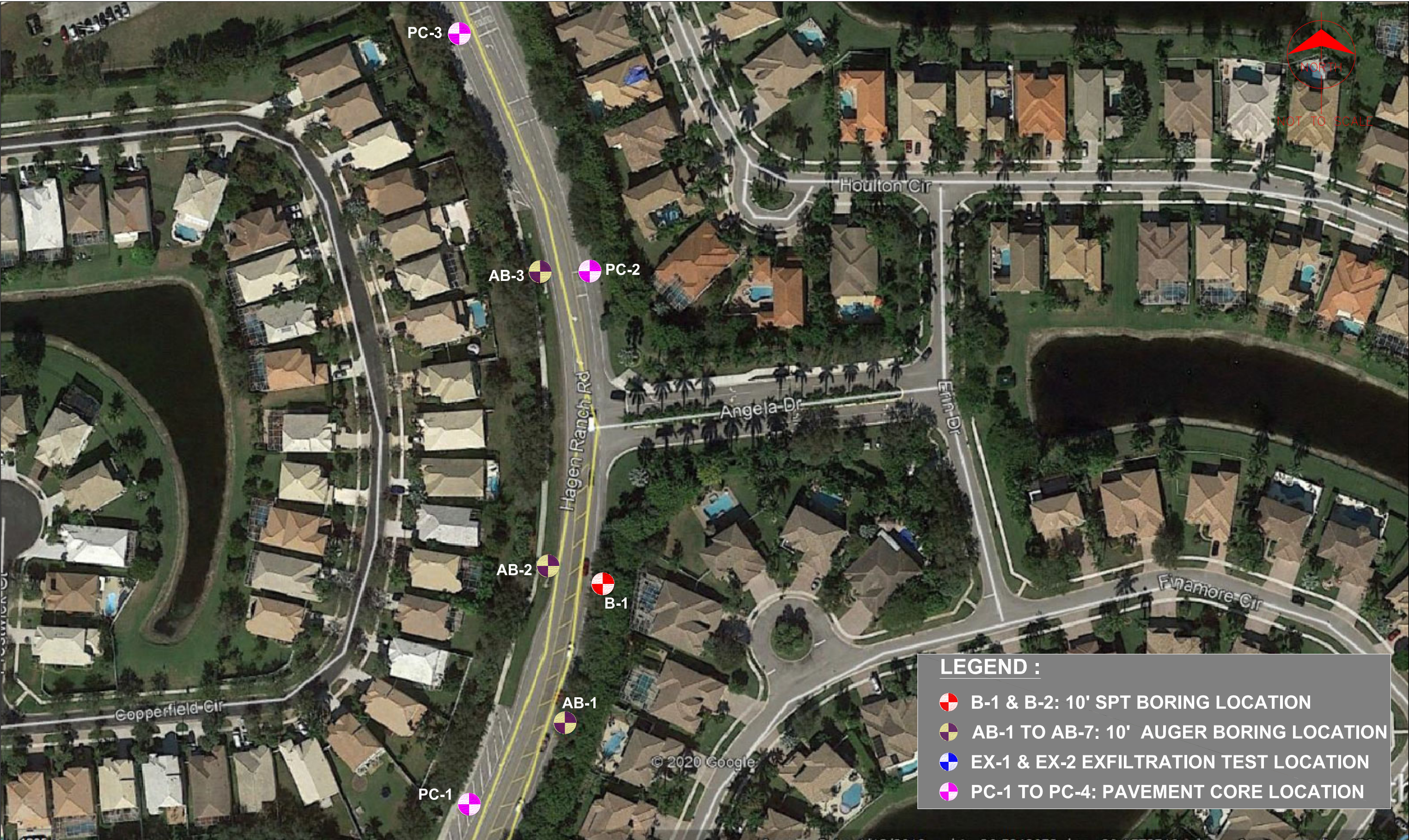
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RADISE appreciates the opportunity to be of service to you. Please feel free to contact us at 561-841-0103 if you have any questions or comments regarding this report.

Respectfully submitted
RADISE International, L.C.



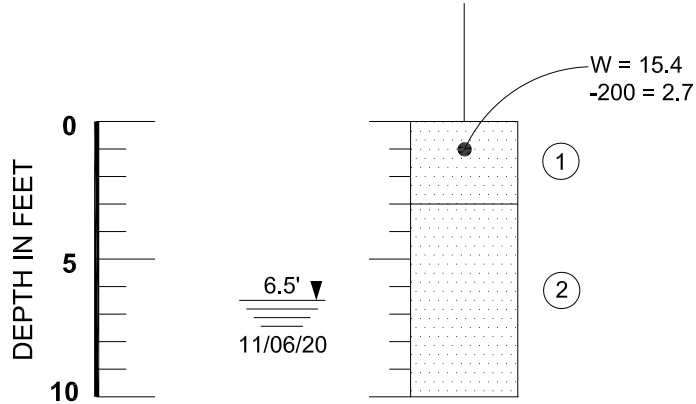
REVISIONS						Names		Dates		 LICENSE NO. - 8901	ENGINEER OF RECORD ANDREW NIXON (P.E.No. - 71458) RADISE International 4152 West Blue Heron Boulevard, Suite 1114 Riviera Beach, Florida. 33404 TEL 561-841-0103 FAX 561-841-0104 URL : http:// www.radise.net		PALM BEACH COUNTY		SCALE: VERTICAL N.T.S.	SHEET TITLE: VICINITY MAP		SHEET NO. 1
Date.	By	Descriptions	Date.	By	Descriptions	Drawn by	AK	11/13/2020	COUNTY		CLIENT	SCALE: HORIZONTAL N.T.S.	PROJECT NAME: HAGEN RANCH ROAD FROM SMITH FARM BOULEVARD TO LANTANA ROAD	RADISE PROJECT NO: 200923				
						Checked by	NK	11/13/2020										
						Designed by	AB	11/13/2020										
						Checked by	AB	11/13/2020										
						Approved by												



REVISIONS						Names	Dates	RADISE INTERNATIONAL	ENGINEER OF RECORD ANDREW NIXON (P.E.No. - 71458) RADISE International 4152 West Blue Heron Boulevard, Suite 1114 Riviera Beach, Florida, 33404 TEL 561-841-0103 FAX 561-841-0104 URL : http:// www.radise.net	PALM BEACH COUNTY		SCALE: VERTICAL N.T.S.	SHEET TITLE: BORING LOCATION PLAN	SHEET NO. 2B
Date.	By	Descriptions	Date.	By	Descriptions					COUNTY	CLIENT			
						Drawn by	AK	11/13/2020	LICENSE NO. - 8901	PALM BEACH	KESHAVARZ AND ASSOCIATES	SCALE: HORIZONTAL N.T.S.	PROJECT NAME: HAGEN RANCH ROAD FROM SMITH FARM BOULEVARD TO LANTANA ROAD	RADISE PROJECT NO: 200923
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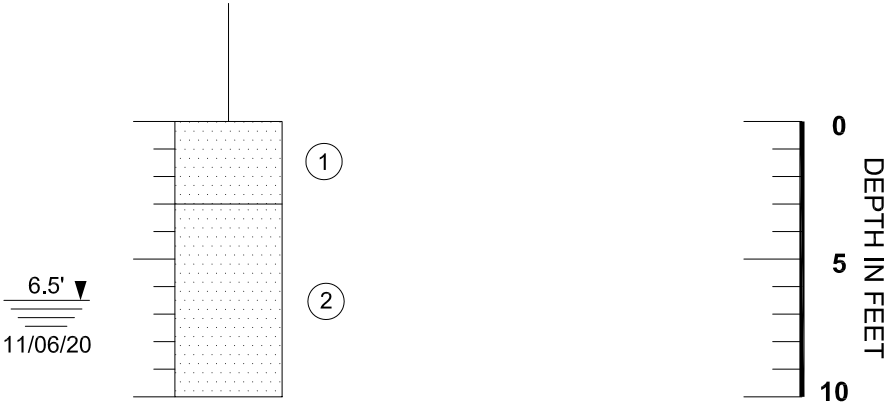
BORING NO.
LONGITUDE:
LATITUDE:
RIG:
HAMMER:
DRILLER:
DATE:

AB-1
W -80.1601°
N 26.5899°
HAND AUGER
N/A
T.FICKLING
11/06/2020



B.T. @ 10'
BELOW EXISTING GRADES

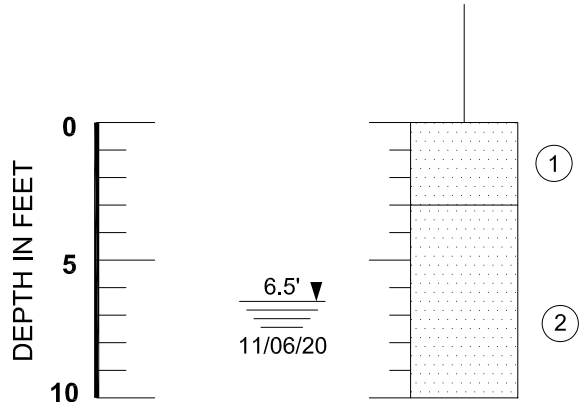
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N 26.5842°
HAND AUGER
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T.FICKLING
11/06/2020



B.T. @ 10'
BELOW EXISTING GRADES

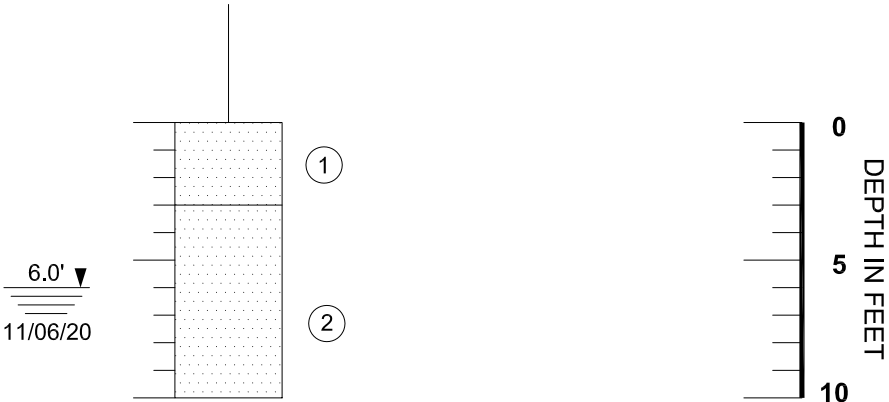
BORING NO.
LONGITUDE:
LATITUDE:
RIG:
HAMMER:
DRILLER:
DATE:

AB-3
W -80.1560°
N 26.5842°
HAND AUGER
N/A
T.FICKLING
11/06/2020



B.T. @ 10'
BELOW EXISTING GRADES

AB-4
W -80.1568°
N 26.5866°
HAND AUGER
N/A
T.FICKLING
11/06/2020



B.T. @ 10'
BELOW EXISTING GRADES

LEGEND

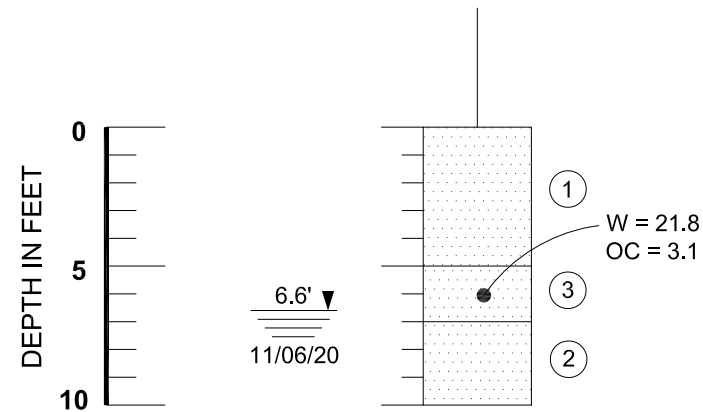
- ① BROWN AND GRAY, FINE SAND, TRACE GRAVEL (A-3)
- ② BROWN AND GRAY, FINE SAND (A-3)
- ③ DARK BROWN, FINE SAND, TRACE ORGAICS (A-3)
- B.T @ 10' BORINGS WERE TERMINATED AT 10 FEET BELOW THE EXISTING GROUND SURFACE
- B-1 BORING NUMBER
- 6.5' ▼ GROUNDWATER LEVEL IN FEET AND DRILLING DATE
- 11/06/20
- W MOISTURE CONTENT (%)
- OC ORGANIC CONTENT (%)
- 200 AMOUNT PASSING US STANDARD 200 SIEVE (%)
- A-3, A-2-4 AASHTO SOIL CLASSIFICATION SYSTEM GROUP SYMBOL (ASTM D 2487)

NOTES:

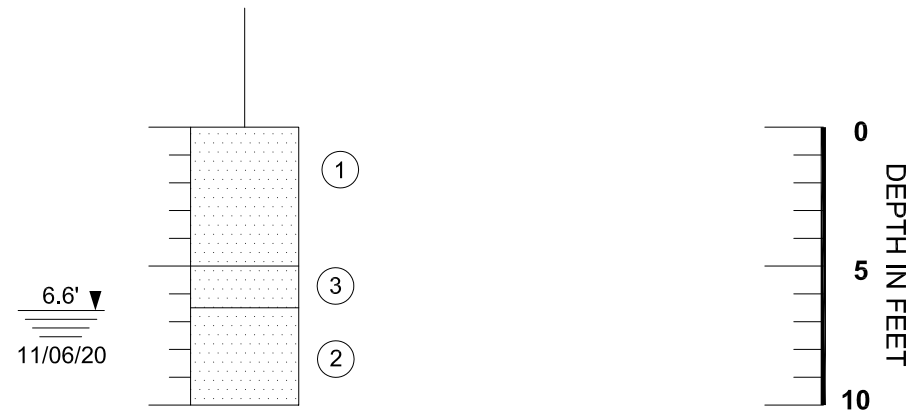
- BORINGS WERE DRILLED ON 11/06/2020. USING HAND AUGER DRILLING EQUIPMENT (ASTM D4152).
- STRATA BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH TEST HOLE LOCATION ONLY. SOIL TRANSITIONS MAY BE MORE GRADUAL THAN IMPLIED.
- GROUNDWATER LEVELS SHOWN ON THE SUBSURFACE PROFILES REPRESENT GROUNDWATER SURFACES ON THE DATES SHOWN. GROUNDWATER LEVEL FLUCTUATIONS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR.
- AFTER COMPLETION OF DRILLING, BOREHOLES WERE BACKFILLED WITH GROUT.

