REVIEW COPY

REPORT OF FINDINGS SINKHOLE INVESTIGATION HARBINWOOD ESTATES SWMF SINKHOLE LONGVIEW DRIVE LEON COUNTY, FLORIDA

Prepared For:

LEON COUNTY PUBLIC WORKS

ENGINEERING SERVICES DIVISION 2280 MICCOSUKEE ROAD TALLAHASSEE, FLORIDA 32308

Prepared By:

ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.

104 NORTH MAGNOLIA DRIVE TALLAHASSEE, FLORIDA 32301 (850) 386-1253

> June 2019 03-47-18-04

ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.

June 14, 2019

EGS File Number: 03-47-18

Leon County Public Works 2280 Miccosukee Road Tallahassee, Florida 32308

ATTN: Theresa Heiker, PE Stormwater Management Coordinator

SUBJECT: Review Copy - Report of Findings of the Sinkhole Investigation and Remedial Recommendations Harbinwood Estates Stormwater Management Facility Sinkhole Longview Drive Leon County, Florida

Theresa:

Environmental and Geotechnical Specialists (**EGS**) has completed the subsurface investigation as authorized for the sinkhole that formed in the Harbinwood Stormwater Management Facility (**SWMF**). The intent of this investigation was to evaluate the safety of Longview Road, identify the horizontal and vertical extent of the karst feature, develop recommendations to stabilize the karst feature while maintaining the operation of the **SWMF**, and provide an engineering cost estimate for the remediation.

SCOPE OF SERVICES

The Scope of Services approved for this investigation included the following:

- Conducting a Geophysical Survey using Electrical Resistivity Imaging (ERI) to evaluate the location, horizontal, and vertical extent of the karst feature;
- Installation of 22 soil borings to depths varying from 18 to 70 feet to calibrate the Geophysical data and provide physical measurements of the subsurface conditions;
- Identify the approximate horizontal and vertical extent of the karst feature, develop a remedial Option, and prepare Preliminary Construction Plans to implement the Remedial Option; and,
- Preparation of this Report.

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SITE CONDITIONS

The existing site is a **SWMF** that was constructed to improve the drainage issues within the Harbinwood Estates Subdivision. The **SWMF** was constructed around 2007 and consisted of constructing an infiltration/surge pond, collection piping, and an overflow structure. A Site Location Map has been included as **Figure 1**.

Although the **SWMF** is not within an area mapped by Leon County as being a potential karst feature, it is close to Lake Jackson, which has several known active karst features around the perimeter. Since the construction of this **SWMF**, there has been no reported karst activity either within the **SWMF** or adjacent to it. A copy of the Leon County GIS Potential Karst Features Map is provided in **Figure 2**.

Also shown in **Figure 2** are the United States Geological Survey (**USGS**) Topographic Contours. As can be seen in **Figure 2**, the flow of surface water and the likely flow of groundwater is to the north toward Lake Jackson. Since a karst feature is normally the result of erosion of the underlying soil and limestone caused by the migration of groundwater, it is likely that the sinkhole will continue to grow toward the south and southwest with time.

EGS personnel traveled to the site in May 2019 and observed the sinkhole. It appears that the limits of soil erosion in the vicinity of the sinkhole has increased in size since the last site visit, indicating that the sinkhole is continuing to grow. Photographs of the existing soil erosion at the time of the visit has been provided in **Figures 3A** and **3B**. In addition to the growing sinkhole, **EGS observed** several depressions have formed around the perimeter of the sinkhole, which will likely continue to grow and eventually connect with the main sinkhole area. Pictures of some of the depressions have been provided in **Figures 3C** and **3D**.

GEOPHYSICAL SURVEY

A Geophysical Survey of the sinkhole area was started by **EGS** on January 7, 2019 and continued through April 4, 2019 using Electrical Resistivity Imaging (**ERI**). The **ERI** survey consisted of installing 13 Transect Lines, labeled **HW-1** through **HW-13**. The **ERI** testing along Transect Lines **HW-1** through **HW-3**, **HW-7**, **HW-12**, and **HW-13** were conducted using traditional ground cables, while **ERI** testing along Transect Lines **HW-4** through **HW-6** and **HW-8** through **HW-11** were conducted using special water resistant marine cables. **ERI** Transect Lines **HW-7**, **HW-12**, and **HW-13** were conducted on the North side of Longview Road. The locations of the 13 Transect Lines are shown in the Field Test Location Map provided as **Figure 4** with detailed location data provided in **TABLE 1**. Copies of the Subsurface Profiles developed from the **ERI** test results are provided in **Figures 5A** through **5G**.

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The following can be seen in Figures 5A through 5G:

- Transect HW-7 (Figure 5A) This Transect Line is located immediately north of Longview Drive. There is a zone of very loose highly weathered limestone that extends from a depth of about 30 feet to 60 feet between Soil Borings VB-4 and VB-7. At the western end of this Transect Line is a visible dip in the limestone to a depth of greater than 70 feet. Although the limestone dips in this area it does not appear to be a zone where significant vertical erosion is occurring. It appears that subsurface erosion is south in the direction of Transect Line HW-1.
- Transect HW-1 (Figure 5A) This Transect Line is immediately south of Longview Drive. There is a zone of very loose subsoils, between Soil Borings VB-1 and VB-3, which extends from a depth of about 5 feet to a depth of greater than 60 feet. Since there is no significant confining layer in this zone, there is likely a downward migration of subsoil in this zone. This zone likely connects with the zone of very loose soil shown in Transect Line HW-2 causing the soil to move downward and to the south.
- Transect HW-2 (Figure 5B) This Transect Line is approximately 25 feet south of Transect Line HW-1 and intersects the edge of the existing surface depression. There is a zone of very loose subsoils near Soil Boring VB-2 that extends from a depth of about 40 feet to a depth of greater than 70 feet. It appears there is a downward migration of soil to the southwest from Soil Boring VB-5 toward Soil Boring VB-2. This area appears to be the likely "chimney" of the karst feature. It is likely this deep erosion zone is continuous with that identified in Transect Line HW-1.
- Transect HW-3 (Figure 5B) This Transect Line is approximately 25 feet south of Transect Line HW-2 and is between a smaller surface depression and the large sinkhole. There appears to be rock below the sinkhole in this area; however, there is a small vertical zone of eroded rock near Soil Boring VB-8 that extends from a depth of 18 feet to a depth of greater than 70 feet. This erosion area is likely a "chimney" of active vertical erosion. <u>EGS believes that with continued vertical erosion of subsoils, this area will become a sinkhole in the future. This future sinkhole has been identified as AREA 2 in this Report.</u>
- Transect Line HW-4 (Figure 5C) This Transect Line is approximately 25 feet south of Transect Line HW-3 and intersects the edge of the large existing sinkhole. There is a zone of very loose subsoils and weathered rock near Soil Boring VB-20 that extends from a depth of about 35 feet to a depth of greater than 70 feet immediately east of the existing sinkhole. The erosion in this area appears to be downward, creating what is likely a path helping to form the large sinkhole at the surface. It is likely this deep erosion zone is continuous with that identified in Transect Lines HW-2 and HW-3.

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The vertical channel visible in this **Figure** corresponds approximately to the location where a small water vortex is visible in the bottom of the large sinkhole. This location has been identified as **AREA 1** in this Report.

- Transect Line HW-5 (Figure 5C) This Transect Line is approximately 40 feet south of Transect Line HW-4 and intersects the southern edge of the large existing sinkhole. There does not appear to be a significant vertical zone of very loose subsoils. In this area most of the erosion is horizontal and is likely moving to the north toward Transect Line HW-4. Based on the results of Soil Boring VB-17, installed about 4 months after ERI scan HW-5 was performed, very loose subsoils were encountered from a depth of about 30 feet to 60 feet which supports the belief that horizontal erosion is occurring.
- Transect Line HW-6 (Figure 5D) This Transect Line is approximately 50 feet south of Transect Line HW-5 and is south of the large existing sinkhole. <u>Although</u> there are large holes in the rock at depths of 60 feet or more, there does not appear to be any significant vertical zone of the loose subsoils, as evidenced by Soil Boring VB-14.
- Transect Lines HW-8 through HW-11 (Figures 5E and 5F) These Transect Lines were performed to confirm the subsurface conditions identified in the other Transect Lines and estimate the horizontal dimension of the active zones of vertical erosion ("chimneys").
- Transect Lines HW-12 and HW-13 (Figure 5G) These Transect Lines were conducted on the North side of Longview Drive to identify if the karst conditions extended north of the roadway. As can be seen in Figure 5G, the karst conditions are deep seated, below about 30 feet, with no clear vertical channel of soil erosion. The karst conditions that caused the large sinkhole in the SWMF are not significantly affecting the area to the north of Longview Drive.

Based on the Geophysical Investigation conducted for this Study, there appears to be 2 primary areas where vertical subsoil erosion is occurring. **AREA 1** is immediately to the east of the existing sinkhole and is likely the location where the "chimney" of the large sinkhole exists. **AREA 2** appears to be an active "chimney" forming approximately 60 feet west of the existing sinkhole.

SOIL BORINGS

EGS installed 22 soil borings for this investigation, labeled **VB-1** through **VB-22**. The locations of the Soil Borings are shown in the Field Test Location Map provided as **Figure 4** with detailed location data provided in **TABLE 2**. A summary of the field and laboratory testing has been included on the *Report of Soil Borings* provided in **APPENDIX A**. Detailed *Soil Boring Logs* and *Soil Classification Data* sheets have been provided in **APPENDICES B** and **C**, respectively. In addition, the Soil Boring Logs are shown on the Subsurface Profiles in **Figures 5A** through **5G**.

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As can be seen in **Figures 5A** through **5G**, the Soil Borings and the Geophysical Survey are in good agreement and confirm the locations of the subsurface karst features.

DEPTH TO A CONFINING LAYER

The depths to a definitive confining layer is shown in **Figure 6**. As can be seen in **Figure 6**, there are some deep holes in the underlying rock surface that are the direct cause of the existing sinkhole. Although there are a number of holes in the rock, it appears the largest and deepest holes are to the south of Longview Drive. Because sinkholes are normally caused by the vertical erosion of soil downward into the underlying limestone, the presence of these vertical holes in the limestone are a good indicator of the locations of current and future sinkholes. Visual observations indicate the direction of growth in the sinkhole is fairly rapid to the south.

HORIZONTAL EXTENT OF LARGE SINKHOLE

As can be seen in **Figure 5G**, the horizontal extent of the large sinkhole that formed in **SWMF** is mostly to the south. To verify the Geophysical Survey conducted on the North side of Longview Drive, **EGS installed** Soil Boring **VB-10** on the North side of Longview Drive at the right-of-way line. As can be seen in the *Report of Soil Borings* provided in **APPENDIX A**, the subsoils on the North side of Longview Drive are fairly dense, with a layer of Plastic Sandy Clay (**CH**) near the surface. <u>This layer of clay is likely causing stormwater to "perch" near the ground surface after periods of heavy or prolonged rainfall. In addition, the clay layer is moderately expansive and will exhibit shrinkage and swelling with changes in moisture content.</u>

CONCLUSION

Based on the subsurface investigation conducted to date for this Study, the following can be concluded:

- The sinkhole within the stormwater pond is a result of the erosion of subsoils into a vertical "chimney" in the rock located immediately east of the depression;
- There is a vertical "chimney" located immediately west of the existing sinkhole, which is allowing soil to migrate downward into the underlying rock formation and will likely result in the formation of another sinkhole in the near future; and,
- There does not appear to be any significant impact to the subsoils on the Northside of Longview Drive as a result of the sinkhole that formed in the **SWMF**.

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REMEDIAL RECOMMENDATIONS

AREA 1 – SEAL LARGE SINKHOLE "CHIMNEY" CLOSED

Because of the large size of the sinkhole and difficulty in getting equipment close to the sinkhole, **EGS recommends** sealing the "chimney" of the sinkhole using a "high slump" self-consolidating non-excavatable flowable fill cap. The general construction sequence will consist of the following:

- Prepare the staging/work areas at the locations shown in Figure 7;
- Construct a temporary diversion dike from the stormwater inlet location to the overflow grate as shown in APPENDIX A - the side slope of the dike facing the water should be covered with an impermeable liner (*Visqueen or equivalent*) to reduce the chance for a piping failure of the dike;
- Construct a temporary sump pit in the bottom of the SWMF at the general location shown in APPENDIX A to pump stormwater into the overflow structure - to protect the work area from flooding;
- Stage a "long reach" excavator next to the sinkhole within the staging/working area shown and remove all the loose sediment within the general limits of **AREA 1** shown in **APPENDIX A**;
- Excavate AREA 1 to a depth of 10 feet below the existing SWMF (approximately EL 87);
- Clean **AREA 1** of all loose soil and debris;
- Pump 2 feet of Non-Excavatable Flowable Fill (FDOT Specification 121-3) into the excavation made at **AREA 1**;
- Allowable the flowable fill to cure for 3 days prior to placing any fill on top of flowable fill;
- After 3 days, place 12-inches of Clayey Sand (A-2-6/A-6) on top of the flowable fill and compact using the excavator bucket to create a semi-rigid compacted mass; and,
- On top of the semi-compacted mass, place Clayey Sand (A-2-6/A-6) to the bottom of the SWMF (EL 97 feet) in lifts not to exceed 9-inches of loose soil, compacting to full using a small smooth non-vibratory roller (static weight of 5 tons or less) making at least 5 passes.

An engineering estimate of the cost seal the sinkhole throat at **AREA 1** is provided in **TABLE 3**.

AREA 2 – SEAL SMALL "CHIMNEY" CLOSED

EGS recommends the "very loose" subsoils and void surrounding the active smaller "chimney" at **AREA 2** be stabilized by means of a targeted cement grout injection program to densify the subsoils and fill any subsurface voids.

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EGS has prepared a figure depicting the recommended staging and work areas for the Contractor, provided in **Figure 7**. The "targeted" grouting program should would generally consist of the following:

- Installation of 9 grout injection pipes (points) around the perimeter of the known "chimney" at the locations shown in APPENDIX A;
- Inject cement grout under pressure on 2 foot intervals through the grout pipes to compact the in situ soils and fill any voids; and,
- Check the effectiveness of the grouting injection program by installing 2 verification soil borings within the grouted area to ensure the soils have been densified and the area adequately remediated.

An engineering estimate of the cost seal the grout the throat of the karst feature at **AREA 2** is provided in **TABLE 4**. The *Cement Grout Plan* is provided in **APPENDIX A** with a copy of the Technical Special Provision (**TSP**) for the grouting operation provided in **APPENDIX D**.

CLAY LINER IN BOTTOM OF SWMF

Once the chimney has been sealed and the sinkhole has been filled in, **EGS recommends** lining the bottom of the **SWMF** to retard the infiltration of stormwater and thus reduce future movement of subsoil into the underlying limestone. The general construction sequence will consist of the following:

- Remove all existing vegetation from the bottom of the SWMF and side slopes to top of over flow grate;
- Place 2 lifts of clayey sand (A-2-6/A-6) over the bottom of the SWMF and up the side slopes to the top of the overflow grate;
- Each lift should not exceed 9-inches of loose soil and each lift should be compacted using the small smooth roller described above; and,
- Cover the compacted fill in the bottom of the **SWMF** 6-inches of uncompacted Sand (**A-3/A-2-4**) having a maximum fines content of 25%.

An engineering estimate of the cost cover the SWMF with a clay liner is provided in **TABLE 5**.

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CLOSURE

The data and results presented in this Geotechnical Investigation are intended for the use of Leon County Public Works for the remediation of the Harbinwood Estates Stormwater Management Facility Sinkhole, described herein. This Report is not intended for any other use and will likely not be applicable. The data may not be used without the expressed written consent of Leon County Public Works. This Report shall not be reproduced, except in full, without the written approval of Environmental and Geotechnical Specialists, Inc. The data and results presented in this Report are based on the tests performed at the specific locations and depths noted. Subsurface conditions at other locations may vary significantly from those presented herein. Should data become available which is different from the data presented herein, Environmental and Geotechnical Specialists, Inc. requests the opportunity to review the data and make any modifications to the design recommendations which may be appropriate.

SIGNATURE

Environmental and Geotechnical Specialists, Inc. appreciates the opportunity to be of service on this project. If you have any questions concerning the information contained in this Report or **EGS** can be of further service please call Katie Ball at (904) 580-8533 or me at (850) 536-8350.

Sincerely,

Environmental and Geotechnical Specialists, Inc. *Florida Certificate of Engineering Authorization 6222*

Myron L. Hayden

Myron L. Hayden, Ph.D., P.E. Chief Geotechnical Engineer FL P.E. No. 34067

This Report has been digitally signed and sealed by Myron Hayden on the date adjacent to the seal.

