CADDO WARD II INDUSTRIAL DEVELOPMENT CORPORATION

for

DEEP SOIL BORING REPORT- PHASE 1 WARD II INDUSTRIAL PARK KSA PROJECT NO. CPW.007-3

PREPARED BY



1111 HAWN AVENUE SHREVEPORT, LA 71107 TELEPHONE 318-221-7501



OCTOBER 30, 2019

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SUMMARY

KSA was hired by Caddo Ward II Industrial Development Corporation to perform Geotechnical Engineering Services of deep borings for the Caddo Ward II Industrial Development Corporation at the Ward II Industrial Park. The deep borings are planned to be taken in three (3) phases with depths alternating between 30 and 50 feet below existing ground elevation.

The purpose was to evaluate the subsurface conditions and make recommendations for the safe and economical design of potential foundation system(s), pavement sections and subgrade preparation. The locations of the borings are throughout the industrial park and located along Roy "Hoppy" Hopkins Drive between Louisiana Highway 1 and Louisiana Highway 170 in Caddo Parish, Louisiana. The proposed boring and phase map is located in Appendix A of this report.

TIMELINE

Phase 1 of the deep boring consisted of eight (8) borings along the north and south sides of Roy "Hoppy" Hopkins Drive in Ward II Industrial Park. The borings were taken between January 14 and 16, 2019. The Boring Numbers for Phase 1 are 9 and 12 through 18. The boring depths are either 30 ft. or 50 ft. below existing ground elevation. See Appendix A for the approximate locations. The boring number and depth of the borings performed are listed in the following table:

DEEP BORINGS – PHASE 1										
BORING NUMBER	BORING DEPTH (ft.)									
9	30									
12	50									
13	50									
14	50									
15	50									
16	50									
17	30									
18	30									

The samples were returned to the laboratory, visually logged in accordance with the Unified Soils Classification System, and then subjected to standard laboratory tests to determine pertinent engineering properties. The results were tabulated on the Logs of Boring listed in Appendix B.

RECOMMENDATIONS

Shallow Foundation Systems

It was determined that shallow foundation systems can be utilized for support of the proposed structures in the areas tested, but fill or excavation may be required, as necessary. Either continuous footings and/or isolated spread footings appear feasible in the areas. An allowable bearing pressure range of 1600 to 2800 psf, depending on the bearing stratum and condition of said stratum at the time of construction, can be used for the design. See ATL Geotechnical Exploration report located in Appendix C for more details on shallow foundations.

Deep Foundation Systems

If the design loads become too large for shallow foundations to be feasible or site grading plans put the footing bearing elevation at or near the volumetrically fat clay, the deep foundation option is also acceptable in lieu of uniformly cutting significant amounts of in-situ soils. The deep foundation option would be done with drilled and cast in place concrete piers in conjunction with a uniform thickness of select fill material placed directly beneath the top of subgrade elevation. The following table lists the minimum allowable loads for various diameter shafts with minimum shaft lengths as required:

Diameter (in)	Depth (ft.)	Allowable Loads (kips)
18	10	12
	15	20
	20	28
	25	38
	30	47
24	10	17
	15	27
	20	39
	25	53
	30	65
30	10	22
	15	36
	20	50
	25	68
	30	84
36	10	28
	15	44
	20	62
	25	85
	30	105

See ATL Geotechnical Exploration report located in Appendix C for more details on deep foundations.

Pavement Sections

The design of pavement sections for this site is based upon the upper twelve (12) inches of subgrade meeting the requirements of compaction and material type of either in-situ lean clays or volumetrically unstable clay soils. Depending upon the material type the subgrade should either be undercut as such to provide placement of a minimum of one (1) foot of select fill material or the soils may be lime stabilized. Typical pavement sections are provided for both Automobile Parking and Drive Areas and Channelized Heavy Truck Traffic Areas. Rigid pavement sections of six (6) inches and eight (8) inches of Portland Cement Concrete are listed as well as flexible pavement sections of two (2) inches and four (4) inches of Hot Mixed Asphaltic

Concrete. The complete pavement sections are listed in the ATL Geotechnical Exploration report located in Appendix C.