REVISIONS							Names	Dates	 LICENSE NO. - 8901	ENGINEER OF RECORD ANDREW NIXON (P.E.No. - 71458) RADISE International 4152 West Blue Heron Boulevard, Suite 1114 Riviera Beach, Florida, 33404 TEL 561-841-0103 FAX 561-841-0104 URL : http:// www.radise.net	PALM BEACH COUNTY		SCALE: VERTICAL N.T.S.	SHEET TITLE:	SHEET NO.	
Date.	By	Descriptions	Date.	By	Descriptions	Drawn by	AK	11/13/2020				COUNTY	CLIENT		SUBSURFACE PROFILES	3A
						Checked by	NK	11/13/2020								
						Designed by	AB	11/13/2020								
						Checked by	AB	11/13/2020								
						Approved by							SCALE: HORIZONTAL N.T.S.	PROJECT NAME: HAGEN RANCH ROAD FROM SMITH FARM BOULEVARD TO LANTANA ROAD	RADISE PROJECT NO: 200923	




AB-5
W -80.1571°
N 26.5873°
HAND AUGER
N/A
T.FICKLING
11/06/2020



AB-6
W -80.1575°
N 26.5677°
HAND AUGER
N/A
T.FICKLING
11/06/2020



B.T. @ 10'
BELOW EXISTING GRADES

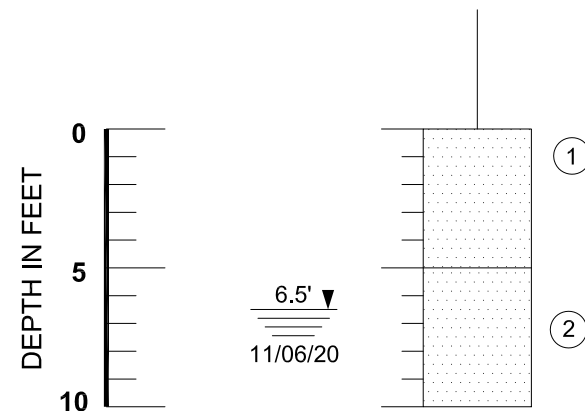
- ①  BROWN AND GRAY, FINE SAND,
TRACE GRAVEL (A-3)
- ②  BROWN AND GRAY,
FINE SAND (A-3)
- ③  DARK BROWN , FINE SAND,
TRACE ORGAICS (A-3)

6.5' ▼ GROUNDWATER LEVEL IN FEET AND
11/06/20 DRILLING DATE

GROUP SYMBOL (ASTM D 2487)

1. BORINGS WERE DRILLED ON 11/06/2020. USING HAND AUGER DRILLING EQUIPMENT (ASTM D4152).
2. STRATA BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH TEST HOLE LOCATION ONLY. SOIL TRANSITIONS MAY BE MORE GRADUAL THAN IMPLIED.
3. GROUNDWATER LEVELS SHOWN ON THE SUBSURFACE PROFILES REPRESENT GROUNDWATER SURFACES ON THE DATES SHOWN. GROUNDWATER LEVEL FLUCTUATIONS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR.
4. AFTER COMPLETION OF DRILLING, BOREHOLES WERE BACKFILLED WITH GROUT.

AB-7
W -80.1575°
N 26.5884°
HAND AUGER
N/A
T.FICKLING
11/06/2020



B.T. @ 10'
BELOW EXISTING GRADES

REVISIONS							Names	Dates
Date.	By	Descriptions	Date.	By	Descriptions	Drawn by	AK	11/13/2020
						Checked by	NK	11/13/2020
						Designed by	AB	11/13/2020
						Checked by	AB	11/13/2020
						Approved by		

RADISE
INTERNATIONAL
LICENSE NO. - 8901

ENGINEER OF RECORD
ANDREW NIXON (P.E.No. - 71458)
RADISE International
4152 West Blue Heron Boulevard, Suite 1114
Riviera Beach, Florida. 33404
TEL 561-841-0103 FAX 561-841-0104
URL : [http:// www.radise.net](http://www.radise.net)

COUNTY	CLIENT
PALM BEACH	KESHAVARZ AND ASSOCIATES

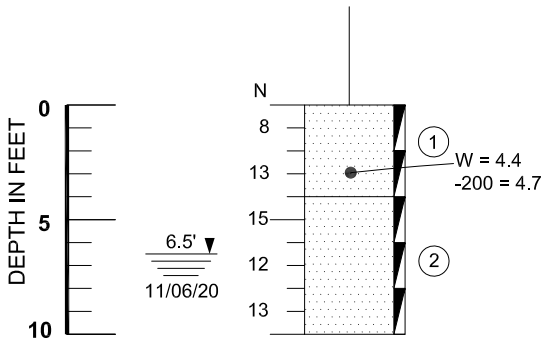
SCALE:
HORIZONTAL
N.T.S.

SUBSURFACE PROFILES	
PROJECT NAME:	HAGEN RANCH ROAD FROM SMITH FARM BOULEVARD TO LANTANA ROAD

RADISE PROJECT NO: 200923
--

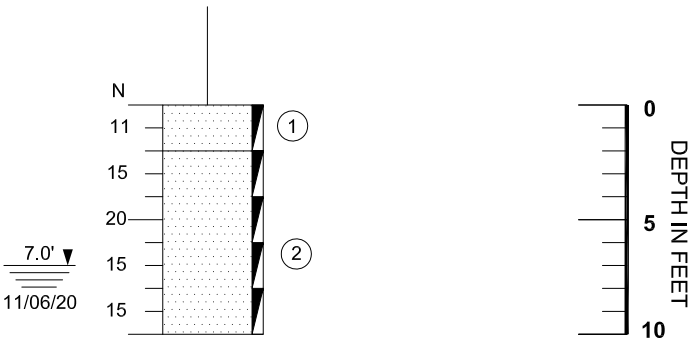
BORING NO.
LONGITUDE:
LATITUDE:
RIG:
HAMMER:
DRILLER:
DATE:

B-1
W -80.1568°
N 26.5842°
CME 45
AUTO
T.FICKLING
11/06/2020



B.T. @ 10'
BELOW EXISTING GRADES

B-2
W -80.1573°
N 26.5874°
CME 45
AUTO
T.FICKLING
11/06/2020



B.T. @ 10'
BELOW EXISTING GRADES

LEGEND

- ① BROWN AND GRAY, FINE SAND, TRACE GRAVEL (A-3)
- ② BROWN AND GRAY, FINE SAND (A-3)
- ③ DARK BROWN, FINE SAND, TRACE ORGAICS (A-3)

B.T @ 10' BORINGS WERE TERMINATED AT 10 FEET BELOW THE EXISTING GROUND SURFACE

B-1 STANDARD PENETRATION TEST (SPT) BORING AND NUMBER

N STANDARD PENETRATION RESISTANCE-BLOWS PER FOOT USING AUTOMATIC HAMMER

SAMPLING INTERVAL

6.5' GROUNDWATER LEVEL IN FEET AND DRILLING DATE

W MOISTURE CONTENT (%)

OC ORGANIC CONTENT (%)

-200 AMOUNT PASSING US STANDARD 200 SIEVE (%)

A-3, A-2-4 AASHTO SOIL CLASSIFICATION SYSTEM GROUP SYMBOL (ASTM D 3282)

NOTES:

- BORINGS WERE DRILLED ON 11/06/2020. SPT BORINGS WERE PERFORMED USING A CME-45C AUTOMATIC HAMMER DRILLING RIG (ASTM D1586) AND HAND AUGER DRILLING EQUIPMENT (ASTM D4152).
- STRATA BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH TEST HOLE LOCATION ONLY. SOIL TRANSITIONS MAY BE MORE GRADUAL THAN IMPLIED.
- GROUNDWATER LEVELS SHOWN ON THE SUBSURFACE PROFILES REPRESENT GROUNDWATER SURFACES ON THE DATES SHOWN. GROUNDWATER LEVEL FLUCTUATIONS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR.
- AFTER COMPLETION OF DRILLING, BOREHOLES WERE BACKFILLED WITH GROUT.