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





TABLE 1 ERI TEST LOCATION DATA HARBINWOOD ESTATES SWMF SINKHOLE LONGVIEW DRIVE LEON COUNTY, FLORIDA

ERI TRANSECT		STATE COORD	PLANE INATES	GEOGRAPHIC POSITIONING SATELLITE COORDINATES SYSTEM (GPS) ²			
LINE LO	CATION ¹	NORTHING EASTING		LATI	TUDE	LONGITUDE	
		(FEET)	(FEET)	DEG (°)	MIN (')	DEG (°)	MIN (')
H\\\/_1	BEGIN	551172	2021101	30	30.927	84	19.978
1100-1	END	551314	2021334	30	30.950	84	19.934
H\\\/_2	BEGIN	551150	2021114	30	30.923	84	19.976
1100-2	END	551293	2021347	30	30.947	84	19.931
	BEGIN	551132	2021124	30	30.920	84	19.974
Πνν-3	END	551274	2021353	30	30.944	84	19.930
	BEGIN	551096	2021147	30	30.914	84	19.970
Πνν-4	END	551252	2021355	30	30.940	84	19.930
	BEGIN	551060	2021159	30	30.908	84	19.967
HW-5	END	551216	2021380	30	30.934	84	19.925
	BEGIN	551022	2021177	30	30.902	84	19.964
ПVV-0	END	551172	2021412	30	30.927	84	19.919
	BEGIN	551215	2021081	30	30.934	84	19.982
	END	551359	2021316	30	30.958	84	19.937
	BEGIN	551215	2021136	30	30.934	84	19.972
Πνν-ο	END	550985	2021277	30	30.896	84	19.945
	BEGIN	551236	2021170	30	30.937	84	19.965
ПVV-9	END	551006	2021311	30	30.899	84	19.938
1.04/ 40	BEGIN	551280	2021240	30	30.945	84	19.952
HVV-10	END	551050	2021381	30	30.907	84	19.925
	BEGIN	551293	2021262	30	30.947	84	19.948
	END	551062	2021403	30	30.909	84	19.921
	BEGIN	551242	2021068	30	30.938	84	19.985
	END	551386	2021302	30	30.962	84	19.940
	BEGIN	551229	2021075	30	30.936	84	19.983
Πνν-13	END	551373	2021310	30	30.960	84	19.938

NOTES:

1. ERI MEANS ELECTRICAL RESISTIVITY IMAGING.

2. COORDINATES RECORDED USING A TRIMBLE GEO7X HANDHELD UNIT.

TABLE 2 SOIL BORING LOCATION AND GROUNDWATER DATA HARBINWOOD ESTATES SWMF SINKHOLE LONGVIEW DRIVE LEON COUNTY, FLORIDA

BORING LABEL	BORING DEPTH ¹	DATE INSTALLED	APPROXIMATE GROUND SURFACE	STATE COORDI	STATE PLANE GEOGRAPHIC COORDINATES ³ COORDINATES			GRAPHIC POSITIONING DINATES SYSTEM (GPS)			MEASURED GROUNDWATER		
			ELEVATION ²	NORTHING	EASTING	LATITUDE		LATITUDE		LONG	ITUDE	DEPTH	ELEVATION
	(FEET)		(FEET)	(FEET)	(FEET)	DEG (°)	MIN (')	DEG (°)	MIN (')	(FEET)	(FEET)		
VB-1	50.0	1/7/19	112	551239	2021221	30	30.938	84	19.955	> 6.0	< 106.0		
VB-2	50.0	1/9/19	112	551252	2021257	30	30.940	84	19.948	10.0	102.0		
VB-3	50.0	1/11/19	112	551250	2021240	30	30.940	84	19.952	> 7.5	< 104.5		
VB-4	61.2	1/10/19	111	551261	2021210	30	30.942	84	19.957	4.7	106.3		
VB-5	50.0	1/21/19	112	551275	2021317	30	30.944	84	19.937	13.0	99.0		
VB-6	70.0	2/11/19	112	551238	2021169	30	30.938	84	19.965	5.0	107.0		
VB-7	58.2	2/12/19	110	551281	2021240	30	30.945	84	19.952	5.0	105.0		
VB-8	68.6	2/15/19	107	551181	2021204	30	30.928	84	19.959	> 3.0	< 104.0		
VB-9	55.1	2/20/19	112	551192	2021162	30	30.930	84	19.967	> 6.5	< 105.5		
VB-10	51.5	4/4/19	110	551293	2021207	30	30.947	84	19.958	> 6.5	< 103.5		
VB-11	38.0	5/15/19	104	551171	2021230	30	30.927	84	19.953	> 3.0	< 101.0		
VB-12	38.4	5/14/19	104	551146	2021235	30	30.923	84	19.952	> 3.0	< 101.0		
VB-13	40.0	5/14/19	104	551120	2021256	30	30.918	84	19.948	2.5	101.50		
VB-14	24.0	5/16/19	104	551106	2021300	30	30.916	84	19.939	> 3.0	< 101.0		
VB-15	17.9	5/13/19	104	551062	2021202	30	30.909	84	19.958	0.5	103.50		
VB-16	40.0	5/22/19	104	551107	2021338	30	30.916	84	19.932	> 3.0	< 101.0		
VB-17	60.1	5/16/19	104	551146	2021312	30	30.923	84	19.937	> 3.0	< 101.0		
VB-18	33.1	5/21/19	104	551167	2021325	30	30.926	84	19.935	> 3.0	< 101.0		
VB-19	26.5	5/17/19	104	551185	2021300	30	30.929	84	19.940	> 3.0	< 101.0		
VB-20	49.0	5/20/19	104	551199	2021292	30	30.931	84	19.941	> 3.0	< 101.0		
VB-21	40.0	5/20/19	104	551196	2021316	30	30.931	84	19.936	> 3.0	< 101.0		
VB-22	41.5	5/23/19	104	551102	2021228	30	30.916	84	19.953	> 3.0	< 101.0		

NOTES: 1. DEPTHS MEASURED BELOW EXISTING GROUND SURFACE.

2. APPROXIMATE EXISTING GROUND SURFACE DETERMINED FROM USGS TOPOGRPAHIC CONTOURS.

3. APPROXIMATE LOCATIONS BASED ON COORDINATES RECORDED USING A TRIMBLE GEO7X HANDHELD UNIT.

TABLE 3 ENGINEERING COST ESTIMATE SEALING SINKHOLE "CHIMNEY" IN AREA 1 HARBINWOOD ESTATES SWMF LONGVIEW DRIVE LEON COUNTY, FLORIDA

PAY ITEM DESCRIPTION	UNITS	NUMBER OF UNITS	COST PER UNIT (\$)	ESTIMATED COST (\$)
MOBILIZATION / DEMOBILIZATION	LS	1	\$25,000	\$25,000
TEMPORARY DIKE CONSTRUCTION	CY	90	\$10	\$900
SOIL TRACKING PREVENTION AREA	LS	1	\$2,500	\$2,500
NON-EXCAVATABLE FLOWABLE FILL ¹	YD ³	100	\$200	\$20,000
CLAYEY FINE SAND BACKFILL ²	CY	3,600	\$25	\$90,000
CONSTRUCTION MONITORING	LS	1	\$20,000	\$20,000
SUBTOTAL				\$158,400
CONTINGENCY (20%)				\$31,680
CONSTRUC	\$190,080			

NOTES: 1. BASED ON FILLING "CHIMNEY" WITH FLOWABLE FILL.

2. BASED ON A FILLING SINKHOLE AND DEPRESSIONS WITH CLAYEY FINE SAND EMBANKMENT FILL.

TABLE 4 ENGINEERING COST ESTIMATE GROUT CHIMNEY CLOSED IN AREA 2 HARBINWOOD ESTATES SWMF SINKHOLE LONGVIEW DRIVE LEON COUNTY, FLORIDA

PAY ITEM DESCRIPTION	UNITS	NUMBER OF UNITS	COST PER UNIT (\$)	ESTIMATED COST (\$)
MOBILIZATION / DEMOBILIZATION	LS	1	\$10,000	\$10,000
NUMBER OF GROUT POINTS		9		
INSTALLATION OF GROUT POINTS ¹	FT	540	\$20	\$10,800
CEMENT GROUT INJECTION ^{2,3}	YD ³	95	\$200	\$19,000
PER DIEM	DAYS	3	\$250	\$750
CONSTRUCTION MONITORING	LS	1	\$5,000	\$5,000
SUBTOTAL				\$45,550
CONTINGENCY (20%)				\$9,110
TOTAL CONST	\$54,660			

NOTES: 1. BASED ON A 5-FEET SPACING OF GROUT POINTS.

2. BASED ON INJECTIING GROUT FROM A DEPTH OF 4 TO 60 FEET.

3. BASED ON SOIL COMPACTION OF 20%.

TABLE 5 ENGINEERING COST ESTIMATE ADDING A CLAY LINER HARBINWOOD ESTATES SWMF LONGVIEW DRIVE LEON COUNTY, FLORIDA

PAY ITEM DESCRIPTION	UNITS	NUMBER OF UNITS	COST PER UNIT (\$)	ESTIMATED COST (\$)
CLAY LINER ³	CY	3,590	\$25	\$89,750
SAND COVER ³	CY	1,795	\$20	\$35,900
REPAIR LANDSCAPING	LS	1	\$15,000	\$15,000
CONSTRUCTION MONITORING	LS	1	\$15,000	\$15,000
SUBTOTAL				\$155,650
CONTINGENCY (20%)				\$31,130
TOTAL CONST	\$186,780			

NOTE: 1. BASED ON COVERING BOTTOM OF SWMF WITH CLAYEY SAND AND SAND



Attachment D



DRAWN I. CAPORINI	CHECKED: K. BALL, E.I.		TITLE: PROJECT LC	CATION MAP	
ENGINEER: M. HAYDE	N, P.E.	SPECIALISTS, INC.	HARBINWOOD ESTATES SWMF SINKHOLE LONGVIEW DRIVE		
CLIENT: LEON COUNTY P	UBLIC WORKS	104 NORTH MAGNOLIA DRIVE TALLAHASSEE, FLORIDA 32301	LEON COUN	TY, FLORIDA	
PROJ. NO.: 03-47-18-04	SCALE:	OFFICE: (850) 386-1253	DATE: JUNE 2019	FIGURE NO.: 1	



DRAWN: I. CAPORINI	CHECKED: K. BALL, E.I.	ENVIRONMENTAL AND GEOTECHNICAL	TITLE:			
ENGINEER: M. HAYI	DEN, P.E.	SPECIALISTIS, INC.	HARBINWOOD ESTATES SWMF SINKHOLE LONGVIEW DRIVE			
CLIENT: LEON COUNTY PUBLIC WORKS		104 NORTH MAGNOLIA DRIVE TALLAHASSEE, FLORIDA 32301	LEON COUN	ity, florida		
PROJ. NO.: 03-47-18-04	SCALE:	OFFICE: (850) 386-1253	DATE: JUNE 2019	FIGURE NO.: 2		



FIGURE 3A: PHOTOGRAPH OF EXISTING SITE CONDITIONS NEAR SOIL BORING VB-14 (FACING NORTH)



FIGURE 3B: PHOTOGRAPH OF EXISTING SITE CONDITIONS NEAR SOIL BORING VB-11 (FACING EAST)



FIGURE 3C: PHOTOGRAPH OF EXISTING SITE CONDITIONS NEAR SOIL BORING VB-1 (FACING EAST)



FIGURE 3D: PHOTOGRAPH OF EXISTING SITE CONDITIONS NEAR SOIL BORING VB-17 (FACING WEST)



CALE:	AS SHOWN	DATE:	JUNE 2019
ROJ. NO.:	03-47-18-04	FIGURE NO.:	4









LEGEND		
IKELY DIRECTION OF SOIL MIGRATION MEASURED GROUNDWATER LEVEL 7.2 24.4 83 285 971 FLUID LOSS RESISTIVITY (Ohm-m) SOIL BORING TRUNCATED. SEE APPENDIX C FOR DETAILED SOIL PROPERTIES	PREPARED: K. BALL, E.I. CHECKED: M. HAYDEN, P.E. REVISED: K. BALL, E.I. ENGINEER: M. HAYDEN, P.E.	ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC. 104 NORTH MAGNOLIA DRIVE TALLAHASSEE, FLORIDA 32301 OFFICE: (850) 386-1253













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15 SCALE (FEET)

LEGEND



APPROXIMATE ORIGINAL SINKHOLE LOCATION

DRAWN:	CHECKED:		TITLE:				
K. BALL, E.I.	K. BALL, E.I. D. DEMEZA, E.I.			APPROXIMATED CONTOUR MAP			
ENGINEER: M. HAYDEN, P.E.		Environmental and Geotechnical Specialists, Inc.	OF CONFINING SURFACE HABINWOOD ESTATES SWMF SINKHOLE				
CLIENT: LEON COUNTY	PUBLIC WORKS	104 North Magnolia Drive Tallahassee, Florida 32301	LEON COUNTY, FLORIDA				
PROJECT NO.: SCALE:		Office. (650) 566-1255	DATE:	FIGURE NO.:			
03-47-18-04			JUNE 2019	6			



<u>APPENDIX A</u> GEOTECHNICAL PLAN SHEETS

NOTES





		REVIS	ONS			SEAL:	Environmental & Geotechnical Specialists, Inc.		
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION			LEON COUNTY PUBLIC WORKS	
									I REP
								PROJECT TITLE	
						MIRON L. HAIDEN	OFFICE: (850) 386-1253	UADDINIWOOD ESTATES SWME SINKUOI E	
						P.E. NO.: 34067	Cert. of Auth.: 6222	IARDIN WOOD ESTATES SWIVIF SINKHOLE	



Cert. of Auth : 6222

P.E. NO.: 34067

OFFICE: (850) 386-1253

HARBINWOOD ESTATES SWMF SINKHOLE

Attachment D - *115* 110 LOOSE BROWN TO GRAY CLAYEY FINE SAND (A-2-6) 105 LOOSE TO MEDIUM DENSE ORANGE AND GRAY CLAYEY SAND (A-6) 100 95 STIFF GRAY AND ORANGE HIGHLY PLASTIC SANDY CLAY (A-7-6) ELEVATION 90 । (FEET) 85 WEATHERED LIMESTONE 80 75 HARD LIMESTONE 70 WEATHERED LIMESTONE 65 HARD LIMESTONE 60 SHEET REPORT OF SOIL BORINGS (2 OF 8) NO.



Attach	iment D
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LOOSE TO MEDIUM DENSE GRAY CLAYEY FINE SAND (A-2-6)	110
LOOSE LIGHT GRAY FINE SAND (A-3) LOOSE GRAY CLAYEY FINE SAND (A-2-6)	105
	100
MEDIUM DENSE GRAY CLAYEY FINE SAND (A-2-6)	
LOOSE GRAY AND ORANGE CLAYEY SAND (A-6)	
	- - - - 85
STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY (A-7-6)	ELEVATI 80
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ORT OF SOIL BORINGS (3 OF 8)	NO.



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LOOSE ORANGE AND GRAY CLAYEY SAND (A-6)	105	
STIFF GRAY HIGHLY PLASTIC CLAY (A-7-6)	100 	
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ORT OF SOIL BORING	SHEET NO.	
(4 OF 8)		



Attachment D - *115* 110 105 FIRM TO STIFF LIGHT BROWN PLASTIC CLAY (A-7-6) 100 95 MEDIUM DENSE LIGHT BROWN PLASTIC CLAYEY SAND (A-7-6) ELEVATI 90 ION 85 FIRM LIGHT BROWN HIGHLY PLASTIC SILT WITH SAND (A-7-5) (FEET) HARD BROWN HIGHLY PLASTIC SILT WITH SAND (A-7-5) 80 _VERY STIFF LIGHT BROWN HIGHLY PLASTIC SILT WITH SAND (A-7-5) 75 SOFT TO FIRM LIGHT BROWN TO TAN HIGHLY PLASTIC SILT WITH SAND (A-7-5) 70 54/9" - HARD TAN HIGHLY PLASTIC SILT WITH SAND (A-7-5) 50/5" - HARD LIMESTONE 65 60

REPORT OF SOIL BORINGS (5 OF 8) SHEET NO.


Cert. of Auth : 6222

P.E. NO.: 34067

Attachment D

HARBINWOOD ESTATES SWMF SINKHOLE

	105	
LOOSE TO MEDIUM DENSE GRAY AND ORANGE HIGHLY PLASTIC CLAYEY SAND (A-7-6) FIRM LIGHT GRAY HIGHLY PLASTIC CLAY WITH SAND (A-7-6) VERY STIFF LIGHT GRAY HIGHLY PLASTIC CLAY WITH SAND (A-7-6) FIRM LIGHT GRAY HIGHLY PLASTIC CLAY WITH SAND (A-7-6) STIFF TO VERY STIFF LIGHT GRAY HIGHLY PLASTIC SILT WITH SAND (A-7-5)	105 100 95 90	
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REPORT OF SOIL BORINGS (6 OF 8)	S	HEE NO.