Site Preparation

Site preparation should include clearing and grubbing of trees, debris and organic laden soils in the construction area to a depth of six (6) to twelve (12) inches. Areas to receive select fill or to bear foundation elements or the pavement structure should be undercut, stabilized, processed and re-compacted or excavated and replaced with select fill, whichever is appropriate. See ATL Geotechnical Exploration report located in Appendix C for specific requirements.

LIMITATIONS

Sound engineering practices and procedures were used in the preparation of this report. This report does not reflect any variations, which may occur at the site. The nature and extent of such variations may not become evident until construction.

APPENDIX A



APPENDIX B

										L	OF	BC	DRING B-9 SHEET 1 of 1	
										_				CLIENT: KSA Engineers, Inc.
				Am 131	erica 7 C	an I anvo	estii on C	ng L Court	ab, Li	_C				PROJECT: Caddo Ward II Industrial Park - Phase 1
		1		Bos	sier	City	, LA	A 71	111					LOCATION: Vivian, Caddo Parish, Louisiana
	15		📩 тм	Tele	epho	one:	31	8-75	2-660)5				NUMBER: G18-12-153
				Fax	: 31	18-7	52-6	617	,					
	EU	-1 -		•							• T •			DRILLING METHOD(S):
(GP,				A		A		4BO	RAIC		AIA			Continuous Flight Auger
PAR					(IMIT	ERG S						
RIAL					T (%			X				RE	Е (%	GROUNDWATER INFORMATION:
ISUC					TEN		⊨	INDE			%) N	SSI	SIEV	Groundwater encountered at 8 ft during drilling operations. Water level recorded at 4 ft upon completion.
			LE		CON	LIMI		Ϋ́	₹F	J L	RAII	PRE	200	
MB((FT)	S S	ISIF ISQ		JRE		STIC	STIC	NSI S/Cl	ESS GTH SQ F	E ST	ING S/S	Ň	
L SY	DTH	APLE	NONSNO	» 0: %	ISTL	LIQL	PLA	PLA		MPR RENC	LUR	UND	ISU	SURFACE ELEVATION: Unknown
SOI	DEI	SAI	/żäż	RQI 8	MO	LL	PL	PI	POI	STEC	FAI	DO C	MIN	DESCRIPTION OF STRATUM
A COM	-	-7	N = 3		20									Soft tan and gray silty lean clay (CL)
	-	\mathbf{X}	N = 9		21									Stiff gray and red lean-to-fat clay (CL-CH) with sand
21-8	-		D - 40		200		20	10		4 77	4.04		75	
I AIC	- 5		P = 4.2	25	23	41	22	19	99	1.77	4.24		75	Medium stiff below 6 ft
	_		P = 2.0) (31 7	51	24	27	90	1.97	5.77			
	-		P = 4.5	5+	31	38	24	14	**				39	Firm gray and tan clayey sand (SC)
	- 10	-												
	-													Very stiff dark gray lean clay (CL) with silt partings
	-	-	P = 4.5	5+	28	47	24	23	**				75	
	- 15													
	-0	-												with occasional lignite layers below 17 ft
	_		P = 4.5	5+	33				78	7.13	4.94			
ž ///	- 20													
	-	-												
	-:	-	P = 4.5	5+	24				103	9.31	9.06			
	- 25													
	-	-												
	-	-	P = 4.5	5+	28	41	22	19	**					
	- 30													Boring Terminated 30 ft
DRI DR														
TAKE														
2121														
20 81														
11/2														
ALU1.														
A GNL														
190														
	N - ST		DARD F	PENE	TRA	TION	I TES		SISTA	NCE				REMARKS [.]
	P - PC	CK			OME	TER	RES	ISTA	NCE					GPS Coordinates: 32* 50' 33.24" N, -93* 57' 48.54" W
P P	R - R0	CK	CORE	REC	OVE	RY		-010		-01				** Sample disturbed upon extrusion.
3	RQD -	RO	UK QU	ALIT	Y DE	SIG	NA FIC	JN						