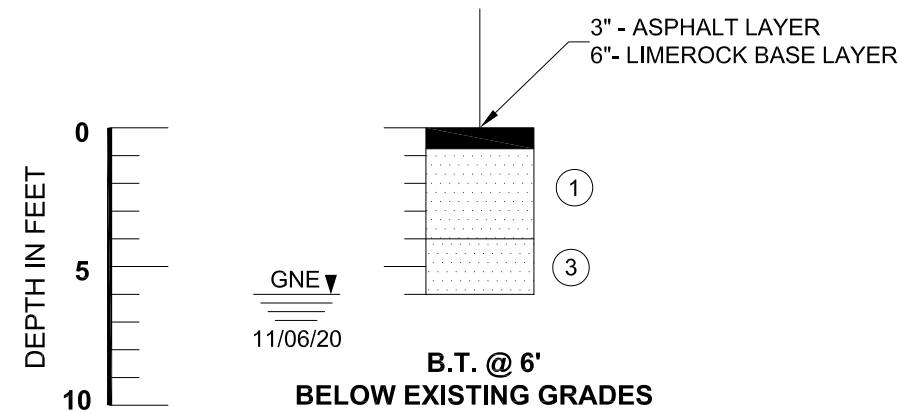
STANDARD PENETRATION TEST DATA *	
SPOON INSIDE DIA.	1.375 INCH
SPOON OUTSIDE DIA.	2 INCHES
AVG. HAMMER DROP	30 INCHES
HAMMER WEIGHT	140 POUNDS
GRANULAR MATERIALS	AUTOMATIC HAMMER
	SPT N - VALUE
RELATIVE DENSITY	BLOWS/FOOT
VERY LOOSE	LESS THAN 3
LOOSE	3 - 8
MEDIUM	8 - 24
DENSE	24 - 40
VERY DENSE	GREATER THAN 40
SILTS AND CLAYS	AUTOMATIC HAMMER
	SPT N - VALUE
CONSISTENCY	BLOWS/FOOT
VERY SOFT	LESS THAN 1
SOFT	1 - 3
FIRM	3 - 6
STIFF	6 - 12
VERY STIFF	12 - 24
HARD	GREATER THAN 24
*FDOT SOILS AND FOUNDATIONS HANDBOOK 2020	

REVISIONS

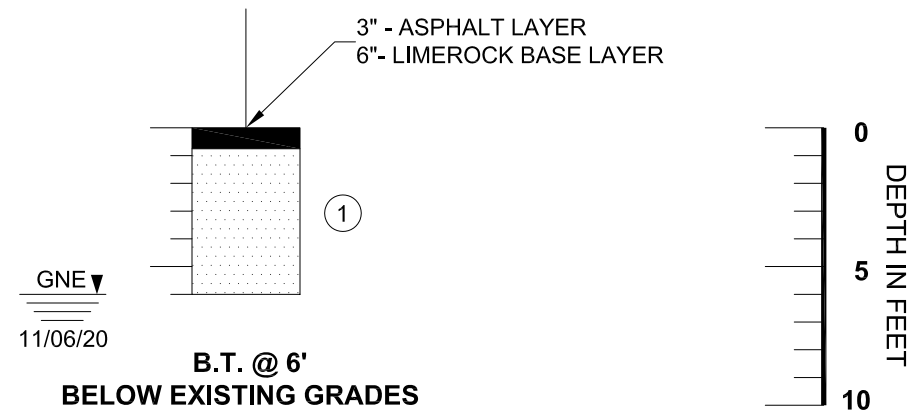
REVISIONS						Names	Dates	 LICENSE NO. - 8901	ENGINEER OF RECORD ANDREW NIXON (P.E.No. - 71458) RADISE International 4152 West Blue Heron Boulevard, Suite 1114 Riviera Beach, Florida, 33404 TEL 561-841-0103 FAX 561-841-0104 URL : http:// www.radise.net	PALM BEACH COUNTY		SCALE: VERTICAL N.T.S.	SHEET TITLE: SUBSURFACE PROFILES	SHEET NO. 3C	
Date.	By	Descriptions	Date.	By	Descriptions	Drawn by	AK								11/13/2020
						Checked by	NK			11/13/2020	PALM BEACH	KESHAVARZ AND ASSOCIATES			
						Designed by	AB			11/13/2020					
						Checked by	AB			11/13/2020					
						Approved by									

BORING NO.
LONGITUDE:
LATITUDE:
RIG:
HAMMER:
DRILLER:
DATE:

PC-1
W -80.1558°
N 26.5826°
HAND AUGER
N/A
T.FICKLING
11/06/2020



PC-2
W -80.1556°
N 26.5840°
HAND AUGER
N/A
T.FICKLING
11/06/2020

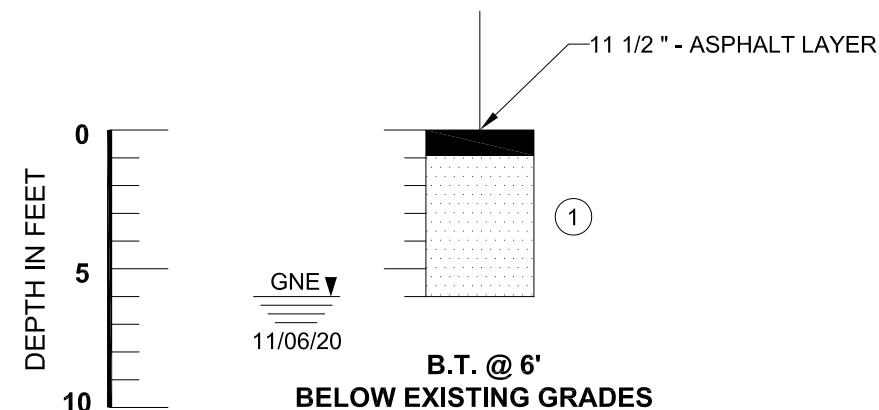


- LEGEND**
- ① BROWN AND GRAY, FINE SAND, TRACE GRAVEL (A-3)
 - ② BROWN AND GRAY, FINE SAND (A-3)
 - ③ DARK BROWN, FINE SAND, TRACE ORGAICS (A-3)
- B.T @ 10' BORINGS WERE TERMINATED AT 6 FEET
BELOW THE EXISTING GROUND SURFACE
- B-1 BORING AND NUMBER
- GNE 11/06/20 GROUNDWATER NOT ENCOUNTERED AND
DRILLING DATE
- W MOISTURE CONTENT (%)
- OC ORGANIC CONTENT (%)
- 200 AMOUNT PASSING US STANDARD 200 SIEVE (%)
- A-3, A-2-4 AASHTO SOIL CLASSIFICATION SYSTEM
GROUP SYMBOL (ASTM D 2487)