ΕT





Attachment D

SINKHOLE REMEDIATION PLAN

AREA 1



NOTES

- 2. EXISTING SOILS ARE SUITABLE FOR USE IN THE TEMPORARY DIKE. З. NON-EXCAVATABLE FLOWABLE FILL SHALL BE IN ACCORDANCE WITH FDOT STANDARD SPECIFICATIONS, SECTION 121. 4. COMPACTION SHOULD BE ACHIEVED USING A 5-TON ROLLER IN STATIC MODE ONLY.
- REFER TO THE TYPICAL SECTION FOR NON-EXCAVATABLE FLOWABLE FILL PLUG THICKNESS, LAYER PLACEMENT, AND TEMPORARY DIKE WITH VISQUEEN LINER. 5.





		REVISI	ONS			SEAL:	Environmental & Geotechnical Specialists, Inc.		
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION		,	LEON COUNTY PUBLIC WORKS	
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								PROJECT TITLE	
						MYRON L. HAYDEN	YDEN EGS 104 NORTH MAGNOLIA DRIVE		
						P.E. NO.: 34067	Cert. of Auth.: 6222	HARBINWOOD ESTATES SWMF SINKHOLE	





P.E. NO.: 34067

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LOCATIONS OF GROUT POINTS ARE APPROXIMATE. DETAILED SURVEY INFORMATION NOT AVAILABLE AT

NUMBERS IN THE CENTER OF INJECTION POINTS INDICATE THE SEQUENCE ORDER. SEE DETAILS FOR INJECTION DEPTH OF GROUT COLUMNS AND INJECTION SEQUENCE.

CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO THE UTILITIES IN THE AREA FROM CEMENT

POST PRODUCTION SPT SHALL BE INSTALLED CENTRALLY LOCATED IN THE GROUT REMEDIATION AREA TO CONFIRM THE ZONE OF "VERY LOOSE" SUBSURFACE SOILS HAVE BEEN ADEQUATELY DENSIFIED (SPT "N" > 8).

SHEET NO.

EMENT GROUT PLAN

APPENDIX B SOIL BORING LOGS

_														Attach	ment	D		
E	NVIRC	onmi Sf	ENTAL & G	eotechnical , Inc.	PROJECT: <u>HARBINWOO</u> CLIENT: <u>LEON COUNTY</u> PROJECT NO.: <u>03-47-18</u>	DD ESTAT ' PUBLIC \ 3-04	ES SWMF S WORKS	SINKF	IOLE			HAN		TYPE: N (FEE	<u>AUT(</u>	ОМА 11	TIC	;
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	104	Nor	th Magno	lia Drive	PROJECT LOCATION:	LEON COU	NTY, FLOF	RIDA					ATE:		2/11	1/19		
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	104	North M:	anolia Drive	PROJECT LOCATION:	LEON COL	JNTY, FLOF	RIDA			ATE:	2/11	/19	-
	Tallah	assee,	Florida 32301	BORING NO.: VB-6		, _3.	-		= FL		: 100%	6 @ 35	.0'
	Offic	e #: (85	0) 386-1253	DRILLER: R. ROGERS					C/	AVING: _C		NONE	-
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	SMRCMMENTAL & GEOTECHARCAL SPECIALISTS, INC. PROJECT: HARBINWOOD ESTATES SWMF SINKHOLE CLIENT: LEON COUNTY PUBLIC WORKS PROJECT NO: 03-47-18-04 PROJECT LOCATION: LEON COUNTY, FLORIDA BORING NO: VB-8 DRILLER: R: ROGERS DEPTH TO WATER: INITIAL: * > 3.0' Image: Comparison of the second se								Att	achme	ent D							
EN	IRON	MEN	ITAL & GE	EOTECHNICAL	CLIENT: LEON COUNT		JULL			НА	MMER	TYP	E: M	ANU	AL			
	:	Spe	CIALISTS,	NC.	PROJECT NO.: 03-47-1	18-04						ELI	EVATIO	DN (F	EET)	:	107	7
	104	Nort	th Magnol	lia Drive	PROJECT LOCATION:	LEON COL	INTY, FLOF	RIDA				DA	TE:	`	2/15	5/19		
	Tallah	ass	ee, Florid	da 32301	BORING NO.: VB-8							FLU		SS:	100%	% @	41.0	0'
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EN/	/IRON	MEN	TAL &	Geotechnical	CLIENT: LEON COUNTY	LEON COUNTY PUBLIC WORKS									IER	TYP	E: M	<u>IAN</u> U	AL				
	\$	SPE C	CIALIST	s, Inc.	PROJECT NO.: 03-47-18	-04							ELI	EV		N (F	EET)):	104	4			
	104	Nort	h Magi	nolia Drive	PROJECT LOCATION: L	EON COL	INTY, FLOF	RIDA					DA	TE:			5/14/2019						
	Tallał	nass	ee, Flo	rida 32301	BORING NO.: VB-12	3-12								FLUID LOSS:				: 100% AT 27.5					
	Offic	ce #:	(850) (850) 3	386-1253 85-8050	DRILLER: R. ROGERS									VIN	IG:	<u> </u>	NONE						
	ı a	Λ π.	(000) 0	00-0000	DEPTH TO WATER: INITIAL: ¥ > 3.0'									HR	: ¥		N/M						
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	-	-		L HIGHLY PL	LIGHT BROWN LASTIC SILT WITH SAND	A-7-5																	
					L HIGHLY PL	SOFT LIGHT BROWN LASTIC SILT WITH SAND	A-7-5		132				•1;	32 -		2	•						
- 10									<u> </u>	-	+	$\left \right $	+				+			╀			
	-			HIGHLY PL	FIRM TAN ASTIC SILT WITH SAND	A-7-5		127				●1: 	27 -		5	•							
								81					81-	5	4/9"				UAL 104 19 \T 27.5' NE /M Alue \$\$9,\$2,\$3 \$\$100 \$\$100 \$\$50/5 \$\$100				
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	-			HIGHLY PL		G-1-0					/				<u></u>				50)/			
		ff		<u></u> НА	ARD LIMESTONE				•			$\left \right $	+	<u> H</u> 5	0/5"_								
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	VIRUT	SPI	ECIALISTS.	INC.			NORKS							104
			,					אחומ			EVATION (TE.	FEEI)	2010	104
	104 Talla	No has	rth Magno	da 32301		EON COL	INTT, FLOP	RIDA		_ DA		5/14/	2019	
	Off	ice	#: (850) 3	86-1253								100%		28.0° -
	Fa	ax #	: (850) 38	5-8050	DRILLER: R. RUGERS			~ ~ ~						-
		_			DEPTH TO WATER: INI	AL: ≑ _		2.5		_ 24	пк: ‡		IN/IVI	
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						A-7-5								
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EM	VIRON	MEN	TAL & G	EOTECHNICAL	PROJECT: HARBINWO		ES SWMF S	SINKH	IOLE	ΗΔМ	/MFR T			
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		SPEC		, INC.	PROJECT NO.: 03-47-	18-04				ELE		<u>.</u> . N (FEET): 10	- 04
	104	North	n Magno	olia Drive	PROJECT LOCATION:	LEON COL	JNTY, FLOF	RIDA		DAT	E:	5/14	/2019	
	Tallah	nasse	ee, Flor	ida 32301	BORING NO.: VB-13					FLU		S : 100	% AT 28	3.0'
	Offic	ce #: x #: ((850) 3 850) 38	86-1253 5-8050	DRILLER: R. ROGERS						/ING: _	<u>`</u>	NONE	
			,		DEPTH TO WATER: IN	NITIAL: ♀_		2.5	5'	24 H	IR: ₹		N/M	
RS)	Ĥ								Wc (%))		N-	Valu	е
DEPTH (METE	DEPTH (FEE	SAMPLE	SYMBOL		DESCRIPTION	AASHTO	TEST RESULTS	Wc (%)		60	N	10	20 30 40	6 0 0 0
	- 32 -			HIGHLY	SOFT LIGHT GRAY PLASTIC SANDY SILT	A-7-5	-200%=52 LL=106 PI=44	76			2	•		
- 10								97		● 97 →	8	•		
	36 -			HIGHLY I	FIRM GRAY PLASTIC SANDY SILT	A-7-5		58		•	7	•		
- 12	40 -							64		••••••	8	•		
- 14	44 -													
	48													
- 16	52 - - - 56 -													
NOT	TES:	N/N N/A	1 MEA	NS NOT MEA NS NOT AVAI	SURED LABLE									

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	-					PROJECT: HARBI		DESTAT	ES SWMF (SINKH	IOLE									4 A T	_
	EN	VIRON	ME Ĉer	NTAL & G	EOTECHNICAL	CLIENT: LEON CO	JUNIY	PUBLIC V	VORKS					_ !	HA		K I Y P	E: <u>A</u>	JION	/IAII	<u>C</u>
			5Pi	ECIALISTS,	INC.	PROJECT NO.: 03	3-47-18-	-04							ELI	EVAT	ION (I	FEET)	:	104	
		104	No	rth Magno	olia Drive	PROJECT LOCATI	ION: LI	EON COL	INTY, FLOF	RIDA				_	DA	TE: _		5/16/	2019		
		Talla	has	see, Flori # (850) 3	da 32301 86-1253	BORING NO.: VB-	-14								FLI	JID L	oss:	100%	<u>6 AT</u>	15.0	<u> </u>
		Fa	x #	: (850) 38	5-8050	DRILLER: R. ROG	SERS								CA	VING	<u>_C</u>		NON	E	
						DEPTH TO WATER	R: INIT	'IAL: ♀		> 3.	0'			_ :	24	HR:	÷		N/N		
	S)		Γ									Nc	(0	6)				NL-V	/al		
	DEPTH (МЕТЕ R	DEPTH (FEET	SAMPLE	SYMBOL		DESCRIPTION		AASHTO	TEST RESULTS	Wc (%)		<u> </u>	, 7	40	60	N		10	30	4	-00
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/e of the s	-0	0 -	Į		GRA	LOOSE AY AND ORANGE CLAYEY SAND	/	A-6		21			•			5	•				
maiciti			L		GRA	AY AND ORANGE	/	A-6		21			•	, , ,		11		•			
Suens		4 -	L		GRA HIGHI Y F	STIFF AY AND ORANGE PLASTIC SANDY C	LAY	A-7-6	00000 000	60	L				•	8	-	•			
oleteu a			Ľ		GRA	VERY STIFF		A-7-6	-200%=62 LL=55 PI=33	45						14		•			
ien liner p	-2		Ł		HIGHLY H	RD LIMESTONE	LAY									49				•	
IId not t		8 -	I		WEATH	HERED LIMESTON	E									29			•	50/:	<u> </u>
to this poring and sh	- 4	12 -														48				•	
יוו אפו ומוווא טוווא		16 -			HA	RD LIMESTONE										50/4	t			50/4	1"
	- 6	20 -															t			50/4	! "
					WEATH	HERED LIMESTON	E									24			•		
		24 -	I		HA	RD LIMESTONE										71					
	-8	28 -	-			SUPED															
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	Env	IRON	mei Spe	NTAL & G	eotechnical , Inc.	PROJECT: <u>HARBINWOO</u> CLIENT: <u>LEON COUNTY</u> PROJECT NO.: <u>03-47-18</u>	DESTAT PUBLIC \ -04	ES SWMF S NORKS	SINKF	IOLE			HA	MMEI EVAT	R TYP ION (F	E: <u>N</u> EET	/ANU):	JAL 10	4
		104	No	rth Magno	olia Drive	PROJECT LOCATION: L	EON COL	JNTY, FLOF	RIDA				DA	TE: _		5/13	3/201	9	
	٦	Callal Offic		see, Flori	ida 32301 86-1253	BORING NO.: VB-15							FL	UID L	oss:_	100	% A1	17.	.5'
		Fa	x #:	(850) 38	5-8050	DRILLER: R. ROGERS							CA	VING	<u>C</u>		NOI	١E	
			_			DEPTH TO WATER: INIT	「IAL: ♀_		0.5	;'			24	HR:	÷ _		GN	E	
ĺ	ERS)	ET)								\	Nc	(%)			N-	Va	lue	e
	EPTH (MET	DEPTH (FE	SAMPLE	SYMBOL		DESCRIPTION	AASHTO	TEST RESULTS	Wc (%)							0	0	2 0	
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of the si)	0- 	I		GRA HIGHLY P	LOOSE AY AND ORANGE LASTIC CLAYEY SAND	A-7-6		26			ę		5	•				
indicitive			Ľ		M GRA	EDIUM DENSE	A-7-6	-200%=47 LL=59 PI=37	32					17			•		
as being		4 -	Į		HIGHLY P	LASTIC CLAYEY SAND			31			•		11		•			
erpreted	,					LOOSE LIGHT GRAY	A-7-6		30			•		9					
ot be inte	-	8 -			THORETT		A-7-6		30 55			•		9					
should n			[\square	<u>,HIGHLY PL</u>	ASTIC CLAY WITH SAND VERY STIFF	A-7-6		69					• 23			•		
ring and			7		<u>\HIGHLY PLA</u>	ASTIC CLAY WITH SAND FIRM	A-7-6		66					7		•			
o this bo	Ļ	12 -			HIGHLY PL	ASTIC CLAY WITH SAND		-200%=80	60					18					
ains only to					HIGHLY PL	GRAY ASTIC SILT WITH SAND	A-7-5	PI=66	00										
ation pert		16 -			HIGHLY PL	STIFF LIGHT GRAY ASTIC SILT WITH SAND	A-7-5		57				•	11		•			
2 L						HARD	A-7-5		56					50/5	5"			50)/5" •
					HIGHLY PL	LIGHT GRAY ASTIC SILT WITH SAND													
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														Attach	ment	D		
EN	VIRON	MENT Spec	AL & GI	eotechnical Inc.	PROJECT: HARBIN CLIENT: LEON CC PROJECT NO.: 03	UNTY PUBLIC	ES SWMF : WORKS	SINKF	IULE			HAI ELE	MMER EVATIO	TYPE: N (FEE	<u>AUT</u>	ОМ/ 1	АТІ 04	2
	104 Tallal Offi	North hasse ce #:	Magno e, Florid (850) 38	lia Drive da 32301 36-1253	PROJECT LOCATIO BORING NO.: <u>VB-</u> DRILLER: R. ROG	DN : <u>LEON COU</u> 16 ERS	JNTY, FLOF	RIDA					TE: JID LOS VING:	5/2 88: C	22/20 NC NC	19 NE ONE		
	га	x #. (550) 56	5-6050	DEPTH TO WATER	: INITIAL: ¥		> 3.	0'			24 I	HR: ₹	_	Ν	J/M		
ERS)	ET)								<u>۱</u>	Nc	(%)		N	-Va	alu	е	
ОЕРТН (МЕТІ	DEPTH (FEI	SAMPLE	SYMBOL		DESCRIPTION	AASHTO	TEST RESULTS	Wc (%)		5 9		2 0	N	0	0	0	2 9	
		┼┼							<u>⊨</u>			T U						Ħ
-0	0 -			<u> </u>	LOOSE GRAY CLAYEY SAND	A-6		12		•			8	•				
				Μ	EDIUM DENSE GRAY	A-6		22			•		11	•				
	4 -			(CLAYEY SAND			30)		11	•				
							-200%=45 LL=36 PI=19	25			•		8	•				
-2								19					8	•				
	8 -			GR/	LOOSE AY AND ORANGE CLAYEY SAND	A-6		25)		8	•				+
								20					5	•				
	12 -							17		•			7	•				
- 4				M GR/ (EDIUM DENSE AY AND ORANGE CLAYEY SAND	A-6		17		•			14		•			
	16 -							15		•			13					
-6		7		М	EDIUM DENSE		-200%=16	16		•			15		•			
	20 -			SI	LTY FINE SAND	A-2-4		15		•			17		•			
	24 -	7						19					13					
- 8				M HIGHLY P	EDIUM DENSE GRAY LASTIC CLAYEY S/	A-7-6		24			•		9					
	28 -						-200%=45 LL=51	26			•		5	•				
NO	TES:	N/M	MEA		SURED													