									LC	DG (OF	BO	RING B-12 SHEET 1 of 1
					_				-				CLIENT: KSA Engineers, Inc.
			Am	eric	an T	esti	ng L	ab, Ll	_C				PROJECT: Caddo Ward II Industrial Park - Phase 1
		1	Bos	sier	City		, 71	111					LOCATION: Vivian, Caddo Parish, Louisiana
	31		🌢 ™ Tel	epho	one:	31	8-75	2-660)5				NUMBER: G18-12-153
			Fax	c' 3'	18-7	52-6	617						
													DATE(S) DRILLED: 1/14/19
GPJ	FIE	ELD	DATA			LA	ABO	RATC	DRY D	ΑΤΑ			
ARK					ATT	ERB	ERG						Continuous Flight Auger
IIAL F				(%)			×				Ш	(%)	GROUNDWATER INFORMATION:
USTF				EN		F	NDE			(%)	SSUF	EVE	Perched water encountered at 6 ft during drilling operations.
				INO	MIT	IWI	∐ Z	~E	<u>ب</u>	AIN	IN)	S 00	Water level recorded at 20 ft after 36 hours.
IBOI	(F		Q F	KE C	D	1C	LICI.	SIT CU.	SSIV	STR	NG F	0. 20	
SYN	H (F	LE6	SMC SMC	TUF	IQUI	IAS	LAS	DEN NDS,	PRE S/S(JRE		S N	
	EPT	AME	BL0%	NOIS				OUN	TON	AILU	NO	INN	
S S		H		2		FL			000	ш	05	2	DESCRIPTION OF STRATUM
3KS			N = 2	24	24	16	8					73	
12-15	-	-	N = 6	22									Medium stiff gray and red lean clay (CL) with sand
	- 5	-	P = 2.5	22	40	20	20	99	1.83	8.92		75	Stiff below 4 ft
		-	P = 15	22				**					Gray and tan with no sand below 6 ft
AL	-	-	1 = 1.5	~~									
	- 10		P = 2.5	21	49	18	31	109	2.22	7.98			
	-	-											
	F	1											
	-		P = 2.5	22				**					
	- 13	-]											
	-	1										-	Hard tan and gray silty lean clay (CL) with silty sand seams and
	-	-17	N = 50	, 19	34	21	13					72	layers
	- 20	Ħ		-									
	-	+											
	_	7	N = 51	19									
	- 25	Ħ											
	-												
¥ (-	Ħ	N - 66	12									Very dense gray and tan silty sand (SM) with occasional clay
	- 30	А	N - 00	15									layers
≥ N	-	1											
HA H	_	-											
Han I and the second se	- 35	74	N = 58	20	NP	NP	NP					24	
	_	1											
A	-	-	N =										Very hard dark gray sandy lean clay (CLS) with silt seams and
SYZ ///	- 40	14	50@4"	21	32	23	9						partings
	_	-											
	-	1											Very stiff below 43 ft
	- 45	14	N = 25	31									
	-	-	Ī	Z									
- 2		TI			_								Auger Refusal 47 ft
1.GD													
NNCO													
AG													
	N - ST	ANE	ARD PENE	TRA	TION	TES	TRE	SISTA	NCE		REMARKS:		
NN C	P - PO T - TXI	DOT	CONE PEI		RATIO	N R	ISTA ESIS	NCE TANCE					GPS Coordinates: 32* 50' 18.80" N, -93* 58' 31.45" W
16 A		CK	CORE REC		RY								** Sample disturbed upon extrusion.
ـــ ا ک		1.01				111							