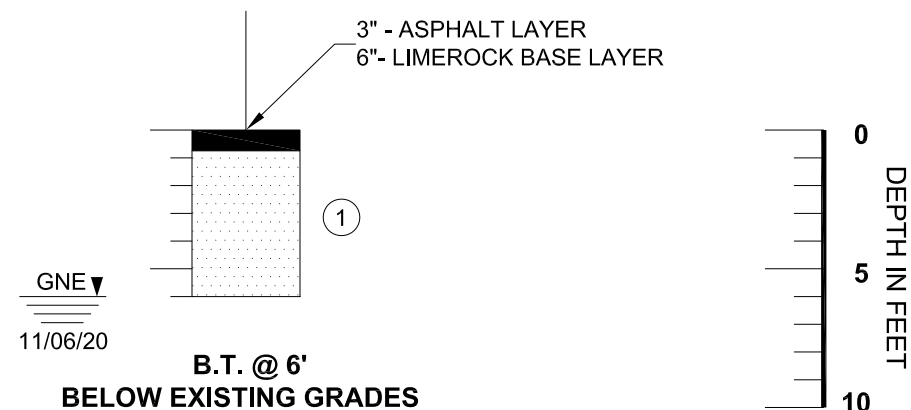
- NOTES:**
- BORINGS WERE DRILLED ON 11/06/2020. USING HAND AUGER DRILLING EQUIPMENT (ASTM D4152).
 - STRATA BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH TEST HOLE LOCATION ONLY. SOIL TRANSITIONS MAY BE MORE GRADUAL THAN IMPLIED.
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 - AFTER COMPLETION OF DRILLING, BOREHOLES WERE BACKFILLED WITH GROUT.

BORING NO.
LONGITUDE:
LATITUDE:
RIG:
HAMMER:
DRILLER:
DATE:

PC-3
W -80.1558°
N 26.5842°
HAND AUGER
N/A
T.FICKLING
11/06/2020



PC-4
W -80.1577°
N 26.5883°
HAND AUGER
N/A
T.FICKLING
11/06/2020



REVISIONS										RADISE INTERNATIONAL		ENGINEER OF RECORD ANDREW NIXON (P.E.No. - 71458) RADISE International 4152 West Blue Heron Boulevard, Suite 1114 Riviera Beach, Florida, 33404 TEL 561-841-0103 FAX 561-841-0104 URL : http:// www.radise.net		PALM BEACH COUNTY		SCALE: VERTICAL N.T.S.	SHEET TITLE:	SHEET NO.
Date.	By	Descriptions	Date.	By	Descriptions	Drawn by	Names	Dates		LICENSE NO. - 8901				COUNTY	CLIENT	SCALE: HORIZONTAL N.T.S.	PROJECT NAME:	RADISE PROJECT NO:
						AK	AK	11/13/2020						PALM BEACH	KESHAVARZ AND ASSOCIATES		HAGEN RANCH ROAD FROM SMITH FARM BOULEVARD TO LANTANA ROAD	3D
						NK	NK	11/13/2020										200923
						AB	AB	11/13/2020										
						AB	AB	11/13/2020										

DATE OF SURVEY: NOVEMBER 2020
SURVEY MADE BY: RADISE INTERNATIONAL, L.C.
SUBMITTED BY: ANDREW NIXON, P.E.

ROAD NAME: HAGEN RANCH ROAD
COUNTY: PALM BEACH

ORGANIC CONTENT				SIEVE ANALYSIS RESULTS % PASS						ATTERBERG LIMITS (%)			AASHTO GROUP	MATERIAL DESCRIPTION	CORROSION TEST RESULTS				
STRATUM NO.	NO. OF TESTS	% ORGANIC	MOISTURE CONTENT	NO. OF TESTS	10 MESH	40 MESH	60 MESH	100 MESH	200 MESH	NO. OF TESTS	LIQUID LIMIT	PLASTIC INDEX			NO. OF TESTS	RESISTIVITY ohm-cm	CHLORIDES ppm	SULFATES ppm	pH
1	0	-	-	2	89.6-98.4	79.0-90.5	52.2-60.1	21.5-24.5	2.7-4.7	0	-	-	A-3	BROWN AND GRAY, FINE SAND, TRACE GRAVEL	0	-	-	-	-
2	0	-	-	0	-	-	-	-	-	0	-	-	A-3	GRAY AND BROWN, FINE SAND	0	-	-	-	-
3	1	3.1	21.8	0	-	-	-	-	-	0	-	-	A-3	DARK BROWN, FINE SAND, TRACE ORGANICS	0	-	-	-	-

EMBANKMENT AND SUBGRADE MATERIAL

STRATA BOUNDARIES ARE APPROXIMATE MAKE FINAL CHECK AFTER GRADING

 = WATER TABLE ENCOUNTERED

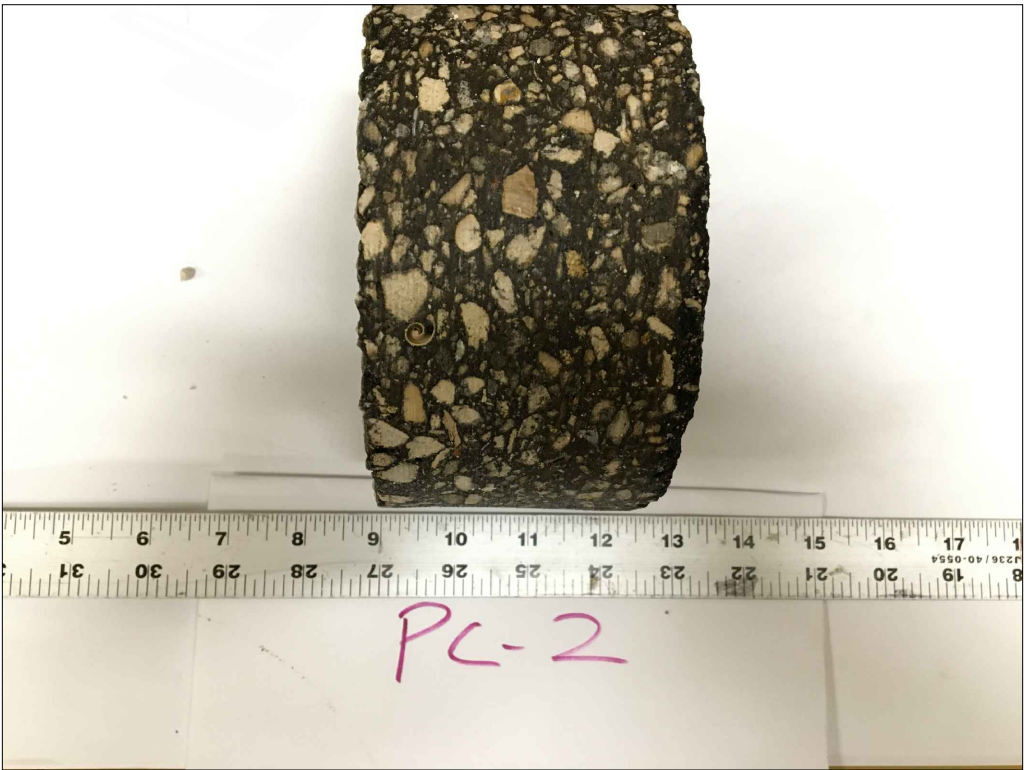
NOTE:

- 1) STRATA BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH TEST HOLE LOCATION ONLY. ANY STRATUM CONNECTING LINES THAT ARE SHOWN ARE FOR ESTIMATING EARTHWORK ONLY AND DO NOT INDICATE ACTUAL STRATUM LIMITS. SUBSURFACE VARIATIONS BETWEEN BORINGS SHOULD BE ANTICIPATED.
- 2) THE SYMBOL "-" REPRESENTS AN UNMEASURED PARAMETER.
- 3) THE MATERIALS FROM STRATUM NUMBERS 1, 2 AND 3 APPEARS SATISFACTORY FOR USE IN THE EMBANKMENT WHEN UTILIZED IN ACCORDANCE WITH FDOT STANDARD PLANS INDEX 120-001.

REVISIONS						Names	Dates	 ENGINEER OF RECORD ANDREW NIXON (P.E.No. - 71458) RADISE International 4152 West Blue Heron Boulevard, Suite 1114 Riviera Beach, Florida, 33404 TEL 561-841-0103 FAX 561-841-0104 URL : http:// www.radise.net	PALM BEACH COUNTY		SCALE: VERTICAL N.T.S.	SHEET TITLE: SUBSURFACE PROFILES	SHEET NO. 4	
Date.	By	Descriptions	Date.	By	Descriptions	Drawn by	AK		11/13/2020	COUNTY	CLIENT	SCALE: HORIZONTAL N.T.S.	PROJECT NAME: HAGEN RANCH ROAD FROM SMITH FARM BOULEVARD TO LANTANA ROAD	RADISE PROJECT NO: 200923
						Checked by	NK		11/13/2020	LICENSE NO. - 8901				
						Designed by	AB		11/13/2020					
						Checked by	AB		11/13/2020					
						Approved by								



3.0 INCHES THICK ASPHALT



3.0 INCHES THICK ASPHALT

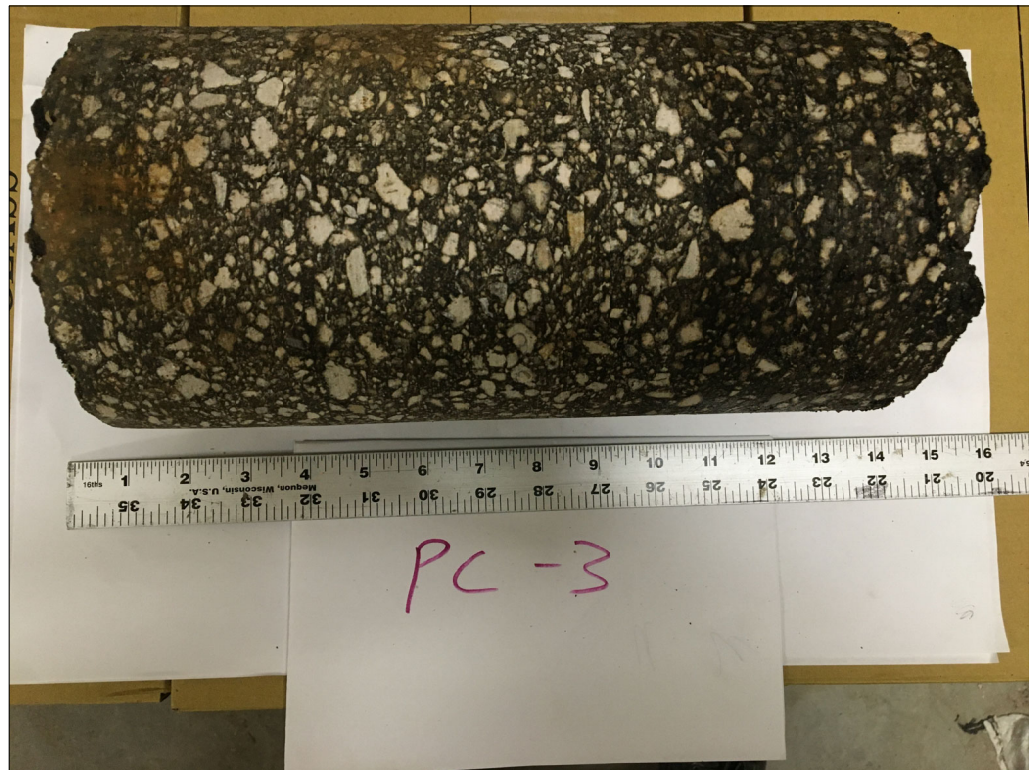


6.0 INCHES THICK LIMEROCK BASE



6.0 INCHES THICK LIMEROCK BASE

REVISIONS						Names		Dates		<div> ENGINEER OF RECORD ANDREW NIXON (P.E.No. - 71458) RADISE International 4152 West Blue Heron Boulevard, Suite 1114 Riviera Beach, Florida, 33404 TEL 561-841-0103 FAX 561-841-0104 URL : http:// www.radise.net</div>	PALM BEACH COUNTY		SCALE: VERTICAL N.T.S.	SHEET TITLE: PAVEMENT CORE AND BASE PHOTOGRAPHS	SHEET NO. 5A
Date.	By	Descriptions	Date.	By	Descriptions	Drawn by	AK	11/13/2020							
						Checked by	NK	11/13/2020							
						Designed by	AB	11/13/2020			COUNTY	CLIENT	SCALE: HORIZONTAL N.T.S.	PROJECT NAME: HAGEN RANCH ROAD FROM SMITH FARM BOULEVARD TO LANTANA ROAD	RADISE PROJECT NO: 200923
						Checked by	AB	11/13/2020	LICENSE NO. - 8901						
						Approved by					PALM BEACH	KESHAVARZ AND ASSOCIATES			