ENV	/IRON	MENTAL	. & Ge	OTECHNICAL	CLIENT: LEON COUNT	Y PUBLIC V	ES SWMF : NORKS	SINKF	IOLE	HAN		(PE:	AUT	OMA	TIC
	\$	Specia	lists, l	INC.	PROJECT NO.: 03-47-18	8-04				ELE	VATION	(FEE	T): _	10)4
	104	North M	lagnol	ia Drive	PROJECT LOCATION:	LEON COL	INTY, FLOF	RIDA		DAT	E:	5/2	2/201	19	
	i allah Offic	assee, ce #: (8	Florid 50) 38	ia 32301 6-1253	BORING NO.: VB-16					FLU	ID LOSS	5 <u>. </u>	NO	NE	
	Fax	< #: (85	0) 385	5-8050	DRILLER: R. ROGERS			. ^	01	CAV	/ING: <u>C</u>		NC	NE	
-					DEPTH TO WATER: IN	AL:		> 3.	<u>0'</u>	24 H	IR: ₹		N	/M	
METERS)	(FEET)	IPLE	BOL		DESCRIPTION	AASHTO	TEST	Wc	Wc (%)		N	-Va	alue	е
DEPTH (I	DEPTH	SAM	SYM		DESCRIPTION	AASHTU	RESULTS	(%)	-10 +20 +30	-40 	IN	-10	-20	-30 -40	- 09
- 10	- - 32 - -			HIGHLY P	LOOSE GRAY LASTIC CLAYEY SAND	A-7-6	PI=34	23 25			6	•			
- 12	- 36 - - -			GRA PLAS	LOOSE AY AND ORANGE TIC CLAYEY SAND	A-7-6	-200%=38 LL=45 PI=26	19 22			67	•			
14	- - 44 - - 48 -														
- 16	- 52 - 56														

					PROJECT: HARBINWOC	D ESTAT	ES SWMF S	SINKH	IOLE					
E	NVIRO	MINK	ENTAL & G	EOTECHNICAL	CLIENT: LEON COUNTY	PUBLIC \	NORKS				MMER TY	'PE: <u>AL</u>	JTOMA	
1		5	PECIALISTS	, ING.	PROJECT NO.: 03-47-18	-04						(FEET):	10)4
	10 Toll	4 N	lorth Magno	olia Drive		EON COL	INTY, FLOF	RIDA		_ DA1	ГE:	5/16/2	2019	
	i ali Ot	iana ffice	assee, Fiori #:(850)3	86-1253	BORING NO.: VB-17					_ FLU	ID LOSS	: 100%	<u>5 AT 35</u>	.0'
	F	ax	#: (850) 38	5-8050	DRILLER: R. ROGERS				<u>.</u>		/ING: <u>C</u>		NONE	
					DEPTH TO WATER: INI	AL: ¥ _		> 3.	0'	_ 24 F	IR: ₹		N/M	
EPTH (METERS)			SYMBOL		DESCRIPTION	AASHTO	TEST RESULTS	Wc (%)	Wc (%	6)	N	N-\	/alue	9
	_	_							30 50 4	5 4 8				
	0			GRA PLAS ⁻	LOOSE AY AND ORANGE TIC CLAYEY SAND	A-7-6		19			7	•		
					EDIOM DENSE VY AND ORANGE TIC CLAYEY SAND	A-7-6		20	•		13	•		
s Deirig	4	-			LOOSE AY AND ORANGE TIC CLAYEY SAND	A-7-6		22			7	•		
				GRA	EDIUM DENSE	A-7-6		31			9	•		
-2 100		-		GRA	LOOSE	A-7-6	-200%=33 LL=43 PI=24	26			7	•		
	8	- ; -		PLAS	TIC CLAYEY SAND	/		24	•		10	•		
				GRA GRA PLAS	EDIUM DENSE \Y AND ORANGE TIC CLAYEY SAND	A-7-6		23	-		10	•		
poring	12	2						24	•		11	•		
								32			11	•		
	16	-					-200%=41 LL=84 PI=66	35		•	8	•		
				MI HIGHLY PI	EDIUM DENSE LIGHT GRAY	A-7-6	11.00							
-6	20			THORETT				39			9			
								35		•	10	•		
	24	-		HIGHLY P	LOOSE LIGHT GRAY LASTIC CLAYEY SAND	A-7-6		38			6	•		
- 8		-		HIGHLY F	STIFF LIGHT GRAY PLASTIC SANDY CLAY	A-7-6		61			7	•		
	28	-			SOFT			65			3			
NC	TES	1 :6 N	N/M MEA I/A MEAI	NS NOT MEA NS NOT AVAI	SURED LABLE									



IRONI S	MENTAL & GI SPECIALISTS,	EOTECHNICAL	CLIENT: LEON COUN	ITY PUBLIC	ES SWMES	SINKH	IULE										
	SPECIALISTS,		CLIENT: LEON COUN								_ ^ 1		VDL-		11/2	N/1 **	. TIC
•		INC.	DDO IECT NO - 00 47	19.04						- '						NIVIA	C
40.1			PROJECT NO.: 03-47-			^ חוכ				- t			לד) א ק	. ⊏ I) : /1 <i>⊂ !</i> ′	2010	<u>ור</u> ג	14
104 l Fallah	North Magno	lia Drive	PROJECT LOCATION:	LEON COL	INTY, FLOF	RIDA				_ L			5	/16/4	2015) 	
Offic	e #: (850) 38	36-1253	BORING NO.: VB-17							- 1		ID LOS	S <u>: 1</u>	00%	<u>6 A I</u>	35	<i>.</i> .0'
Fax	(#: (850) 385	5-8050	DRILLER: R. ROGERS	5			<u></u>			- (/ING: _	<u> </u>				
			DEPTH TO WATER: I	NITIAL: ¥ _		> 3.	0'			_ 2	24	IR: ₹			N/N	/	_
Ē							V	Vc	(%	6)			Ν	1-/	/al	u	е
DEPTH (FEE	SAMPLE SYMBOL		DESCRIPTION	AASHTO	TEST RESULTS	Wc (%)	c			Ģ	0	N	C	5	0.0	2 0	. 0
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		HA	RD LIMESTONE														
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64 -							L										
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Ent	/IRONI 104 I Tallah Offic	MENTAL & SPECIALIST North Magn nassee, Flo se #: (850)	Geotechnical s, Inc. nolia Drive rida 32301 386-1253	PROJECT: HARBINW CLIENT: LEON COUN PROJECT NO.: 03-47 PROJECT LOCATION: BORING NO.: VB-22 DRILLED: P. POCCED	OOD ESTAT ITY PUBLIC \ -18-04 : LEON COL	ES SWMF S WORKS INTY, FLOR				HAN ELE DAT FLU	IMER TYP VATION (E: ID LOSS <u>:</u>	'E: <u>AL</u> FEET): 5/23/2 100%	2019	1ATI 104 17.5	<u>C</u>
	Fax	< #: (850) 3	85-8050	DEPTH TO WATER: I	s NITIAL: ¥		> 3.	0'		24 H	ing: <u>↓</u> IR: ₹	I	N/M	-	
TERS)	EET)	L E						W	c (%)		N-\	/alı	Je	
DEPTH (ME	DEPTH (F	SAMPL		DESCRIPTION	AASHTO	TEST RESULTS	Wc (%)	10	20	40 60	N	10	+20 +30	40	09
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- 12			WEATI	HERED LIMESTONE							23		•		
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<u>APPENDIX C</u> SOIL CLASSIFICATION DATA

	SOIL CLASSIFICATION DATA Project: HARBINWOOD ESTATES SWMF SINKHOLE														
Project: HA	Project: HARBINWOOD ESTATES SWMF SINKHOLE Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04														
Client: LEO	Ν COU	JNTY	PUBL		ORKS							Project	No.: 03-47-1	8-04	
Boring: VB-	1											Locatio	on: LEON CC	DUNTY, FLORIDA	
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description	
0.0-0.5	16												A-2-6	LOOSE BROWN CLAYEY FINE SAND	
1.0-1.5	13	100	100	100	94	80	52	28	22	11			A-2-6	LOOSE BROWN CLAYEY FINE SAND	
2.0-2.5	14											5	A-2-6	LOOSE BROWN CLAYEY FINE SAND	
3.0-3.5	16												A-2-6	LOOSE BROWN CLAYEY FINE SAND	
4.0-4.5	18												A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND	
4.5-6.0	16											9	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND	
6.0-7.5	18	100	100	99	92	75	42	26				20	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND	
7.5-9.0	28											8	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND	
9.0-10.5	22											8	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND	
10.5-12.0	21											21	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND	
12.5-14.0	29	100	100	100	99	98	94	35	35	16		10	A-2-6	MEDIUM DENSE ORANGE AND GRAY CLAYEY FINE SAND	
15.0-16.5	25											15	A-2-6	MEDIUM DENSE ORANGE AND GRAY CLAYEY FINE SAND	
17.5-19.0	30											17	A-7-6	VERY STIFF ORANGE AND GRAY	

								S		LASS	SIFICAT	ION DAT	A		
Project: HA	Project: HARBINWOOD ESTATES SWMF SINKHOLE Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04														
Client: LEO		UNTY	PUBL		ORKS							Project	No.: 03-47-1	18-04	
Boring: VB-	·1											Locatio	on: LEON CC	DUNTY, FLORIDA	
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description	
· · ·				. ,										HIGHLY PLASTIC CLAY	
20.0-21.5	28											13	A-7-6	VERY STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY	
22.5-24.0	28	100	100	100	99	98	96	82	79	49		13	A-7-6	VERY STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY	
25.0-26.5	44											13	A-7-6	VERY STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY	
27.5-29.0	40											6	A-7-6	STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY	
30.0-31.5	32											9	A-7-6	STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY	
32.5-34.0	35											6	A-7-6	STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY	
35.0-36.5	36											7	A-7-6	STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY	
37.5-39.0												6		HIGHLY WEATHERED LIMESTONE	
40.0-41.5												37		WEATHERED LIMESTONE	
42.5-44.0												24		WEATHERED LIMESTONE	
45.0-46.5												34		WEATHERED LIMESTONE	
48.0-50.0												51		HARD LIMESTONE	
	1														
	1	1	1		1										

Project: HARBINWOOD ESTATES SWMF SINKHOLE Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04 Boring: VB-2 Location: LEON COUNTY, FLORIDA DEPTH (%) (%) (%) (%) (%) (%) (%) (%) (%) (%)														
Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04 Boring: VB-2 -20 -40 -60 -100 -200 LL PI Org. N AASHTO Description DEPTH (FEET) (%) (%) (%) (%) (%) (%) (%) PI Org. N AASHTO Description														
Boring: VB-2 Location: LEON COUNTY, FLORIDA DEPTH (FEET) Wc (%) -40 (%) -40 (%) -60 (%) -100 (%) -200 (%) LL PI Org. (%) N Value AASHTO Description														
Boring: VB-2 Location: LEON COUNTY, FLORIDA DEPTH Wc -4 -10 -20 -40 -60 -100 -200 LL PI Org. N AASHTO Description														
(FEET) (%) (%) (%) (%) (%) (%) (%) Value AASH10 Description 0.0-0.5 16 16 A-2-6 CLAYEY FINE SAND														
0.0-0.5 16 LOOSE GRAY CLAYEY FINE SAND														
1.0-1.5 15 100 99 99 93 77 47 30 A-2-6 LOOSE GRAY CLAYEY FINE SAND	1													
2.0-2.5 16 A B B B B B B B B B B B B B B B B B B														
3.0-3.5 5 5 MEDIUM DENSE BROWN SILTY FINE SAND														
4.0-4.5 6 100 100 96 80 52 29 14 A-2-4 MEDIUM DENSE BROWN														
5.0-5.5 15 15 MEDIUM DENSE BROWN SILTY FINE SAND														
6.0-6.5 13 A-2-6 LOOSE GRAY CLAYEY FINE SAND														
7.0-7.5 19 100 99 93 73 46 28 23 14 A-2-6 LOOSE GRAY CLAYEY FINE SAND														
7.5-9.0 17 7 A-2-6 LOOSE GRAY														
9.0-10.5 16 Find the second se														
10.5-12.0 20 3 A-2-6 LOOSE GRAY														
12.5-14.0 18 B B B B B B B B B B B B B B B B B B														
15.0-16.5 60 47 39 30 23 15 10 8 A-1-a MEDIUM DENSE GRAY														

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Project: HA	RBIN	NOOD) EST	ATES	SWM	SINF	HOLE								
Client: LEO		JNTY	PUBL	IC WO	ORKS							Project	No.: 03-47-18	3-04	
Boring: VB-	Boring: VB-2 Location: LEON COUNTY, FLORIDA DEPTH Wc -4 -10 -20 -40 -60 -100 -200 LL PI Org. N ΔΔSHTO Description														
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description	
						. ,								SANDY GRAVEL	
17.5-19.0												11	A-1-a	MEDIUM DENSE GRAY SANDY GRAVEL	
20.0-21.5	19											10	A-2-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY FINE SAND	
22.5-24.0	22											13	A-7-6	VERY STIFF ORANGE AND GRAY HIGHLY PLASTIC SANDY CLAY	
25.0-26.5	25	100	100	100	96	81	68	55	63	48		12	A-7-6	VERY STIFF ORANGE AND GRAY HIGHLY PLASTIC SANDY CLAY	
27.5-29.0	26											11	A-7-6	VERY STIFF ORANGE AND GRAY HIGHLY PLASTIC SANDY CLAY	
30.0-31.5	39											19	A-7-6	VERY STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY WITH WEATHERED LIMESTONE	
32.5-34.0	34											11	A-7-6	VERY STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY WITH WEATHERED LIMESTONE	
35.0-36.5												10		WEATHERED LIMESTONE	
37.5-39.0												20		WEATHERED LIMESTONE	
40.0-41.5												13		WEATHERED LIMESTONE	
42.5-44.0												17		WEATHERED LIMESTONE	
45.0-46.5												16		WEATHERED LIMESTONE	
48.0-50.0												19		WEATHERED LIMESTONE	
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_____ ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC. _____

	SOIL CLASSIFICATION DATA Project: HARBINWOOD ESTATES SWMF SINKHOLE													
Project: HA	RBIN	VOOD	EST/	ATES	SWMI		KHOLE							
Client: LEO	N COL	JNTY	PUBL	IC WO	ORKS							Project	No.: 03-47-	18-04
Boring: VB	-3											Locatio	on: LEON CO	DUNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
0.0-0.5	10												A-2-6	LOOSE BROWN CLAYEY FINE SAND
1.0-1.5	16	100	99	98	91	76	41	21					A-2-6	LOOSE BROWN CLAYEY FINE SAND
2.0-2.5	13											8	A-2-6	LOOSE GRAY CLAYEY FINE SAND
3.0-3.5	17												A-2-6	LOOSE GRAY CLAYEY FINE SAND
4.0-4.5	16												A-2-6	LOOSE GRAY CLAYEY FINE SAND
5.0-5.5	19	100	99	99	92	76	41	21	21	11		3	A-2-6	LOOSE GRAY CLAYEY FINE SAND
6.0-6.5	20												A-2-6	LOOSE GRAY CLAYEY FINE SAND
7.0-7.5	11												A-2-6	LOOSE GRAY CLAYEY FINE SAND
7.5-9.0	26	100	100	99	95	81	51	38	39	22		5	A-6	LOOSE ORANGE AND GRAY CLAYEY SAND
9.0-10.5	20											14	A-6	MEDIUM DENSE ORANGE AND GRAY CLAYEY SAND
10.5-12.0	27											11	A-6	MEDIUM DENSE ORANGE AND GRAY CLAYEY SAND
12.5-14.0	29											11	A-6	MEDIUM DENSE ORANGE AND GRAY CLAYEY SAND
15.0-16.5	32											12	A-7-6	STIFF GRAY AND ORANGE

								S		LASS	SIFICAT	ION DAT	A		
Project: HA	RBINV	VOOD	EST/	ATES	SWM		KHOLE								
Client: LEO		JNTY	PUBL		ORKS							Project	No.: 03-47-	18-04	
Boring: VB-	3											Locatio	on: LEON C	OUNTY, FLORIDA	
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description	
17.5-19.0	27											9	A-7-6	HIGHLY PLASTIC SANDY CLAY STIFF GRAY AND ORANGE HIGHLY PLASTIC SANDY CLAY	
20.0-21.5	36	100	100	99	98	96	95	63	67	45		9	A-7-6	STIFF GRAY AND ORANGE HIGHLY PLASTIC SANDY CLAY	
22.5-24.0	81											6	A-7-6	STIFF GRAY AND ORANGE HIGHLY PLASTIC SANDY CLAY	
25.0-26.5	25.0-26.5 GRAY AND ORANGE														
27.5-29.0												8		WEATHERED LIMESTONE	
30.0-31.5												15		WEATHERED LIMESTONE	
32.5-33.8												82/10"		HARD LIMESTONE	
35.0-36.5												37		HARD LIMESTONE	
37.5-37.8												50/4"		HARD LIMESTONE	
40.0-40.4												50/5"		HARD LIMESTONE	
42.5-42.7												50/2"		HARD LIMESTONE	
45.0-46.5												26		WEATHERED LIMESTONE	
48.0-50.0												47			
						L			I	L		I			