										LC)G	OF	BO	RING B-13 SHEET 1 of 1
				A :===	e vi e	T				~				CLIENT: KSA Engineers, Inc.
				Am 131	eric	an I anv	esti on C	ng L	ab, Ll	_C				PROJECT: Caddo Ward II Industrial Park - Phase 1
		T	T	Bos	ssier	Cit	y, LA	A 71	111					LOCATION: Vivian, Caddo Parish, Louisiana
	R			🖢 m Tel	eph	one:	31	8-75	2-660)5				NUMBER: G18-12-153
				Fax	c 3	18-7	′52-6	617						DATE(S) DRILLED: 1/14/19
LdS		FIE	ELD	DATA			LA	ABO	RATC	RY D	ΑΤΑ			DRILLING METHOD(S):
ARK.C						ATT	ERB	ERG						Continuous Flight Auger
SIAL F					(%)			×				Я	(%)	GROUNDWATER INFORMATION:
USTE					LEN.		-	NDE			(%)	SSU	IEVE	Groundwater encountered at 13 ft during drilling operations.
				⊢ –	NO	MIT	LIMI	Σ	노토	E C	SAIN	N)	S 00	
ARD		FT)	s	S/FT SQ F	RE 0	ID LI	STIC	TICI	NSIT S/CU	TH C FI	STF	NG I	0.2	
N O		TH (IPLE	NSNO SMO	STU	-IQU	PLAS	PLAS	DEN	IPRE ENG VS/S	URE	FINI	N SL	
CADD		DEP	SAM	ROD %	MOI		PL	PI	DRY POU	STRI (TON	FAIL	CON	MIN	DESCRIPTION OF STRATUM
KSA-	7		-X	N = 10	16									Stiff red and tan sandy lean clay (CLS)
-153				P = 3.0	20	42	19	23	106	3.20	5.01		57	
518-12		5	-	P = 3.0	18				**					
2018/0				N = 23	13	31	20	11				42	Firm tan, reddish tan and gray clayey sand (SC)	
CALV	A		-1	N = 19	18									
CHN	10 - N = 20 17 29 19 10													
EOTE			1		7									First light second (20)
INI				<u>수</u> N = 24	∠ 23									Firm light gray clayey sand (SC)
DI CO		15	Ť.	24	20									ж.
GEO			-											
-IS			-7	N = 12	26	36	20	16					26	
EPOR		20												
AAL R	4		1											
SVAFIN		25	1	N = 25	30									Very stiff dark gray and gray fat clay (CH) with silt seams and partings
JOB		20	-											
RENT														
CUR		30	<u>1</u> Ді	N = 50	28	63	28	35					98	Hard below 29 ft
ORIVE														
AREI				N =										with lignite layers below 33 ft
C SH		35	Ą	50@5"	37									
SYSV			$\frac{1}{2}$	N = 59	25	51	23	28					97	Very hard below 39 ft
IINK		40	1		20		20	20					57	
ITAN-														
9:19			7	N = 63	20									
1/19 (45	1											
- 211														
1.GD		50	1	N = 69	19	57	23	34					97	
NNLO		00												Boring Terminated 50 ft
DG A G														
01 - LC	N - STANDARD PENETRATION TEST RESISTANCE													REMARKS
GNNL	P - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE T - TXDOT CONF PENETRATION RESISTANCE													GPS Coordinates: 32* 50' 21.56" N, -93* 58' 20.26" W
DG A (R-	RO	CK	CORE REC	OVE	RY		-010						** Sample disturbed upon extrusion.
Ч 	RG	χ υ -	nuc	UALIT		SIG	NATIO							