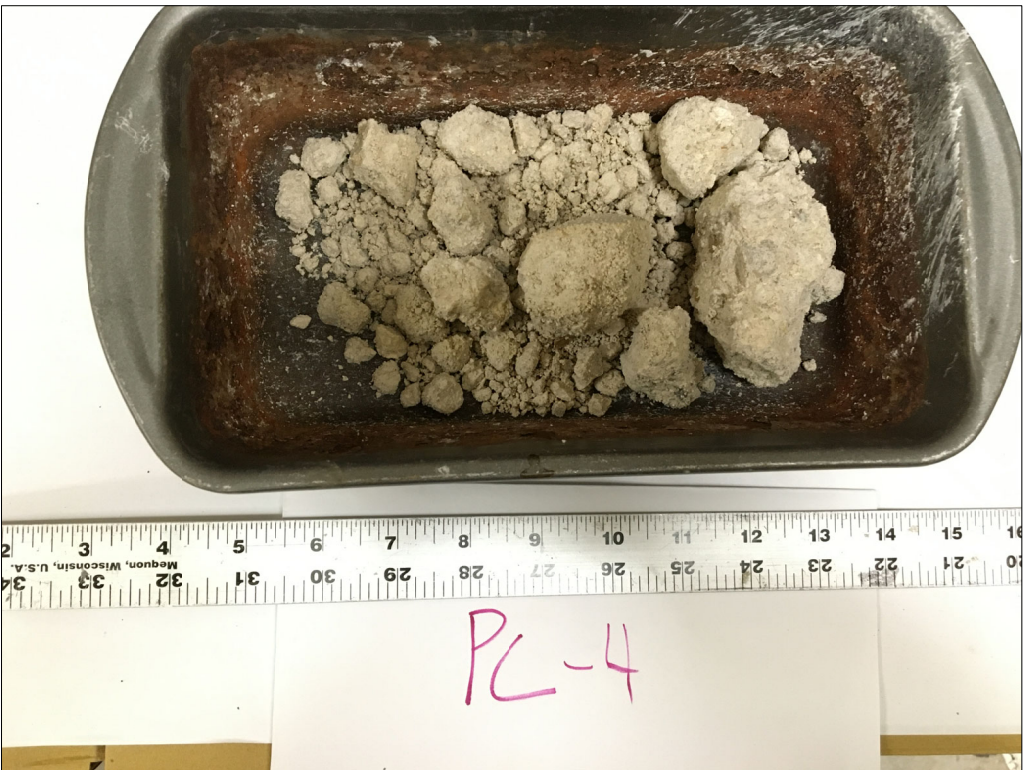


11.5 INCHES THICK ASPHALT



3.0 INCHES THICK ASPHALT

PC-3
NO BASE



6.0 INCHES THICK LIMEROCK BASE

REVISIONS							Names	Dates	 LICENSE NO. - 8901	ENGINEER OF RECORD ANDREW NIXON (P.E.No. - 71458) RADISE International 4152 West Blue Heron Boulevard, Suite 1114 Riviera Beach, Florida, 33404 TEL 561-841-0103 FAX 561-841-0104 URL : http:// www.radise.net	PALM BEACH COUNTY		SCALE: VERTICAL N.T.S.	SHEET TITLE: PAVEMENT CORE AND BASE PHOTOGRAPHS	SHEET NO. 5B		
Date.	By	Descriptions	Date.	By	Descriptions	Drawn by	AK	11/13/2020									
						Checked by	NK	11/13/2020									
						Designed by	AB	11/13/2020					COUNTY	CLIENT	SCALE: HORIZONTAL N.T.S.	PROJECT NAME: HAGEN RANCH ROAD FROM SMITH FARM BOULEVARD TO LANTANA ROAD	RADISE PROJECT NO: 200923
						Checked by	AB	11/13/2020					PALM BEACH	KESHAVARZ AND ASSOCIATES			
						Approved by											



Table A-1: Summary of Laboratory Test Results

Project Name: Hagen Ranch Road - Keshavarez - GEO

Project ID: 200923

ATTERBERG LIMITS									GRAIN SIZE ANALYSIS U.S STANDARD SIEVE SIZE (% Passing)												
Boring No	Sample Depth	Soil Classification	Moisture Content (%)	Organic Content (%)	-200	LL (%)	PL (%)	PI	3"	1.5"	3/4"	3/8"	#4	#10	#20	#40	#50	#60	#100	#140	#200
AB - 1	0' - 2'	A-3	15.4	-	2.7	-	-	-	100	100	100	100	99.0	98.4	97.8	90.5	72.6	60.1	24.5	6.3	2.7
B - 1	2' - 4'	A-3	4.4	-	4.7	-	-	-	100	100	100	98.6	94.5	89.6	86.5	79.0	63.4	52.2	21.5	7.6	4.7
AB - 5	5' - 7'	A-3	21.8	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

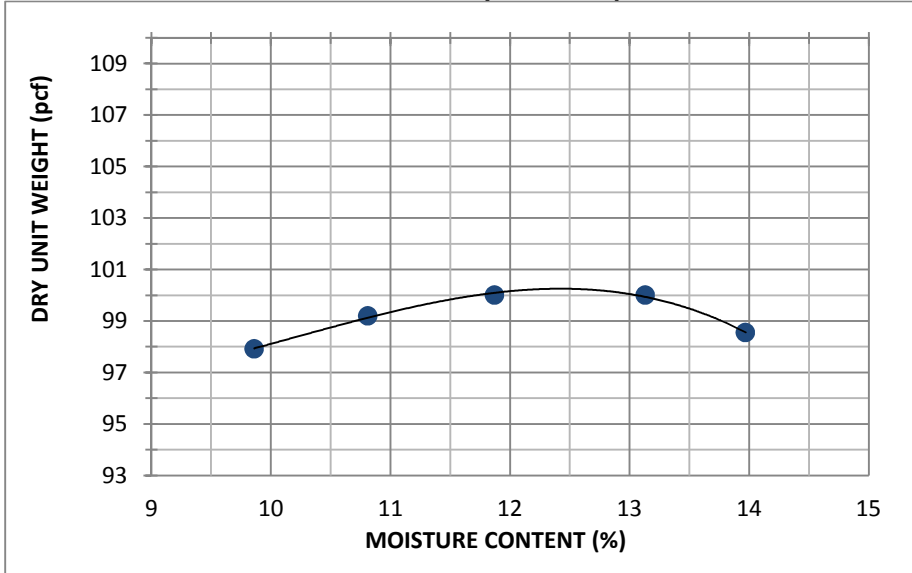
Moisture Content tested in accordance ASTM-D2216,
Organic Content tests are performed with furnace temperature @450 Celsius and tested accordance ASTM-D2974,
Grain Size Analysis was tested in general accordance with ASTM-D422,
Fines Content (Passing No. 200 Sieve) was tested in general accordance with ASTM D 1140.

Limerock Bearing Ratio (LBR) Report

Client	Keshavarz & Associates
Client Project #	
Project Name	Hagen Ranch Road

Report Date	11/18/2020
RADISE Project #	200923
RADISE Sample #	2020 - 1852

Moisture - Density Relationship



Sample Details

Sample Date	11/10/2020
Sample Location	AB-1
Soil Description	Brown fine sand, trace gravel
Soil Classification	Poorly-graded sand (SP)
Material	
Sample #	AB-1

Moisture Content

Moisture Content	4.8
------------------	-----

Note: Moisture Content performed in general accordance with ASTM-D2216

Atterberg Limits (Fine fraction)

Liquid Limit	N/A
Plasticity Index	NP

Note: Plasticity Index Properties performed in accordance with ASTM-D4318

Organic Content

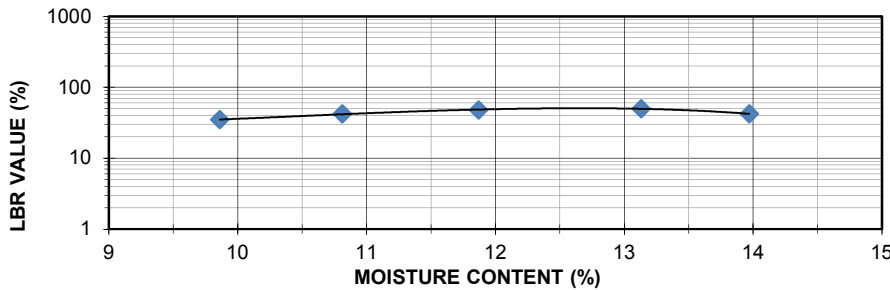
Organic Content (%)	0.18
---------------------	------

Note: Organic Content test performed in accordance with ASTM-D2974

Grain Size Analysis

Sieve	% Passing
3"	100
1.5"	100
3/4"	100
3/8"	100
#4	99.0
#10	98.4
#20	97.8
#40	90.5
#50	72.6
#60	60.1
#100	24.5
#140	6.3
#200	2.7

Note: Grain Size Analysis performed in accordance with ASTM-D422



Coarse Fraction (Retained on 3/4" Sieve)

Specific Gravity	
Absorption (%)	

Proctor

Maximum Density (pcf)	100.3
Optimum Moisture (%)	12.4
LBR Value	50

Note: Moisture Density Relationship performed in accordance with FM 5-515(Limerock Bearing Ratio)Dry Preparation and Automatic hammer type was used.