								S		LASS	SIFICAT	ION DAT	ΓA	
Project: HA	RBIN	NOOD) EST	ATES	SWMI	F SINK	HOLE							
Client: LEO		JNTY	PUBL		ORKS							Project	No.: 03-47-	18-04
Boring: VB-	4											Locatio	on: LEON CO	DUNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
0.0-0.3				. ,										4.0-INCHES ASPHALT
0.3-0.8	16												A-2-4	BROWN
010 010														SILTY FINE SAND
1.0-1.5	17	100	99	98	94	82	54	34	24	11			A-2-6	MEDIUM DENSE
														BROWN AND GRAY
														CLAYEY FINE SAND
2.0-2.5	20											13	A-2-9	MEDIUM DENSE
														BROWN AND GRAY
														CLAYEY FINE SAND
3.0-3.5	14												A-2-6	MEDIUM DENSE
														BROWN AND GRAY
														CLAYEY FINE SAND
4.0-4.5	14												A-2-6	MEDIUM DENSE
														BROWN AND GRAY
														CLAYEY FINE SAND
5.0-5.5	28	100	100	99	94	80	51	35				10	A-2-6	MEDIUM DENSE
														BROWN AND GRAY
														CLAYEY FINE SAND
6.0-6.5	23												A-2-6	MEDIUM DENSE
														BROWN AND GRAY
														CLAYEY FINE SAND
7.0-7.5	21												A-2-6	MEDIUM DENSE
														BROWN AND GRAY
														CLAYEY FINE SAND
7.5-9.0	15											18	A-2-6	MEDIUM DENSE
														BROWN AND GRAY
														CLAYEY FINE SAND
9.0-10.5	18											24	A-2-6	MEDIUM DENSE
														BROWN AND GRAY
														CLAYEY FINE SAND
10.5-12.0	16											17	A-2-6	MEDIUM DENSE
														BROWN AND GRAY
														CLAYEY FINE SAND
12.5-14.0	25	100	100	99	98	96	55	35	37	23		14	A-2-6	MEDIUM DENSE
														BROWN AND GRAY
														CLAYEY FINE SAND
15.0-16.5	26											14	A-2-6	MEDIUM DENSE
														BROWN AND GRAY
	•						•	•		•			•	

								S			SIFICAT	TION DAT	A	
Project: HA	RBINV	NOOD) EST/	ATES	SWMI		KHOLE							
Client: LEO	Ν COU	JNTY	PUBL	IC WO	ORKS							Project	No.: 03-47-	18-04
Boring: VB-	-4											Locatio	on: LEON CO	DUNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
								. ,						CLAYEY FINE SAND
17.5-19.0	33											8	A-2-6	MEDIUM DENSE BROWN AND GRAY CLAYEY FINE SAND
20.0-21.5	26											15	A-7-6	VERY STIFF GRAY HIGHLY PLASTIC CLAY WITH SAND
22.5-24.0	31											17	A-7-6	VERY STIFF GRAY HIGHLY PLASTIC CLAY WITH SAND
25.0-26.5	28											12	A-7-6	VERY STIFF GRAY HIGHLY PLASTIC CLAY WITH SAND
27.5-29.0	43	100	100	100	99	98	94	79	109	70		16	A-7-6	VERY STIFF GRAY HIGHLY PLASTIC CLAY WITH SAND
30.0-31.5	39											2	A-7-6	VERY SOFT GRAY HIGHLY PLASTIC CLAY
32.5-34.0	53											WOH	A-7-6	VERY SOFT GRAY
35.0-36.5	52											WOH	A-7-6	VERY SOFT GRAY HIGHLY PLASTIC CLAY
37.5-39.0	43											4	A-7-6	FIRM GRAY HIGHLY PLASTIC CLAY WITH WEATHERED LIMESTONE
40.0-41.5	45											4	A-7-6	FIRM GRAY HIGHLY PLASTIC CLAY
42.5-44.0	48											6	A-7-6	FIRM GRAY HIGHLY PLASTIC CLAY
45.0-46.5	1											64		HARD LIMESTONE
47.5-49.0												22		WEATHERED LIMESTONE
													I	

	SOIL CLASSIFICATION DATA														
Project: HA	Project: HARBINWOOD ESTATES SWMF SINKHOLE Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04														
Client: LEO	N COL	JNTY	PUBL		ORKS							Project	No.: 03-47-	-18-04	
Boring: VB	-4							Locatio	on: LEON C	OUNTY, FLORIDA					
DEPTH (EEET)	Wc	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org.	N Value	AASHTO	Description	
50.0-51.5	(70)	(70)	(/0)	(70)	(/0)	(70)	(70)	(70)			(70)	13		WEATHEREDLIMESTONE	
52.5-54.0	30	100	99	98	92	72	52	32				5	A-2-6	LOOSE BROWN CLAYEY FINE SAND	
55.0-56.5	52											5	A-7-6	FIRM GRAY HIGHLY PLASTIC CLAY	
57.5-59.0												16		WEATHERED LIMESTONE	
60.0-60.4												50/5"		HARD LIMESTONE	
61.5-61.7												50/2"		HARD LIMESTONE	
						1									

SOIL CLASSIFICATION DATA														
Project: HARBINWOOD ESTATES SWMF SINKHOLE														
Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04														
Boring: VB-	OUNTY, FLORIDA													
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
0.0-0.5	18												A-2-6	MEDIUM DENSE GRAY
1.0-1.5	15												A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND
2.0-2.5	16	100	100	99	89	69	37	26	31	19		9	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND
3.0-3.5	12												A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND
4.0-4.5	13												A-2-4	MEDIUM DENSE GRAY SILTY FINE SAND
5.0-5.5	12	100	100	99	94	77	47	25				8	A-2-4	MEDIUM DENSE GRAY SILTY FINE SAND
6.0-6.5	11												A-2-4	MEDIUM DENSE GRAY SILTY FINE SAND
7.0-7.5	14												A-2-4	MEDIUM DENSE GRAY SILTY FINE SAND
7.5-9.0	15	100	100	100	96	82	51	31	27	14		10	A-2-6	MEDIUM DENSE ORANGE AND GRAY CLAYEY FINE SAND
9.0-10.5	17											19	A-2-6	MEDIUM DENSE ORANGE AND GRAY CLAYEY FINE SAND
10.5-12.0	15											20	A-2-6	MEDIUM DENSE ORANGE AND GRAY CLAYEY FINE SAND
12.5-14.0	17											32	A-2-6	DENSE GRAY AND ORANGE CLAYEY FINE SAND
15.0-16.5	18											27	A-2-6	DENSE GRAY AND ORANGE

SOIL CLASSIFICATION DATA															
Project: HARBINWOOD ESTATES SWMF SINKHOLE															
Client: LEO	Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04														
Boring: VB-	5							Locatio	on: LEON CO	DUNTY, FLORIDA					
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description	
														CLAYEY FINE SAND	
17.5-19.0	22	100	100	99	93	76	44	26	27	17		24	A-2-6	DENSE GRAY AND ORANGE CLAYEY FINE SAND	
20.0-21.5	26											25	A-2-6	DENSE GRAY AND ORANGE CLAYEY FINE SAND	
22.5-24.0	18											26	A-2-6	DENSE GRAY AND ORANGE CLAYEY FINE SAND	
25.0-26.5	23											28	A-2-6	DENSE GRAY AND ORANGE CLAYEY FINE SAND	
27.5-29.0	22											25	A-2-6	DENSE GRAY AND ORANGE CLAYEY FINE SAND	
30.0-31.5	29	100	100	100	99	98	81	25	33	22		17	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND	
32.5-34.0	30											16	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND	
35.0-36.5	33											18	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND	
37.5-39.0	51											15	A-7-6	VERY STIFF ORANGE HIGHLY PLASTIC CLAY	
40.0-41.5	63	100	100	100	100	100	98	95	125	96		9	A-7-6	STIFF ORANGE HIGHLY PLASTIC CLAY	
42.5-44.0	58											10	A-7-6	STIFF ORANGE HIGHLY PLASTIC CLAY	
45.0-46.5												9		WEATHERED LIMESTONE	
48.0-50.0												46		HARD LIMESTONE	

____ ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC. _____

	SOIL CLASSIFICATION DATA														
Project: HA	Project: HARBINWOOD ESTATES SWMF SINKHOLE														
Client: LEO	Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04														
Boring: VB-	Boring: VB-6 Location: LEON COUNTY, FLORIDA														
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	Ы	Org. (%)	N Value	AASHTO	Description	
0.0-0.5		\		(/	\						()			6.0-INCHES ASPHALT	
0.5-1.0	15												A-2-6	BROWN CLAYEY FINE SAND WITH GRAVEL	
1.0-1.5	20	99	99	98	94	80	51	34	30	17		13	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND	
2.0-2.5	23											4	A-2-6	LOOSE GRAY CLAYEY FINE SAND	
3.0-3.5	17											4	A-2-6	LOOSE GRAY CLAYEY FINE SAND	
4.0-4.5	14	100	100	99	93	74	35	16				8	A-3	LOOSE LIGHT GRAY FINE SAND	
5.0-5.5	16											8	A-3	LOOSE LIGHT GRAY FINE SAND	
6.0-6.5	22											4	A-2-6	LOOSE GRAY CLAYEY FINE SAND	
7.0-8.5	18	100	100	99	95	83	52	34	24	11		7	A-2-6	LOOSE GRAY CLAYEY FINE SAND	
8.5-10.0	17											14	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND	
10.0-11.5	18											16	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND	
12.5-14.0	18	100	100	100	94	75	46	26				20	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND	
15.0-16.5	22											10	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND	
17.5-19.0	26											10	A-2-6	MEDIUM DENSE GRAY	

	SOIL CLASSIFICATION DATA														
Project: HA	RBIN	NOOD	EST/	ATES	SWM		HOLE								
Client: LEO	Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04														
Boring: VB-	6							Locatio	on: LEON COU	JNTY, FLORIDA					
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	Ы	Org. (%)	N Value	AASHTO	Description	
. ,														CLAYEY FINE SAND	
20.0-21.5	25	100	100	100	100	99	92	32	34	19		8	A-6	LOOSE GRAY AND ORANGE CLAYEY SAND	
22.5-24.0	27											7	A-6	LOOSE GRAY AND ORANGE CLAYEY SAND	
25.0-26.5	44											7	A-7-6	STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY	
27.5-29.0	69	100	100	100	99	97	84	60	43	26		7	A-7-6	STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY	
30.0-31.5	45											6	A-7-6	STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY	
32.5-34.0	61											8	A-7-6	STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY	
35.0-36.5	44	100	100	100	99	98	95	87				8	A-7-6	STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY	
37.5-39.0	43											7	A-7-6	STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY	
40.0-41.5	79											6	A-7-6	STIFF BROWN AND GRAY HIGHLY PLASTIC CLAY WITH LIMESTONE	
42.5-44.0	63											7	A-7-6	STIFF BROWN AND GRAY HIGHLY PLASTIC CLAY WITH LIMESTONE	
45.0-46.5												22		WEATHERED LIMESTONE	
47.5-49.0												74		HARD LIMESTONE	
50.0-51.5												18		WEATHERED LIMESTONE	
52.5-53.2												50/2"		HARD LIMESTONE	
55.0-56.5												10		WEATHERED LIMESTONE	
57.5-59.0												17		WEATHERED LIMESTONE	
60.0-61.5												10		WEATHERED LIMESTONE	
											OTEOU				

SOIL CLASSIFICATION DATA Project: HARBINWOOD ESTATES SWMF SINKHOLE Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04 Location: LEON COUNTY, FLORIDA Boring: VB-6 DEPTH Wc -200 -4 -10 -20 -40 -60 -100 Org. Ν AASHTO Description LL ΡΙ (FEET) (%) Value (%) (%) (%) (%) (%) (%) (%) (%) 62.5-64.0 HARD LIMESTONE 50 ---65.0-65.1 50/1" --HARD LIMESTONE 68.0-70.0 56 --HARD LIMESTONE

SOIL CLASSIFICATION DATA															
Project: HARBINWOOD ESTATES SWMF SINKHOLE															
Client: LEO	Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04 Boring: VB-7 Location: LEON COUNTY FLORIDA														
Boring: VB-	-7						Locatio	on: LEON CO	UNTY, FLORIDA						
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description	
0.0-0.5	12												A-2-4	MEDIUM DENSE GRAY	
1.0-1.5	16											13	A-2-4	SILTY FINE SAND MEDIUM DENSE GRAY	
2.0-2.5	5	99	98	94	76	47	22	12				13	A-2-4	SILTY FINE SAND MEDIUM DENSE GRAY	
3.0-3.5	5											10	A-2-4	MEDIUM DENSE GRAY SIL TY FINE SAND	
4.0-4.5	9	100	99	95	73	45	23	14				9	A-2-4	MEDIUM DENSE GRAY SILTY FINE SAND	
5.0-5.5	13											8	A-2-4	MEDIUM DENSE GRAY SILTY FINE SAND	
6.0-6.5	21											4	A-2-6	LOOSE GRAY CLAYEY FINE SAND	
7.0-8.5	18	100	100	100	92	75	44	29	29	19		18	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND	
8.5-10.0	18											30	A-2-6	DENSE GRAY CLAYEY FINE SAND	
10.0-11.5	14											28	A-2-6	DENSE GRAY CLAYEY FINE SAND	
12.5-14.0	31											20	A-6	MEDIUM DENSE GRAY CLAYEY SAND	
15.0-16.5	37	100	100	100	99	96	44	34	40	28		26	A-6		
17.5-19.0	33											20	A-6	MEDIUM DENSE GRAY	

SOIL CLASSIFICATION DATA															
Project: HA	Project: HARBINWOOD ESTATES SWMF SINKHOLE														
Client: LEO	Ν COI	JNTY	PUBL		ORKS							Project	No.: 03-47-	18-04	
Boring: VB-	7							Locatio	on: LEON CO	DUNTY, FLORIDA					
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description	
														CLAYEY SAND	
20.0-21.5	28											16	A-6	MEDIUM DENSE GRAY CLAYEY SAND	
22.5-24.0	29	100	100	100	100	98	80	49				13	A-6	MEDIUM DENSE GRAY CLAYEY SAND	
25.0-26.5	25											20	A-6	MEDIUM DENSE GRAY CLAYEY SAND	
27.5-29.0	25											22	A-7-6	VERY STIFF GRAY AND ORANGE HIGHLY PLASTIC CLAY	
30.0-31.5	39	100	99	98	98	94	87	51	58	38		19	A-7-6	VERY STIFF GRAY AND ORANGE HIGHLY PLASTIC CLAY	
32.5-34.0	26											10	A-7-6	STIFF GRAY AND ORANGE HIGHLY PLASTIC CLAY	
35.0-36.5	64											9	A-7-6	STIFF GRAY AND ORANGE HIGHLY PLASTIC CLAY	
37.5-39.0	65	100	100	100	99	98	93	81				9	A-7-6	STIFF GRAY AND ORANGE HIGHLY PLASTIC CLAY	
40 0-41 5												12		WEATHERED LIMESTONE	
42.5-44.0												23		WEATHEREDLIMESTONE	
45.0-45.8												50/3"		HARD LIMESTONE	
47.5-47.9												50/5"		HARD LIMESTONE	
50.0												50/0"		HARD LIMESTONE	
52.5-54.0												28		WEATHERED LIMESTONE	
55.0-56.5												35		HARD LIMESTONE	
58.0-58.2												50/2"		HARD LIMESTONE	

_____ ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC. _____

	SOIL CLASSIFICATION DATA														
Project: HA	Project: HARBINWOOD ESTATES SWMF SINKHOLE														
Client: LEO	Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04														
Boring: VB	-8							Locatio	on: LEON CO	DUNTY, FLORIDA					
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description	
0.0-1.5	18											14	A-2-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY FINE SAND	
1.5-3.0	18	100	100	100	96	86	54	33	32	16		26	A-2-6	DENSE GRAY AND ORANGE CLAYEY FINE SAND	
3.0-4.5	17											21	A-2-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY FINE SAND	
4.5-6.0	16											28	A-2-6	DENSE GRAY AND ORANGE CLAYEY FINE SAND	
6.0-7.5	16											22	A-2-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY FINE SAND	
7.5-9.0	19	100	100	98	88	66	40	27	26	19		18	A-2-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY FINE SAND	
9.0-10.5	16											14	A-2-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY FINE SAND	
10.5-12.0	16											15	A-2-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY FINE SAND	
12.5-14.0	17											13	A-2-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY FINE SAND	
15.0-16.5	18	100	100	99	88	66	40	27	26	19		24	A-2-4	MEDIUM DENSE GRAY SILTY FINE SAND	
17.5-19.0	24											13	A-7-6	VERY STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY	
20.0-21.5	63	100	100	100	99	97	93	64	107	75		13	A-7-6	VERY STIFF ORANGE AND GRAY HIGHLY PLASTIC CLAY	
22.5-24.0	42											7	A-7-6	STIFF GRAY	