									LC	DG	OF	BC	RING B-14 SHEET 1 of 1
	1	1	Am 131 Bos M Tele Fax	eric 7 C ssier epho : 3	an T any r Cit one: 18-7	esti on C y, LA 31 752-6	ng L Court A 71 8-75 6617	ab, Ll 111 2-660	_C 05		-		CLIENT: KSA Engineers, Inc. PROJECT: Caddo Ward II Industrial Park - Phase 1 LOCATION: Vivian, Caddo Parish, Louisiana NUMBER: G18-12-153 DATE(S) DRILLED: 1/15/19
GPJ	FIE	ELD	DATA			LA	ABO	RATC	RY D	ATA			DRILLING METHOD(S):
PARK.C				_	ATT	ERB	ERG S						Continuous Flight Auger
CADDO WARD II INDUSTRIAL SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RDD: %	MOISTURE CONTENT (%			D PLASTICITY INDEX	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION: No groundwater encountered during drilling operations. SURFACE ELEVATION: Unknown DESCRIPTION OF STRATUM
KSA	_	-X	N = 6	16	NP	NP	NP					45	Loose brown and gray silty sand (SM)
12-15	_	-4	N = 7	25									Medium stiff gray and red fat clay (CH)
B/G18	- 5	-	P = 4.5+	20	59	23	36	98	3.13	9.25		89	Very stiff gray and tan below 5 ft
OTECHNICAL/20	- - - 10 -	-	P = 4.5+ P = 4.5+	23 25	67	29	38	**					
EO ETC/GINT GE	- - - 15 -	- -X - -	N = 33	26	62	27	35					96	Hard, gray, dark gray and tan with silt seams and partings and ferrous stains below 13 ft
NAL REPORTS - G	- - 20 -		N = 47	26									
NT JOBSVAFI	- - 25 -		N = 54	23	47	34	13					86	Very hard gray, dark gray and tan lean clay (CL) with silt and occasional sand seams
DRIVE/CURRE	- - - 30 -		N = 69	21	42	24	18					47	Dense gray, dark gray and tan clayey sand (SC)
ATL LLC SHARE	- - - 35 -		N = 65	21	38	23	15					74	Very hard gray and dark gray lean clay (CL) with sand
2/11/19 09:19 - NATLLINKSYSV	- 40 		N = 50@5" N = 50@5"	19 20	41	21	20						Dark gray below 43 ft
LO LO	-	-	N =	16	NP	NP	NP					34	Very dense gray silty sand (SM)
- LOG A GNNL01	- 50		<u>bU@4"</u>									<u> </u>	Boring Terminated 50 ft
SNNL01	N - ST/ P - PO			OME	TER	RES	ISTA	SISTA NCE	NCE	REMARKS: GPS Coordinates: 32* 50' 19.58" N, -93* 58' 3.48" W			
LOG A (R - RO RQD -	CK	CORE REC	OVE Y DE	RY	VATIO	DN						** Sample disturbed upon extrusion.