Maximum Density Correction

Corrected Max. Density (pcf)	100.3
------------------------------	-------

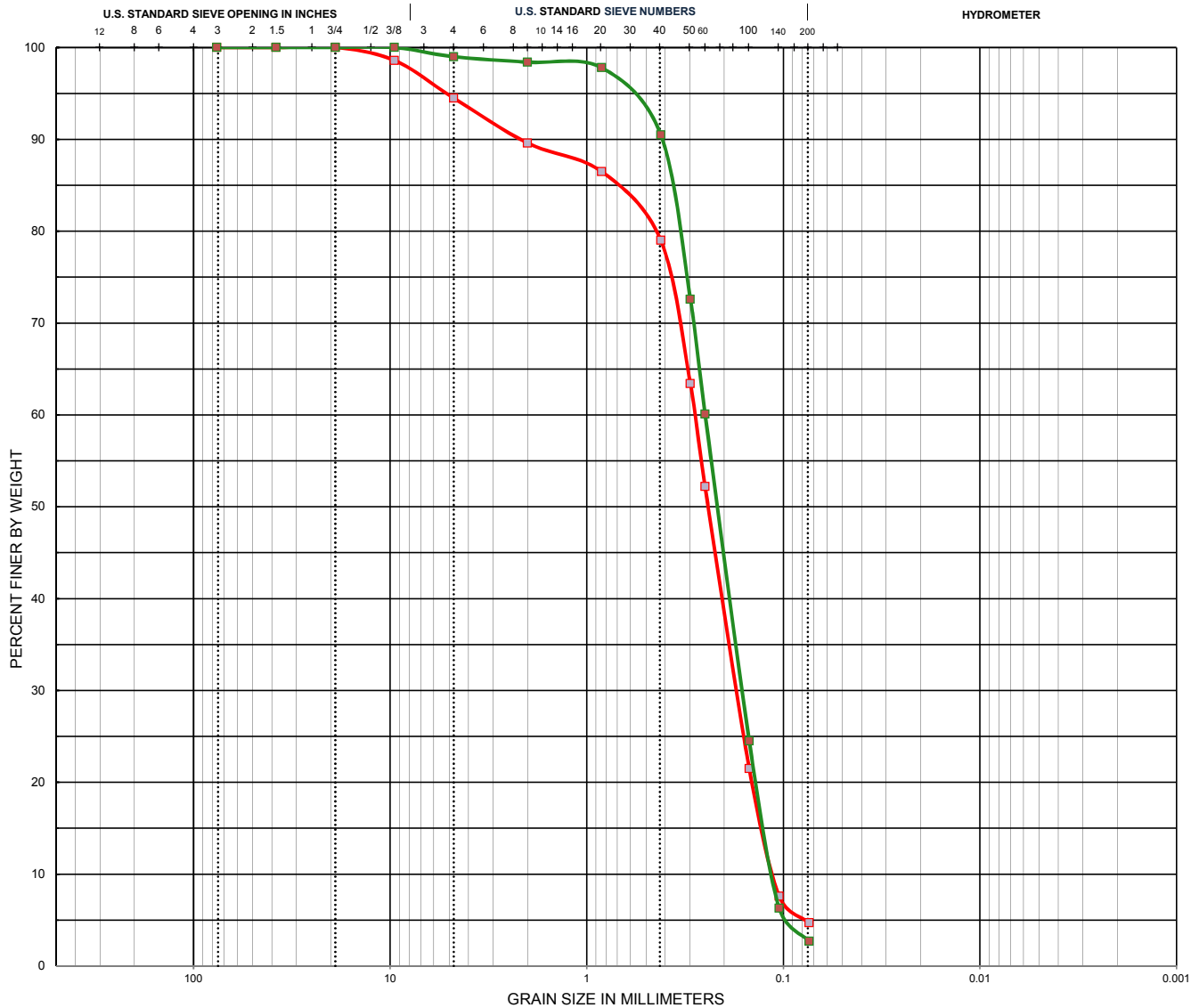


GRAIN SIZE DISTRIBUTION

CLIENT NAME Keshavarz & Associates

PROJECT NAME Hagen Ranch Road - Keshavarez - GEO

PROJECT NUMBER 200923



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring No, Depth	Classification	LL	PL	PI	Cc	Cu
B - 1, 2' - 4'	Fine sand (A-3) - Excellent to Good				0.99	2.49
HA - 1, 0' - 2'	Fine sand (A-3) - Excellent to Good				0.95	2.19

Boring No, Depth	D100	D60	D30	D10	% Cobble	%Gravel	%Sand	%Silt	%Clay
B - 1, 2' - 4'	19	0.28	0.18	0.11	0	5.5	89.8	4.7	
HA - 1, 0' - 2'	9.51	0.25	0.16	0.11	0	1	96.3	2.7	

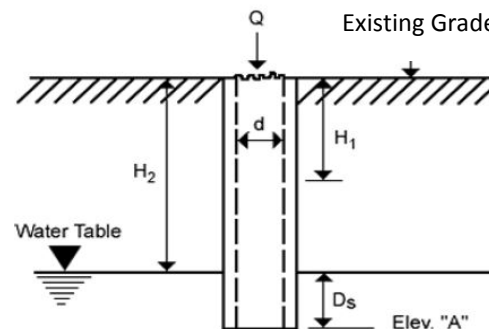
Summary of Exfiltration Test Results
Hagen Ranch Road
Palm Beach County, Florida

Boring No.	Test Depth (ft.)	Diameter of the test hole (in.)	Diameter of the test hole, d (ft.)	Length of the exposed soil, L (ft.)	Depth to water table, H₂ (ft.)	Volume of Water (gal.)	Time (sec)	Stabilized flow rate, Q (cfs)	Saturated Hole Depth, D_s (ft)	Hydraulic Conductivity, K (cfs/ft ² - ft head)
EX-1	0 - 10	8	0.67	10	5.5	23.4	600	0.005	4.5	6.10E-05
EX-2	0 - 10	8	0.67	10	7.0	98.3	600	0.022	3.0	2.24E-04

USUAL OPEN-HOLE TEST

Notes:

1. Methodology and equation from the SFWMD Environmental Resource Permit Information Manual Volume IV



$$K = \frac{4Q}{\pi d (2H_2^2 + 4H_2D_s + H_2d)}$$

K = Hydraulic Conductivity (cfs/ft.² - ft. head)

Q = "Stabilized" Flow Rate (cfs)

d = Diameter of Test Hole (feet)

H₂ = Depth to Water Table (feet)

D_s = Saturated Hole Depth (feet)