SOIL CLASSIFICATION DATA															
Project: HA	Project: HARBINWOOD ESTATES SWMF SINKHOLE														
Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04															
Boring: VB-	8							Locatio	on: LEON CO	UNTY, FLORIDA					
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description	
														HIGHLY PLASTIC CLAY	
25.0-26.5												6		HIGHLY WEATHERED LIMESTONE	
27.5-29.0												13		WEATHERED LIMESTONE	
30.0-31.5												16		WEATHERED LIMESTONE	
32.5-34.0												36		WEATHERED LIMESTONE	
35.0-35.9												50/5"		HARD LIMESTONE	
37.5-39.0												50		HARD LIMESTONE	
40.0-41.5												11		WEATHERED LIMESTONE	
42.5-44.0												3		VERY LOOSE GRAY SILTY FINE SAND	
45.0-46.5	99	100	99	97	96	95	92	84	198	162		1	A-7-6	SOFT BROWN HIGHLY PLASTIC CLAY WITH LIMESTONE	
47.5-49.0	112											2	A-7-6	SOFT BROWN HIGHLY PLASTIC CLAY WITH LIMESTONE	
50.0-51.5	151											WOH	A-7-6	VERY SOFT BROWN HIGHLY PLASTIC CLAY WITH LIMESTONE	
52.5-54.0	116											WOH	A-7-6	VERY SOFT BROWN HIGHLY PLASTIC CLAY WITH LIMESTONE	
55.0-56.5	134											4	A-7-6	FIRM BROWN HIGHLY PLASTIC CLAY WITH LIMESTONE	
57.5-59.0	45											2	A-7-6	SOFT BROWN HIGHLY PLASTIC CLAY WITH LIMESTONE	
60.0-61.5	99											4	A-7-6	FIRM BROWN HIGHLY PLASTIC CLAY WITH LIMESTONE	
62.5-64.0	148											8	A-7-6	STIFF BROWN HIGHLY PLASTIC CLAY WITH LIMESTONE	
65.0-66.5												20		WEATHERED LIMESTONE	
68.0-68.6												50/1"		HARD LIMESTONE	
								S	OIL C	LASS	SIFICAT	ION DAT	Γ A		
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Project: HA	RBINV	NOOD) EST	ATES	SWM	F SINF	KHOLE								
Client: LEO	Ν COL	JNTY	PUBL		ORKS							Project	No.: 03-47-	18-04	
Boring: VB-	9											Locatio	on: LEON CO	DUNTY, FLORIDA	
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description	
0.0-1.5	13	100	100	99	94	77	52	28				10	A-2-6	MEDIUM DENSE GRAY	
1.5-3.0	13											10	A-2-6	CLAYEY FINE SAND MEDIUM DENSE GRAY	
3.0-4.5	19	100	100	100	95	82	50	30	28	14		8	A-2-6	LOOSE GRAY	
4.5-6.0	22											5	A-2-6	LOOSE GRAY CLAYEY FINE SAND	
6.0-7.5	20											4	A-2-6	LOOSE GRAY CLAYEY FINE SAND	
7.5-9.0	21	100	100	100	99	96	75	43	36	22		6	A-6	LOOSE ORANGE AND GRAY CLAYEY SAND	
9.0-10.5	21											7	A-6	LOOSE ORANGE AND GRAY CLAYEY SAND	
10.5-12.0	22											10	A-6	LOOSE ORANGE AND GRAY CLAYEY SAND	
12.5-14.0	55	100	100	100	100	99	98	87	102	66		11	A-7-6	STIFF GRAY HIGHLY PLASTIC CLAY	
15.0-16.5												19		WEATHERED LIMESTONE	
17.5-19.0												34		HARD LIMESTONE	
20.0-21.5												56		HARD LIMESTONE	
22.5-24.0												4		HIGHLY WEATHERED LIMESTONE	
25.0-26.5												18		WEATHERED LIMESTONE	
27.5-29.0												9		WEATHERED LIMESTONE	
30.0-31.5												70		HARD LIMESTONE	
32.5-32.8												50/3"		HARD LIMESTONE	
35.0-36.5												15		WEATHERED LIMESTONE	
37.5-38.8												50/4"		HARD LIMESTONE	
40.0-40.8												50/6"		HARD LIMESTONE	

SOIL CLASSIFICATION DATA Project: HARBINWOOD ESTATES SWMF SINKHOLE Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04 Boring: VB-9 Location: LEON COUNTY, FLORIDA DEPTH Wc -200 -10 -20 -40 -60 -100 Org. Ν -4 AASHTO LL ΡΙ Description Value (FEET) (%) (%) (%) (%) (%) (%) (%) (%) (%) 42.5-44.0 HARD LIMESTONE 60 ---45.0-45.3 50/3" HARD LIMESTONE --47.5-48.3 50/4" --HARD LIMESTONE 50.0-50.8 50/3" HARD LIMESTONE ---52.5-52.7 50/2" --HARD LIMESTONE 50/2" 55.0-55.2 ---HARD LIMESTONE 58.0-58.1 50/1" HARD LIMESTONE ---

ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.

								S		LASS	SIFICAT		Γ A	
Project: HA	RBIN	NOOD	EST/	ATES	SWMI	F SINK	KHOLE							
Client: LEO	Ν COU	JNTY	PUBL		ORKS							Project	No.: 03-47-1	8-04
Boring: VB-	·10											Locatio	on: LEON CO	UNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
0.0-0.5	17												A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND
1.0-1.5	35	100	99	99	96	82	71	51	60	40		12	A-7-6	STIFF GRAY HIGHLY PLASTIC SANDY CLAY
2.0-2.5	36											9	A-7-6	STIFF GRAY HIGHLY PLASTIC SANDY CLAY
3.0-3.5	15											13	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND
4.0-4.5	17											8	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND
5.0-5.5	18	100	100	99	92	72	51	28	31	19		9	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND
6.0-6.5	18											10	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND
7.5-9.0	7											29	A-2-6	DENSE TO VERY DENSE GRAY CLAYEY FINE SAND
9.0-10.5	15											88	A-2-6	DENSE TO VERY DENSE GRAY CLAYEY FINE SAND
10.5-12.0	24	100	100	99	95	76	40	21	21	11		26	A-2-6	DENSE TO VERY DENSE GRAY CLAYEY FINE SAND
12.5-14.0	21											24	A-2-6	DENSE TO VERY DENSE GRAY CLAYEY FINE SAND
15.0-16.5	18											26	A-2-6	DENSE TO VERY DENSE GRAY CLAYEY FINE SAND
17.5-19.0	19											19	A-2-6	MEDIUM DENSE GRAY

Project: HARBINWOOD ESTATES SWMF SINKHOLE	
Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04	
Boring: VB-10 Location: LEON COUNTY, FLORIDA	
DEPTH (FEET) Wc -4 -10 -20 -40 -60 -100 -200 LL PI Org. (%) N Value AASHTO Description	
CLAYEY FINE SAM	ND
20.0-21.5 17 23 A-2-6 MEDIUM DENSE GRAY CLAYEY FINE SAT	
22.5-24.0 20 22 A-2-6 MEDIUM DENSE GRAY	
25.0-26.5 20 23 A-2-6 MEDIUM DENSE GRAY	
27.5-29.0 20 100 100 99 94 72 39 22 32 15 16 A-2-6 MEDIUM DENSE GRAY CLAYEY FINE SAL	
30.0-31.5 25 16 A-2-6 MEDIUM DENSE GRAY CLAYEY FINE SAI	
32.5-34.0 20 12 A-2-6 MEDIUM DENSE GRAY CLAYEY FINE SAL	
35.0-36.5 22 12 A-2-6 MEDIUM DENSE GRAY CLAYEY FINE SAN	
37.5-39.0 23 14 A-2-6 MEDIUM DENSE GRAY CLAYEY FINE SAT	
40.0-41.5 28 MEDIUM DENSE GRAY CLAYEY FINE SAT	
42.5-44.0 29 100 100 98 99 90 79 51 44 26 12 A-7-6 STIFF GRAY HIGHLY PLASTIC VERY SA	
45.0-46.5 36 45.0-46.5 36 45.0-46.5 36 411 A-7-6 5TIFF GRAY HIGHLY PLASTIC VERY SA	
47.5-49.0 35 12 A-7-6 STIFF GRAY	
50.0-51.5 37 12 A-7-6 STIFF	

SOIL CLASSIFICATION DATA Project: HARBINWOOD ESTATES SWMF SINKHOLE Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04 Location: LEON COUNTY, FLORIDA Boring: VB-10 DEPTH Wc -100 -200 Ν -4 -10 -20 -40 -60 Org. LL AASHTO Description ΡΙ (FEET) (%) (%) Value (%) (%) (%) (%) (%) (%) (%) GRAY HIGHLY PLASTIC VERY SANDY CLAY

ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.

								S	OIL C	LASS	SIFICAT		Γ A	
Project: HA	RBIN	NOOD) EST	ATES	SWMI		KHOLE							
Client: LEO		UNTY	PUBL	IC WO	ORKS							Project	No.: 03-47-1	8-04
Boring: VB-	-11											Locatio	on: LEON CO	UNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
0.0-1.5	11											7	A-2-4	LOOSE LIGHT BROWN SILTY FINE SAND
1.5-3.0	12	100	100	100	95	79	48	23				11	A-2-4	MEDIUM DENSE LIGHT BROWN SILTY FINE SAND
3.0-4.5	14											18	A-2-4	MEDIUM DENSE LIGHT BROWN SILTY FINE SAND
4.5-6.0	16											12	A-2-4	MEDIUM DENSE LIGHT BROWN SILTY FINE SAND
6.0-7.5	15											17	A-2-4	MEDIUM DENSE LIGHT BROWN SILTY FINE SAND
7.5-9.0	18											19	A-2-4	MEDIUM DENSE LIGHT BROWN SILTY FINE SAND
9.0-10.5	19											15	A-2-4	MEDIUM DENSE LIGHT BROWN SILTY FINE SAND
10.5-12.0	20											22	A-2-4	MEDIUM DENSE LIGHT BROWN SILTY FINE SAND
12.5-14.0	20	100	100	99	92	74	34	26	22	4		13	A-2-4	MEDIUM DENSE LIGHT BROWN SILTY FINE SAND
15.0-16.5	27											10	A-6	MEDIUM DENSE LIGHT BROWN CLAYEY SAND
17.5-19.0	28											15	A-6	MEDIUM DENSE LIGHT BROWN CLAYEY SAND
20.0-21.5	64											12	A-7-6	STIFF LIGHT BROWN HIGHLY PLASTIC CLAY WITH SAND
22.5-24.0	63	100	100	100	99	97	94	83	112	71		8	A-7-6	STIFF LIGHT BROWN

									S	DIL C	LASS	SIFICAT	ION DAT	A	
	Project: HA	RBINV	VOOD	EST/	ATES	SWM	SINF	KHOLE							
	Client: LEO		JNTY	PUBL		ORKS							Project	No.: 03-47-	18-04
	Boring: VB-	11											Locatio	on: LEON C	OUNTY, FLORIDA
	DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
														-	HIGHLY PLASTIC CLAY WITH SAND
	25.0-26.5	59											10	A-7-6	STIFF LIGHT BROWN HIGHLY PLASTIC CLAY WITH SAND
	27.5-29.0	62											8	A-7-6	STIFF LIGHT BROWN HIGHI Y PLASTIC CLAY WITH SAND
	30.0-31.5	92											14	A-7-5	STIFF LIGHT BROWN HIGHLY PLASTIC SILT
	32.5-34.0	89	100	100	100	100	99	98	94	142	72		9	A-7-5	STIFF LIGHT BROWN HIGHLY PLASTIC SILT
	35.0-36.5	82											19	A-7-5	VERY STIFF LIGHT BROWN HIGHLY PLASTIC SILT
	38.0												50/0"		REFUSAL
_															
_															

								S		LASS	SIFICAT		ΓA	
Project: HA	RBIN	NOOE) EST/	ATES	SWMI		HOLE							
Client: LEO		JNTY	PUBL	IC WO	ORKS							Project	No.: 03-47-18	-04
Boring: VB	·12											Locatio	on: LEON COU	NTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
0.0-1.5	20											6	A-7-6	FIRM LIGHT BROWN PLASTIC CLAY
1.5-3.0	21											14	A-7-6	STIFF LIGHT BROWN PLASTIC CLAY
3.0-4.5	21											14	A-7-6	STIFF LIGHT BROWN PLASTIC CLAY
4.5-6.0	22	100	100	100	99	93	67	53	44	28		12	A-7-6	STIFF LIGHT BROWN PLASTIC CLAY
6.0-7.5	22											12	A-7-6	STIFF LIGHT BROWN PLASTIC CLAY
7.5-9.0	24											11	A-7-6	STIFF LIGHT BROWN PLASTIC CLAY
9.0-10.5	24											18	A-7-6	MEDIUM DENSE LIGHT BROWN PLASTIC CLAYEY SAND
10.5-12.0	29	99	99	99	97	91	74	37	49	32		12	A-7-6	MEDIUM DENSE LIGHT BROWN PLASTIC CLAYEY SAND
12.5-14.0	32											13	A-7-6	MEDIUM DENSE LIGHT BROWN PLASTIC CLAYEY SAND
15.0-16.5	40											15	A-7-6	MEDIUM DENSE LIGHT BROWN PLASTIC CLAYEY SAND
17.5-19.0	73											7	A-7-5	FIRM LIGHT BROWN HIGHLY PLASTIC SILT WITH SAND
20.0-21.5	56											9	A-7-5	FIRM LIGHT BROWN HIGHLY PLASTIC SILT WITH SAND
22.5-23.1	82											50/1"	A-7-5	HARD BROWN

_____ ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC. _____

								S		LASS	SIFICAT	ION DAT	A	
Project: HA	RBINV	vood	EST/	TES	SWMF		KHOLE							
Client: LEO	Ν COL	JNTY	PUBL	IC WO	ORKS							Project	No.: 03-47-	18-04
Boring: VB-	12											Locatio	on: LEON C	OUNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
25.0-26.5	82	100	100	98	94	90	86	75	174	96		18	A-7-5	HIGHLY PLASTIC SILT WITH SAND VERY STIFF
2010 2010	02		100					10				10		LIGHT BROWN HIGHLY PLASTIC SILT WITH SAND
27.5-29.0	109											5	A-7-5	FIRM LIGHT BROWN HIGHLY PLASTIC SILT WITH SAND
30.0-31.5	132											2	A-7-5	SOFT LIGHT BROWN HIGHLY PLASTIC SILT WITH SAND
32.5-34.0	127											5	A-7-5	FIRM TAN HIGHLY PLASTIC SILT WITH SAND
35.0-36.3	81											54/9"	A-7-5	HARD TAN HIGHLY PLASTIC SILT WITH SAND
38.0-38.4												50/5"		HARD LIMESTONE

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								S		LAS	SIFICAT		A	
Project: HA	RBIN	NOOD	EST/	ATES	SWMI	SINF	HOLE							
Client: LEO		JNTY	PUBL	IC WO	ORKS							Project	No.: 03-47-	18-04
Boring: VB-	13											Locatio	on: LEON C	OUNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
0.0-1.5	21											11	A-2-4	MEDIUM DENSE LIGHT GRAY SILTY FINE SAND
1.5-3.0	18	100	100	100	91	57	28	18				19	A-2-4	MEDIUM DENSE LIGHT GRAY SILTY FINE SAND
3.0-4.5	20											28	A-2-4	MEDIUM DENSE LIGHT GRAY SILTY FINE SAND
4.5-6.0	16											26	A-2-4	MEDIUM DENSE LIGHT GRAY SILTY FINE SAND
6.0-7.5	18											19	A-2-4	MEDIUM DENSE LIGHT GRAY SILTY FINE SAND
7.5-9.0	16	100	100	99	91	64	39	27	21	6		17	A-2-4	MEDIUM DENSE LIGHT GRAY SILTY FINE SAND
9.0-10.5	24											6	A-2-4	LOOSE LIGHT GRAY SILTY FINE SAND
10.5-12.0	24											8	A-2-4	LOOSE LIGHT GRAY SILTY FINE SAND
12.5-14.0	25											11	A-2-4	MEDIUM DENSE LIGHT GRAY SILTY FINE SAND
15.0-16.5	23	100	100	100	94	64	38	25	24	9		12	A-2-4	MEDIUM DENSE LIGHT GRAY SILTY FINE SAND
17.5-19.0	36											12	A-6	MEDIUM DENSE LIGHT GRAY CLAYEY SAND
20.0-21.5	21											22	A-6	MEDIUM DENSE LIGHT GRAY CLAYEY SAND
22.5-24.0	20											19	A-6	MEDIUM DENSE LIGHT GRAY