									LC	DG	OF	BO	RING B-15 SHEET 1 of 1
			Am	neric	an T	esti	ng L	ab, Ll	LC				CLIENT: KSA Engineers, Inc.
	5		13	17 C	any	on C	ourt						PROJECT: Caddo Ward II Industrial Park - Phase 1
	A J	T		ssie	r Cit	y, L/	471° 875	111 2 660	15				LOCATION: Vivian, Caddo Parish, Louisiana
			Fax	ерп к: 3	18-7	52-6	6-75 6617	, ,	5				NUMBER: G18-12-153
													DATE(S) DRILLED: 1/15/19
(.GPJ	FIE		DATA			LA	ABO	RATC		ATA			DRILLING METHOD(S): Continuous Flight Auger
PAR							ERG S						
TRIAL				NT (%			Ш			0	JRE	/E (%	GROUNDWATER INFORMATION:
SND				NTEN	⊢⊢	VIT	IND			N (%	ESSI	SIEV	Water level recorded at 9 ft upon completion.
	0			CO	LIMI	CLIN	CITY	L'FT L'ET		TRAI	PR	200	
YMB	I (FT	ES	NS/F S/SQ NS	URE	DID	ASTI	ASTI	ENSI S/C	GTH SQ F	KE S.	NING	NO.	
	EPTH	AMPL	BLOV 8 BLOV	OIST	Ľ	Ы	ЫЛ		IREN ONS/	AILUF	OUN	NUS	SURFACE ELEVATION: Unknown
SCAL SC	B		/ ភ្លុំ ដុំ ភ្លុំ ភ្លុំ	ž	LL	PL	PI	82	SE	ΕÞ	S.F.	Σ	DESCRIPTION OF STRATUM
3 KSP	-		N = 6	21	41	19	22						Medium stiff reddish tan lean clay (CL)
12-15	_	-	P = 2.25	21									Stiff gray and tan fat clay (CH) with occasional silt seams
NG18-	- 5	-	P = 4.5+	22	69	24	45	96				98	Very stift below 4 ft
12018	_	-	P = 4.5+	24				**					
NICAL	_	-	P = 2.5	22	86	29	57	97	2.43	4.25			Stiff below 8 ft
ECHI	- 10												
GEOI	-	+	7	<u> </u>									Firm brown and grav silty sand (SM)
SINT	-	-7	N = 28	21	NP	NP	NP					28	
ETC/	- 15 -											0.000,000,000	
GEO	-												Very stiff dark gray fat clay (CH) with silt partings
-STS	- 20	-	P = 4.5+	20	54	22	32	89				100	
(EPOI	- 20	-											
AN R	-	1											with lignite layers below 23 ft
SVAFI	- 25		P = 3.5	19									
BO	-	-											
KEN	_												
VOUR	- 30		P = 4.5+	14	69	26	43	**				99	
ORIVE	-												
ARE	_	₩											Very hard dark gray lean-to-fat clay (CI -CH) with silt laminations
CSH	- 35	А	N = 69	15	50	22	28					98	
JI II	-												
AXSV	-	-1	N =	14									
	40	h	50@3"	14									
ITA	-	-											
920	-	-7	N = 75	20	48	22	26					93	
1190	- 45	<u> </u>											
-2/1	-												
1.GD1	. 50	R	N = 50@4"	15									
ANLO	- 50	\square	·····										Boring Terminated 50 ft
3 A GI													
Ĭ,		\square											
INL01	N - ST. P - PO		ARD PENE		TION	RES	ISTA	SISTA	NCE		REMARKS:		
- AGN	T - TXI R - RC	DOT CK	CONE PE	NETF	RATIO	ON R	ESIS	TANCE					** Sample disturbed upon extrusion
j i	RQD -	RO	CK QUALIT	YDE	SIG	ATIC	ON						

									RING B-16 SHEET 1 of 1				
		1	Am 131 Bos ▲ ™ Tel	ieric 17 C ssiei epho	an T any r Cit one:	esti on C y, LA 31	ng L ourt 71 ⁻ 8-75	ab, Ll 111 2-660	_C)5				CLIENT: KSA Engineers, Inc. PROJECT: Caddo Ward II Industrial Park - Phase 1 LOCATION: Vivian, Caddo Parish, Louisiana NUMBER: G18-12-153
	·		1 0/	λ. Ο 	10-7	02-0							DATE(S) DRILLED: 1/16/19
GPJ	FIE	ELC	DATA			LA	ABO	RATC	DRY D	ATA			
PARK				()			ERG S					()	
OWARD II INDUSTRIAL SYMBOL	н (FT)	oLES	DWS/FT NS/SQ FT DWS	TURE CONTENT (%	QUID LIMIT	LASTIC LIMIT	LASTICITY INDEX	DENSITY NDS/CU.FT	PRESSIVE NGTH S/SQ FT)	JRE STRAIN (%)	FINING PRESSURE	S NO. 200 SIEVE (%	GROUNDWATER INFORMATION: Groundwater encountered at 5 ft during drilling operations. Water level recorded at 1 ft upon completion.
SOIL	DEPT	SAMF	N: BLO	MOIS		PL	PI	POUN	STRE	-AILU	POU	NINU	
VS SA	-	-1	N = 3	17					0			53*	Loose gray and tan slightly clayey silty sand (SM)
	 -		N = 4	17	31	18	13					55	Medium stiff gray, tan and red sandy lean clay (CLS)
18-12	- 5		$P = 0.5 - \frac{5}{2}$	¥14	32	16	16	**				52	
	+		N = 13	14	34	15	19						Firm gray, tan and red clayey sand (SC)
DIECHNICAL	- - - 10		P = 3.75	12								45	
	- - - 15		P = 4.5+	18	59	24	35	104	1.91	4.75			Very stiff gray, tan and red fat clay (CH) with occasional sandy silt partings
KEPOKIS-G	- 20		P = 4.5+	21									
JOBSVAFINAL	- 25		P = 3.75	17	28	21	7	107	0.77	2.75		49	Firm dark gray clayey sand (SC)
	- 30		P = 4.5+	15	56	23	33	108	5.74	8.91		100	Very stiff dark gray fat clay (CH) with silt partings
	- - - 35 -		P = 4.5+	21									with lignite layers below 32 ft
	- - - 40 -		P = 4.5+	17	63	24	39	105	0.81	0.93		99	Very hard below 38 ft
	- - - 45 -	- -X -	N = 50@3"	19									
	-	-7	N =	18	42	21	21						Very hard dark gray lean clay (CL) with silt laminations
- EUG A GNNEUT.	- 50		<u>50@3"</u>										Boring Terminated 50 ft
	N - ST. P - PO T - TXI R - RO RQD -	ANE CKE DOT CK RO	DARD PENE T PENETR CONE PEI CORE REC CK QUALIT	ETRA ROME NETF COVE Y DE	TION TER RATIO RY SIGN	N TES RES DN RI NATIO	ST RE ISTA ESIS DN	SISTA NCE TANCE	NCE	REMARKS: GPS Coordinates: 32* 50' 19.83" N, -93* 57' 34.14" W * %Clay & Colloids 14, %Silt 39, %Sand 47 ** Sample disturbed upon extrusion.			

									RING B-17 SHEET 1 of 1				
			٨٣	aaria		- ooti	n a 1	ah 11	CLIENT: KSA Engineers, Inc.				
			An 13	17 C	an i Canv	on C	ng L Court	ab, Li	_0				PROJECT: Caddo Ward II Industrial Park - Phase 1
		1	Bc	ssie	r Cit	y, LA	171	111					LOCATION: Vivian, Caddo Parish, Louisiana
			≜ ™ _Te	leph	one	31	8-75	2-660)5				NUMBER: G18-12-153
			Fa	x: 3	18-7	'52-6	617						DATE(S) DRILLED: 1/16/19
rd:	FIE	ELC	D DATA			L/	ABO	RATC	RY D	ATA			DRILLING METHOD(S):
ARK.C													Continuous Flight Auger
RIAL F				(%)			×				Ш	(%)	GROUNDWATER INFORMATION:
USTF				LEN		_⊢	NDE			(%)	Inss	EVE	Groundwater encountered at 12.5 ft during drilling operations.
			_⊢	LNO:	MIT	LIMI	Σ	~E	۳ _	SAIN	IN)	S OC	Water level recorded at 6.5 it upon completion.
VBO NBO	Ē	l s	SQ F	REO	D LI	TIC	TICI	ISIT /CU.	C FT	STF	NG F	0.2	
L SYI) HT	IPLE	SNO-	STUI	LIQU	PLAS	PLAS	DEN	APRE ENG VS/S	URE	UND	N SU	SURFACE ELEVATION: Unknown
SOII	DEP	SAN		IOW N	LL	PL	PI	POL	STR	FAIL	CON (POI	MIN	DESCRIPTION OF STRATUM
4SA	-	-7	N = 19	15	NP	NP	NP					27	Firm brown silty sand (SM)
153	ŀ	Ŕ	N = 23	12									
318-12	- 5	\mathbb{A}	N = 10	16	29	18	11					61	Stiff reddish brown and brown sandy lean clay (CLS)
2018/0	-	Ð	N = 6 N = 12	17	20	14	6					49	Loose gray and tan silty clayey sand (SC-SM)
	L		N - 12	¥									Firm gray and tan silty sand (SM)
ECHN	- 10	Å	N = 20	15	NP	NP	NP					40	
3EOT	F	-		¥									
	F	$\overline{\lambda}$	N = 16	22									Very stiff gray, tan and red sandy lean clay (CLS) with silt
ETC	- 15		P = 2.5	24	44	21	23	103	2.07	9.03		50	partings
GEO	L												
LIS-	20		P = 2.25	28	66	29	37	92	2.03	5.27		100	Very stiff gray, tan and red fat clay (CH) with silt partings
(IEPO	- 20	-											
	F	-											
STAF	- 25		P = 3.0	19									
	-	-											
	-	-17	N = 50	21								42	Dense gray and tan clayey sand (SC)
NE/C	- 30	Ĥ		+									Boring Terminated 30 ft
E DRI													
SHAR													
LLC (
SIATL													
NKSY													
VTLLI													
- 02													
9 09:2													
2/11/1													
- 105													
NL01.0													
A GN													
LOG													
4L01 -	N - ST	ANE		ETRA	TION	I TES		SISTA	NCE	REMARKS:			
A GNP		DOT	CONE PE	NET	RATIO	ON R	ESIS	TANCE					GPS Coordinates: 32* 50' 19.97" N, -93* 57' 19.53" W
LOG.	RQD -	RO	CK QUALI	TY DE	SIG		DN				<u></u>		