								S	OIL C	LASS	SIFICAT	ION DAT	A	
Project: HA	RBINV	VOOD	EST/	ATES	SWMF	SINK	HOLE							
Client: LEO		JNTY	PUBL		ORKS							Project	No.: 03-47-	18-04
Boring: VB-	13											Locatio	on: LEON C	OUNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
	. ,			. ,										CLAYEY SAND
25.0-26.5	77											8	A-7-5	FIRM LIGHT GRAY HIGHLY PLASTIC SANDY SILT
27.5-29.0	79											8	A-7-5	FIRM LIGHT GRAY HIGHLY PLASTIC SANDY SILT
30.0-31.5	76	100	100	100	100	95	71	52	106	44		2	A-7-5	SOFT LIGHT GRAY HIGHLY PLASTIC SANDY SILT
32.5-34.0	97											8	A-7-5	FIRM GRAY HIGHLY PLASTIC SANDY SILT
35.0-36.5	58											7	A-7-5	FIRM GRAY HIGHLY PLASTIC SANDY SILT
38.0-40.0	64											8	A-7-5	FIRM GRAY HIGHLY PLASTIC SANDY SILT

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								S		LASS	SIFICAT		Α	
Project: HA	RBINV	NOOD) EST/	ATES	SWMI	F SINF	KHOLE							
Client: LEO	N COL	JNTY	PUBL	IC WO	ORKS							Project	No.: 03-47-	-18-04
Boring: VB-	-14											Locatio	on: LEON C	OUNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
0.0-1.5	21											5	A-6	LOOSE GRAY AND ORANGE CLAYEY SAND
1.5-3.0	21											11	A-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY SAND
3.0-4.5	60											8	A-7-6	STIFF GRAY AND ORANGE HIGHLY PLASTIC SANDY CLAY
4.5-6.0	45	100	100	100	99	95	84	62	55	33		14	A-7-6	VERY STIFF GRAY AND ORANGE HIGHLY PLASTIC SANDY CLAY
6.0-7.5												49		HARD LIMESTONE
7.5-9.0												29		WEATHERED LIMESTONE
9.0-9.4												50/5"		HARD LIMESTONE
10.5-12.0												48		HARD LIMESTONE
12.5-14.0												45		HARD LIMESTONE
15.0-15.3												50/4"		HARD LIMESTONE
17.5-18.3												50/4"		HARD LIMESTONE
20.0-21.5												24		WEATHERED LIMESTONE
22.5-24.0												71		HARD LIMESTONE
	1		1	1		·								

								S	OIL C	LASS	SIFICAT	ION DAT	A	
Project: HA	RBIN	NOOD) EST/	TES	SWMI	F SINF	KHOLE							
Client: LEO		JNTY	PUBL		ORKS							Project	No.: 03-47-18-	04
Boring: VB	-15											Locatio	on: LEON COU	NTY, FLORIDA
	Wc	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org.	N Value	AASHTO	Description
0.0-1.5	26	(70)	(78)	(/0)	(70)	(76)	(78)	(70)			(70)	5	A-7-6	LOOSE GRAY AND ORANGE HIGHLY PLASTIC CLAYEY SAND
1.5-3.0	32	100	100	100	98	95	73	47	59	37		17	A-7-6	MEDIUM DENSE GRAY AND ORANGE HIGHLY PLASTIC CLAYEY SAND
3.0-4.5	31											11	A-7-6	MEDIUM DENSE GRAY AND ORANGE HIGHLY PLASTIC CLAYEY SAND
4.5-6.0	30											9	A-7-6	LOOSE LIGHT GRAY HIGHLY PLASTIC CLAYEY SAND
6.0-7.5	30											9	A-7-6	LOOSE LIGHT GRAY HIGHLY PLASTIC CLAYEY SAND
7.5-9.0	55											7	A-7-6	FIRM LIGHT GRAY HIGHLY PLASTIC CLAY WITH SAND
9.0-10.5	69											23	A-7-6	VERY STIFF LIGHT GRAY HIGHLY PLASTIC CLAY WITH SAND
10.5-12.0	66											7	A-7-6	FIRM LIGHT GRAY HIGHLY PLASTIC CLAY WITH SAND
12.5-14.0	60	100	100	100	99	99	97	80	117	66		18	A-7-5	VERY STIFF GRAY HIGHLY PLASTIC SILT WITH SAND
15.0-16.5	57											11	A-7-5	STIFF LIGHT GRAY HIGHLY PLASTIC SILT WITH SAND
17.5-17.9	56											50/5"	A-7-5	HARD LIGHT GRAY HIGHLY PLASTIC SILT WITH SAND

								S		LASS	SIFICAT	ION DAT	A	
Project: HA	RBINN	NOOD	EST/	ATES	SWM	SINK	HOLE							
Client: LEO	Ν COL	JNTY	PUBL	IC WO	ORKS							Project	No.: 03-47-	18-04
Boring: VB-	16											Locatio	on: LEON CO	DUNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
0.0-1.5	12											8	A-6	LOOSE GRAY CLAYEY SAND
1.5-3.0	22											11	A-6	MEDIUM DENSE GRAY CLAYEY SAND
3.0-4.5	30											11	A-6	MEDIUM DENSE GRAY CLAYEY SAND
4.5-6.0	25	100	100	100	99	87	52	45	36	19		8	A-6	LOOSE GRAY AND ORANGE CLAYEY SAND
6.0-7.5	19											8	A-6	LOOSE GRAY AND ORANGE CLAYEY SAND
7.5-9.0	25											8	A-6	LOOSE GRAY AND ORANGE CLAYEY SAND
9.0-10.5	20											5	A-6	LOOSE GRAY AND ORANGE CLAYEY SAND
10.5-12.0	17											7	A-6	LOOSE GRAY AND ORANGE CLAYEY SAND
12.5-14.0	17											14	A-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY SAND
15.0-16.5	15											13	A-2-4	MEDIUM DENSE GRAY SILTY FINE SAND
17.5-19.0	16	100	100	100	100	98	45	16				15	A-2-4	MEDIUM DENSE GRAY SIL TY FINE SAND
20.0-21.5	15											17	A-2-4	MEDIUM DENSE GRAY SILTY FINE SAND
22.5-24.0	19											13	A-2-4	MEDIUM DENSE GRAY

								S		LASS	SIFICAT	ION DAT	A	
Project: HA	RBINV	VOOD	EST/	ATES	SWMI		KHOLE							
Client: LEO	Ν COL	JNTY	PUBL		ORKS							Project	No.: 03-47-	18-04
Boring: VB-	16											Locatio	on: LEON C	OUNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
														SILTY FINE SAND
25.0-26.5	24											9	A-7-6	MEDIUM DENSE GRAY HIGHLY PLASTIC CLAYEY SAND
27.5-29.0	26	100	100	100	99	94	88	45	51	34		5	A-7-6	LOOSE GRAY HIGHLY PLASTIC CLAYEY SAND
30.0-31.5	23											6	A-7-6	LOOSE GRAY HIGHLY PLASTIC CLAYEY SAND
32.5-34.0	25											8	A-7-6	LOOSE GRAY HIGHLY PLASTIC CLAYEY SAND
35.0-36.5	19	100	100	100	99	94	75	38	45	26		6	A-7-6	LOOSE GRAY AND ORANGE PLASTIC CLAYEY SAND
38.0-40.0	22											7	A-7-6	LOOSE GRAY AND ORANGE PLASTIC CLAYEY SAND

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								S		LASS	SIFICAT		ΓA	
Project: HA	RBIN	NOOD) EST/	ATES	SWMI	F SIN	KHOLE							
Client: LEO	N COU	JNTY	PUBL	IC WO	ORKS							Project	No.: 03-47-18	-04
Boring: VB-	·17											Locatio	on: LEON COU	JNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	Ы	Org. (%)	N Value	AASHTO	Description
0.0-1.5	19											7	A-7-6	LOOSE GRAY AND ORANGE PLASTIC CLAYEY SAND
1.5-3.0	20											13	A-7-6	MEDIUM DENSE GRAY AND ORANGE PLASTIC CLAYEY SAND
3.0-4.5	22											7	A-7-6	LOOSE GRAY AND ORANGE PLASTIC CLAYEY SAND
4.5-6.0	31											9	A-7-6	MEDIUM DENSE GRAY AND ORANGE PLASTIC CLAYEY SAND
6.0-7.5	26	100	100	100	100	98	59	33	43	24		7	A-7-6	LOOSE GRAY AND ORANGE PLASTIC CLAYEY SAND
7.5-9.0	24											10	A-7-6	MEDIUM DENSE GRAY AND ORANGE PLASTIC CLAYEY SAND
9.0-10.5	23											10	A-7-6	MEDIUM DENSE GRAY AND ORANGE PLASTIC CLAYEY SAND
10.5-12.0	24											11	A-7-6	MEDIUM DENSE GRAY AND ORANGE PLASTIC CLAYEY SAND
12.5-14.0	32											11	A-7-6	MEDIUM DENSE LIGHT GRAY HIGHLY PLASTIC CLAYEY SAND
15.0-16.5	35	100	100	100	100	98	79	41	84	66		8	A-7-6	MEDIUM DENSE LIGHT GRAY HIGHLY PLASTIC CLAYEY SAND
17.5-19.0	39											9	A-7-6	MEDIUM DENSE LIGHT GRAY HIGHLY PLASTIC CLAYEY SAND
20.0-21.5	35											10	A-7-6	MEDIUM DENSE LIGHT GRAY HIGHLY PLASTIC CLAYEY SAND
22.5-24.0	38											6	A-7-6	LOOSE LIGHT GRAY

								S		LASS	SIFICAT	ION DAT	A	
Project: HA	RBIN	NOOD) EST/	ATES	SWMI		HOLE							
Client: LEO		JNTY	PUBL	IC WO	ORKS							Project	No.: 03-47-18	-04
Boring: VB-	17											Locatio	on: LEON COU	NTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
•														HIGHLY PLASTIC CLAYEY SAND
25.0-26.5	61											7	A-7-6	STIFF LIGHT GRAY HIGHLY PLASTIC SANDY CLAY
27.5-29.0	65											3	A-7-6	SOFT LIGHT GRAY HIGHLY PLASTIC SANDY CLAY
30.0-31.5	67	100	100	100	99	98	87	69	93	67		WOH	A-7-6	VERY SOFT LIGHT GRAY HIGHLY PLASTIC SANDY CLAY
32.5-34.0	77											1	A-7-5	VERY SOFT GRAY HIGHLY PLASTIC SILT
35.0-36.5	88											WOH	A-7-5	VERY SOFT GRAY HIGHLY PLASTIC SILT
37.5-39.0	115											WOH	A-7-5	VERY SOFT GRAY HIGHLY PLASTIC SILT
40.0-41.5	81											WOH	A-7-5	VERY SOFT GRAY HIGHLY PLASTIC SILT
42.5-44.0	89											WOH	A-7-5	VERY SOFT GRAY HIGHLY PLASTIC SILT
45.0-46.5	94	100	100	100	99	98	95	88	192	132		WOH	A-7-5	VERY SOFT GRAY HIGHLY PLASTIC SILT
47.5-49.0	127											WOH	A-7-5	VERY SOFT LIGHT GRAY HIGHLY PLASTIC SILT
50.0-51.5	88											WOH	A-7-5	VERY SOFT LIGHT GRAY HIGHLY PLASTIC SILT
52.5-54.0	95											WOH	A-7-5	VERY SOFT LIGHT GRAY HIGHLY PLASTIC SILT
55.0-56.5	118	100	100	100	100	100	100	91				WOH	A-7-5	VERY SOFT

Project: 114		N005		ATES	C/4/14		(UO) F	3		LAG			A	
Client: LEC	N COI	UNTY			SVVIMI DRKS	- 21NF	NHULE					Project	No.: 03-47	-18-04
Boring: VB	-17											Locatio	on: LEON C	OUNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org.	N Value	AASHTO	Description
(,				(/0)		(/0)								LIGHT GRAY HIGHLY PLASTIC SILT
57.5-57.6 60.0-60.1												50/1" 50/1"		HARD LIMESTONE HARD LIMESTONE

								S	OIL C	LASS	SIFICAT	ION DAT	A	
Project: HA	RBIN	NOOD) EST	ATES	SWM		HOLE							
Client: LEO		JNTY	PUBL		ORKS							Project	No.: 03-47-18-	04
Boring: VB-	·18											Locatio	on: LEON COUI	NTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
0.0-1.5	16											8	A-2-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY FINE SAND
1.5-3.0	23											9	A-2-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY FINE SAND
3.0-4.5	20											7	A-2-6	LOOSE GRAY CLAYEY FINE SAND
4.5-6.0	24	100	100	100	100	99	79	27	33	14		8	A-2-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY FINE SAND
6.0-7.5	24											13	A-2-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY FINE SAND
7.5-9.0	25											16	A-2-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY FINE SAND
9.0-10.5	32											14	A-7-6	VERY STIFF GRAY AND ORANGE HIGHLY PLASTIC CLAY WITH SAND
10.5-12.0	33											16	A-7-6	VERY STIFF GRAY AND ORANGE HIGHLY PLASTIC CLAY WITH SAND
12.5-14.0	44											9	A-7-6	STIFF GRAY AND ORANGE HIGHLY PLASTIC CLAY WITH SAND
15.0-16.5	62	100	100	100	99	98	95	82	74	42		10	A-7-6	STIFF GRAY AND ORANGE HIGHLY PLASTIC CLAY WITH SAND
17.5-19.0	48											9	A-7-6	STIFF GRAY AND ORANGE HIGHLY PLASTIC CLAY WITH SAND
20.0-21.5	49											40	A-7-6	HARD GRAY HIGHLY PLASTIC CLAY WITH SAND
22.5-24.0												13		WEATHERED LIMESTONE
25.0-26.5												30		WEATHERED LIMESTONE

SOIL CLASSIFICATION DATA Project: HARBINWOOD ESTATES SWMF SINKHOLE Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04 Location: LEON COUNTY, FLORIDA Boring: VB-18 DEPTH Wc -200 -4 -10 -20 -40 -60 -100 Org. Ν AASHTO Description LL ΡΙ (FEET) (%) Value (%) (%) (%) (%) (%) (%) (%) (%) 27.5-29.0 WEATHERED LIMESTONE 28 ---30.0-31.5 16 --WEATHERED LIMESTONE 50/1" 32.5-33.1 --HARD LIMESTONE

ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.

								S		LASS	SIFICAT	TION DAT	Ά	
Project: HA	RBINV	VOOD	EST/	ATES	SWMI	F SINK	HOLE							
Client: LEO	N COL	JNTY	PUBL	IC WO	ORKS							Project	No.: 03-47-	18-04
Boring: VB-	19											Locatio	on: LEON CO	DUNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
0.0-1.5	21											11	A-6	MEDIUM DENSE LIGHT GRAY AND ORANGE CLAYEY SAND
1.5-3.0	21											15	A-6	MEDIUM DENSE LIGHT GRAY AND ORANGE CLAYEY SAND
3.0-4.5	24											13	A-2-6	MEDIUM DENSE LIGHT GRAY AND ORANGE CLAYEY FINE SAND
4.5-6.0	24											12	A-2-6	MEDIUM DENSE LIGHT GRAY AND ORANGE CLAYEY FINE SAND
6.0-7.5	25											11	A-2-6	MEDIUM DENSE LIGHT GRAY AND ORANGE CLAYEY FINE SAND
7.5-9.0	23	100	100	100	98	93	78	32	43	22		17	A-2-6	MEDIUM DENSE LIGHT GRAY AND ORANGE CLAYEY FINE SAND
9.0-10.5	23											18	A-2-6	MEDIUM DENSE LIGHT GRAY AND ORANGE CLAYEY FINE SAND
10.5-12.0	33											14	A-6	MEDIUM DENSE LIGHT GRAY AND ORANGE CLAYEY SAND
12.5-14.0	26											9	A-6	MEDIUM DENSE LIGHT GRAY AND ORANGE CLAYEY SAND
15.0-16.5	55											10	A-7-6	STIFF LIGHT GRAY AND ORANGE HIGHLY PLASTIC CLAY WITH SAND
17.5-19.0	60											8	A-7-6	STIFF LIGHT GRAY AND ORANGE HIGHLY PLASTIC CLAY WITH SAND
20.0-21.5	67	99	97	96	95	94	88	73	98	68		5	A-7-6	FIRM GRAY AND BROWN HIGHLY PLASTIC CLAY WITH SAND
22.5-24.0												39		WEATHERED LIMESTONE
25.0-26.5												39		WEATHERED LIMESTONE

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								S		LASS	SIFICAT		A	
Project: HA	RBIN	NOOD	EST/	ATES	SWM		KHOLE							
Client: LEO		JNTY	PUBL	IC WO	ORKS							Project	No.: 03-47-1	8-04
Boring: VB-	20											Locatio	on: LEON CC	DUNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	Ы	Org. (%)	N Value	AASHTO	Description
0.0-1.5	20											12	A-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY SAND
1.5-3.0	19	100	100	100	99	90	42	36	40	22		16	A-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY SAND
3.0-4.5	17											18	A-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY SAND
4.5-6.0	19											13	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND
6.0-7.5	18											14	A-2-6	GRAY CLAYEY FINE SAND
7.5-9.0	22											13	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND
9.0-10.5	21											11	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND
10.5-12.0	19											12	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND
12.5-14.0	21	100	100	100	99	96	79	30				13	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND
15.0-16.5	22											16	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND
17.5-19.0	21											16	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND
20.0-21.5	21											13	A-2-6	MEDIUM DENSE GRAY CLAYEY FINE SAND
22.5-24.0	21											7	A-2-6	LOOSE GRAY

								S		LASS	SIFICAT	ION DAT	Ά	
Project: HA	RBIN	NOOD) EST/	ATES	SWMI	F SIN	KHOLE							
Client: LEO		JNTY	PUBL		ORKS							Project	No.: 03-47-1	8-04
Boring: VB	-20											Locatio	on: LEON CO	UNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
														CLAYEY FINE SAND
25.0-26.5	43											6	A-7-6	LOOSE GRAY AND ORANGE PLASTIC CLAYEY SAND
27.5-29.0	27	100	100	100	99	97	84	43	49	20		4	A-7-6	LOOSE GRAY AND ORANGE PLASTIC CLAYEY SAND
30.0-31.5	23											4	A-7-6	LOOSE GRAY AND ORANGE PLASTIC CLAYEY SAND
32.5-34.0	42											WOH	A-7-5	VERY SOFT GRAY AND ORANGE HIGHLY PLASTIC SILT WITH SAND
35.0-36.5	99	100	100	100	99	99	96	79				WOH	A-7-5	VERY SOFT GRAY AND ORANGE HIGHLY PLASTIC SILT WITH SAND
37.5-39.0	79											5	A-7-5	FIRM GRAY AND ORANGE HIGHLY PLASTIC SILT WITH SAND
40.0-41.5	75											WOH	A-7-5	VERY SOFT GRAY AND ORANGE HIGHLY PLASTIC SILT WITH SAND
42.5-44.0	129											WOH	A-7-5	VERY SOFT GRAY AND ORANGE HIGHLY PLASTIC SILT WITH SAND
45.0-46.5	119	100	100	100	99	98	93	78	148	106		5	A-7-5	FIRM GRAY AND ORANGE HIGHLY PLASTIC SILT WITH SAND
47.5-49.0												5		HIGHLY WEATHERED LIMESTONE

	SOIL CLASSIFICATION DATA													
Project: HA	RBIN	NOOD) EST	ATES	SWMI	SINF	KHOLE							
Client: LEO		JNTY	PUBL		ORKS							Project	No.: 03-47-	18-04
Boring: VB-	21											Locatio	on: LEON CO	OUNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
0.0-1.5	26											7	A-2-6	LOOSE GRAY CLAYEY EINE SAND
1.5-3.0	20											12	A-2-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY FINE SAND
3.0-4.5	22	100	100	100	99	98	53	22	28	11		10	A-2-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY FINE SAND
4.5-6.0	23											11	A-2-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY FINE SAND
6.0-7.5	24											11	A-2-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY FINE SAND
7.5-9.0	27											15	A-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY SAND
9.0-10.5	31											15	A-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY SAND
10.5-12.0	35	100	100	100	99	93	81	43				12	A-6	MEDIUM DENSE GRAY AND ORANGE CLAYEY SAND
12.5-14.0	35											7	A-6	LOOSE GRAY AND ORANGE CLAYEY SAND
15.0-16.5	60											8	A-7-6	STIFF ORANGE HIGHLY PLASTIC SANDY CLAY
17.5-19.0	64	100	98	96	92	89	78	64	88	59		12	A-7-6	STIFF ORANGE HIGHLY PLASTIC SANDY CLAY
20.0-21.5												21		WEATHERED LIMESTONE
22.5-24.0												8		WEATHERED LIMESTONE
25.0-26.5												3		HIGHLY WEATHERED LIMESTONE
27.5-29.0												14		WEATHERED LIMESTONE
30.0-31.5												15		WEATHERED LIMESTONE

SOIL CLASSIFICATION DATA Project: HARBINWOOD ESTATES SWMF SINKHOLE Client: LEON COUNTY PUBLIC WORKS Project No.: 03-47-18-04 Location: LEON COUNTY, FLORIDA Boring: VB-21 DEPTH Wc -200 -4 -10 -20 -40 -60 -100 Org. Ν AASHTO LL ΡΙ Description (FEET) (%) Value (%) (%) (%) (%) (%) (%) (%) (%) 32.5-34.0 WEATHERED LIMESTONE 14 ---35.0-35.3 50/3" --HARD LIMESTONE 38.0-40.0 11 --WEATHERED LIMESTONE

ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.

								S			SIFICAT		ΓA	
Project: HA	RBIN	NOOD) EST/	ATES	SWMI	F SINK	HOLE							
Client: LEO	Ν COI	JNTY	PUBL	IC WO	ORKS							Project	No.: 03-47-18	-04
Boring: VB-	22											Locatio	on: LEON COU	NTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
0.0-1.5	18											6	A-2-6	LOOSE GRAY CLAYEY FINE SAND
1.5-3.0	27											7	A-7-6	STIFF GRAY HIGHLY PLASTIC CLAY WITH SAND
3.0-4.5	35	100	100	100	100	99	90	71	79	55		10	A-7-6	STIFF GRAY HIGHLY PLASTIC CLAY WITH SAND
4.5-6.0	27											9	A-7-6	STIFF GRAY HIGHLY PLASTIC CLAY WITH SAND
6.0-7.5	27											12	A-7-6	STIFF GRAY HIGHLY PLASTIC CLAY WITH SAND
7.5-9.0	26											16	A-7-6	VERY STIFF GRAY HIGHLY PLASTIC CLAY WITH SAND
9.0-10.5	36											9	A-7-6	STIFF GRAY HIGHLY PLASTIC CLAY WITH SAND
10.5-12.0	31											12	A-7-6	STIFF GRAY HIGHLY PLASTIC CLAY WITH SAND
12.5-14.0	39											9	A-7-6	STIFF GRAY HIGHLY PLASTIC CLAY WITH SAND
15.0-16.5	38	100	100	100	100	100	93	73	82	53		6	A-7-6	STIFF GRAY HIGHLY PLASTIC CLAY WITH SAND
17.5-19.0	42											WOH	A-7-6	VERY SOFT GRAY HIGHLY PLASTIC CLAY WITH SAND
20.0-21.5	35											3	A-7-6	SOFT GRAY HIGHLY PLASTIC CLAY WITH SAND
22.5-24.0	27											2	A-2-6	VERY LOOSE GRAY

— ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC. —————————

								S		LASS	SIFICAT	ION DAT	A	
Project: HA	RBINV	NOOD	EST/	ATES	SWM	F SINF	KHOLE							
Client: LEO	Ν COL	JNTY	PUBL		ORKS							Project	No.: 03-47-	18-04
Boring: VB-	22											Locatio	on: LEON C	OUNTY, FLORIDA
DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	AASHTO	Description
• •														CLAYEY FINE SAND
25.0-26.5	23	99	97	95	90	81	46	27	31	14		WOH	A-2-6	VERY LOOSE GRAY CLAYEY FINE SAND
27.5-29.0	25											WOH	A-2-6	VERY LOOSE GRAY CLAYEY FINE SAND
30.0-31.5	64											3	A-7-5	FIRM WHITE HIGHLY PLASTIC SILT
32.5-34.0	68											4	A-7-5	FIRM WHITE HIGHLY PLASTIC SILT
35.0-36.5												12		WEATHERED LIMESTONE
37.5-39.0												23		WEATHERED LIMESTONE
40.0-41.5												21		WEATHERED LIMESTONE
					-									
	I								L	L				

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APPENDIX D TECHNICAL SPECIAL PROVISION

TECHNICAL SPECIAL PROVISION

FOR

SUBSURFACE PRESSURE GROUTING

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

Professional Engineer:	Myron L. Hayden, P.E.
Date:	June 13, 2019
Fla. License No.:	34067
Firm Name:	Environmental & Geotechnical
	Specialists, Inc.
Firm Address:	104 North Magnolia Drive
City, State, Zip Code:	Tallahassee, FL 32301
Certificate of Authorization:	6222
Pages:	1-5

SECTION T173 SUBSURFACE PRESSURE GROUTING

T173-1 Description

The work specified in this Technical Special Provision consists of subsurface pressure grouting and grout pipe installation as shown in the plans. The purpose of the grouting program is to improve the subsurface conditions by injecting cement grout to fill voids and to densify the soils to minimize the potential for future ground subsidence. Grout pipe installation consists of drilling or driving pipes to convey grout through the underlying soils. Cement grout injection shall be at the depths indicated on the Cement Grout Plan or as directed by the Engineer. The Contractor shall submit with bid the reference documentation of at least five years experience in subsurface pressure grouting of projects with similar size and scope.

T173-2 Contractor Submittals

- 1. Grout pipe installation procedures.
- 2. Grout mix design.
- 3. Heave monitoring instrumentation and procedures.
- 4. Contractor's Project Management contact information.
- 5. Calibration procedures for pump equipment.
- 6. List of pumping equipment to be used in the preparation or handling of grout.
- 7. Qualifications of Grouting Supervisor.
 - a. A minimum of 5 years experience in subsurface pressure grouting.
 - b. Experience record of at least 3 project in the last 5 years of a similar size and scope of this project.
 - c. Experience shall be provided as outlined in FDOT Standard Specification 105-8.

The Contractor shall not begin work until these documents are submitted and accepted in writing, as sufficient, by the Engineer.

T173-3 Materials

- 1. Portland Cement shall meet requirements of FDOT Standard Specification 921.
- 2. Fine Aggregate shall meet requirements of FDOT Standard Specification 902.
- 3. Water shall meet requirements of FDOT Standard Specification 923.
- 4. Fly Ash shall meet the requirements of FDOT Standard Specification 929-2.
- 5. Admixtures shall meet the requirements of FDOT Standard Specification 924.
- 6. Grout mix shall be delivered from an FDOT approved plant, and shall be a sand-cement mixture with appropriate additive and minimum 2-day compressive strength of 150 pounds per square inch (psi). Design mix shall be submitted to Engineer for approval.

T173-4 Mix Proportions

The grout mix shall include a minimum Portland cement content of 12 percent of the dry weight of sand. Addition of water on site to ensure pumpability shall not be allowed without authorization of Engineer. Evaluate and adjust source and characteristics of sand, and adjust mix proportions including sand, fly ash, and other mix components. The grout mix proportions shall be adjusted

for each point of injection, and from batch to batch during injection, if necessary, to obtain optimum grout pumpability consistent with requirements of this Technical Special Provision.

T173-5 Equipment

Equipment shall be capable to sufficiently advance the grout casing through the existing subsoil to the depth required to meet the grouting program objectives. All oil or rust inhibitors shall be removed from all portions of the equipment in contact with the grout prior to use. Pressure grout pumps shall have a variable range of rate of delivery between 1 cubic foot per minute and 10 cubic feet per minute and shall be equipped with on-line pressure gauges with range of 50-500 psi and remote controls capable of reaching all the grout injection points. Pressure grout pumps shall be calibrated to measure the grout volume and rate of delivery for the intended grout mix design in unites of cubic feet and cubic feet per minute, respectively. Provide vertical survey control in the vicinity of each injection point to determine if surface heave has occurred.

T173-6 Construction Methods

Prior to the start of any grout injection operations, the Contractor and Engineer shall jointly inspect the site to observe and document the pre-construction condition of the site and any existing structures or facilities. Measure and record the elevation of the ground surface at representative locations in the grout injection area. Document the results of the site inspection in a written report and provide a copy of this report to the Engineer prior to the start of the grouting operations. Calibration of grout pumps shall be required as directed by the Engineer. Ready mix tickets shall be submitted to the Engineer. The cement grout injection program shall be performed to fill voids and densify any loose soil underlying the roadway at the specified locations shown on the Cement Grout Plans or as directed by the Engineer. The placement of cement grout within the soil shall act to densify the surrounding soil. A slump ranging from 6 to 9 inches shall be used or as directed by the Engineer. Grouting shall start with a 7-inch slump. Depending upon the intake, the slump may be increased or decreased at the direction of the Engineer.

T173-6.1 Injection Point Spacing and Placement

Primary grout injection pipes shall be driven or installed in a predrilled pilot hole, not jetted, to the specified depths as noted in the Cement Grout Plan. Any variation from the depths listed in the Cement Grout Plan shall be approved by the Engineer. If the grout injection pipes are installed in predrilled pilot holes, the pilot hole shall have a diameter at least 3/4 inch smaller than the grout injection pipe. The injection pipes shall be installed at the injection point locations and in the sequence shown on the Cement Grout Plan unless otherwise directed by the Engineer. Dependent upon the grout take and grout injection pipe depths, the grouting sequence shown on the Cement Grout Plan may be modified by the Engineer. All changes in injection pipe spacing, grout delivery pressure, and allowable quantities of grout at a given depth and location shall be approved by the Engineer. The use of rotary wash drilling techniques or vibratory hammers for installation of grout injection pipes is not permitted. The diameter of injection pipes shall be adequate to permit injection of cement grout. The injection pipes should have a minimum of 2 1/2 inches inside diameter. "Nippled" casing shall not be allowed. Hard caps able to withstand the driving forces shall be used at the pipe bottom to prevent soil plugging the casing during grout pipe installation. The use of augers in lieu of injection pipes is not acceptable. Keep accurate installation records for all injection points, including location and depth of injection points, method of installation, and other pertinent data such as difficulties encountered during drilling or pipe driving.

T173-6.2 Grout Injection Procedures

The grouting sequence shall proceed as indicated on the Cement Grout Plan. The injection of grout shall begin at the bottom depth of the injection pipe and proceed upward in 2-foot intervals to a depth of approximately 4 feet below the existing grade or as directed by the Engineer. No grout other than that required to fill the hole shall be injected above the 4-foot depth. The grouting program shall commence with a test program for evaluation of equipment performance, selection of grout pressure criteria and refusal criteria. In general, injection at each interval shall continue until one of the following occurs:

- 1. Maximum grout pressure of 200 psi increase over the pressure required to initiate grout take.
- 2. Maximum grout pressures at the ground surface of 400 psi is achieved unless otherwise directed by the Engineer.
- 3. Maximum grout "take" quantity of 5 cubic yards within a 2-foot interval occurs.
- 4. Maximum 20 cubic yards of grout has been pumped at any one injection point.
- 5. Maximum surface heave of ¹/₄ inch occurs at any location within the injection area. If there is a dip in the existing ground profile that needs correction, this limit may be increased by the Engineer.

The above criteria may be modified by the Engineer during grouting depending upon field conditions. Grouting procedure shall continue with the grout pipe withdrawn in a controlled manner and with sufficient pressure on the grout to assure that the drilled hole is filled with grout to prevent a breaching of any clayey layer present.

T173-7 Contractor's Supervision and Quality Control

Keep accurate records for grout mix proportions, quantities of grout taken at each 2 feet interval, and respective injection pressures. The actual sequence of grouting operations, proportions of grout mixes, etc., shall be as provided herein, except that the provisions may be modified by the Engineer as required by field conditions. All daily drilling, grouting, and testing reports shall be submitted to the Engineer within 48 hours. Grout Point Installation Reports shall be required and shall contain at least the following information: Name of driller, type of drill, method being used, date started, dated completed, location of hole, type and depth of materials encountered. Grouting Reports shall be required and shall contain at least the following information: Name of grout slump, log of quantity injected per linear foot of hole, date, rate of pumping, and pressure at the hole.

T173-8 Testing and Quality

Perform slump test in the field on each truck or as directed by the Engineer. One sample shall be collected on the first truck for compressive strength testing and one sample shall be collected and tested for compressive strength every 100 cubic yards of grout pumped or as directed by the Engineer. A laser level control system shall be installed and operated by the Contractor for use during grouting. The monitoring shall be carried out to detect any movement within 25 feet of the grouting operations whenever grouting is occurring.

Payment will not be authorized for grouting resulting in surface heave above the maximum allowed. Contractor shall be responsible for any damage to the roadway, embankment and nearby structures resulting from pressure grouting operation.

Calibration for volume production, pressure loss, and slump loss shall be performed to the satisfaction and at the frequency directed by the Engineer. Contractor shall perform Standard Penetration Test borings in improved areas to evaluate the success of the grouting operation when requested by the Engineer. Borings may be required to be performed during the grouting operations and again at the the completion of grouting.

The contractor will have full responsibility for all testing and quality control necessary to ensure that the work is in compliance with the contract and applicable specifications. Any testing or onsite observations performed by the Engineer are for verification only and do not absolve contractor from sole responsibility of full compliance and performance of the work.

T173-9 Method of Measurement

The project is lump sum and shall include Maintenance of Traffic, Injection point piping, Grout, and Mobilization.

T173-10 Basis of Payment

The work under this section shall be paid for at the contract unit price as listed in the proposal. Such prices and payments shall be full compensation for all work specified under this Section and all other work, materials, tests, equipment, labor, repairs and incidentals to complete the work. Payment shall be made under:

Pay Item No. (E999 10 41) Lump Sum Contract