										LC	RING B-18 SHEET 1 of 1			
				۸m	orio	an T	osti		ah II	C				CLIENT: KSA Engineers, Inc.
				An 131	17 C	anvo	on C	ourt	ab, Li	_0				PROJECT: Caddo Ward II Industrial Park - Phase 1
				Bos	ssier	Cit	y, LA	A 71	111					LOCATION: Vivian, Caddo Parish, Louisiana
				™ <u>T</u> el	epho	one:	31	8-75	2-660)5				NUMBER: G18-12-153
				Fax	c 3	18-7	52-6	617						DATE(S) DRILLED: 1/16/19
GPJ	FI	EL		ΑΤΑ			LA	٩ВО	RATC	RY D	ATA			DRILLING METHOD(S):
PARK														Continuous Flight Auger
SIAL					T (%			×				RE	(%)	GROUNDWATER INFORMATION:
INST					TEN		E	NDE			(%)	SSU	IEVI	Groundwater encountered at 7 ft during drilling operations. Water level recorded at 5.5 ft upon completion
				F	NOC	MIT	LIM	Σ	ᠵᢆᡄ	Ш с	SAIN	PRE (N)	00 S	
MBC	ET)	S.	S/FT	SOR	RE (ID L	STIC	STIC	NSIT S/CU	SSI TH Ø FJ	STI	NG I	0.2	
L SY) HT	API F	MO	SNONS/	ISTU	LIQU	PLAS	PLAS	/ DEI	APRE KENG NS/S	URE	UND	US N	SURFACE ELEVATION: Unknown
SOI	DEF	SAN	5/ z	E E E E E E E E E E E E E E E E E E E	WO	LL	PL	ΡI	DR) POL	STR	FAII	Po Po O	MIN	DESCRIPTION OF STRATUM
	-	-X	N	= 6	27									Medium stiff gray, tan and red sandy lean clay (CLS)
		-	P	= 2.0	21	44	23	21					60	
	- 5	-	P:	= 2.0	14	21	16	5	**				40	Firm gray, tan and red clayey sand (SC)
	ł	X	N :	= 23	L17_									
	L		P:	= 3 0	20	43	24	10	106	2 35	1 22		60	Very stiff gray, tan and red sandy lean clay (CLS)
	P = 3.0 20 43 24 19 106 2.35 4.22													
	F	1												
	È .		P =	= 2.25	23	54	23	31	102	1.39	6.31		87	Stim gray and tan fat clay (CH) with occasional sandy slit seams
	15													
	E	-												Very stiff dark brown lean clay (CL) with silt partings
<u>-</u>	Ē	-	Р =	= 4.5+	37	45	26	19	81	0.85	3.39			
EFOR	- 20	-												
	-		-											Very stiff dark gray sandy lean clay (CLS) with silty sand seams
	- 25		P =	= 3.0	23	34	21	13					63	and layers
	-			- 4 5 -	04	10	05	45						with Iron ore seams and layers below 27 ft
	- 30		P =			40	25 							Boring Terminated 30 ft
DRIV														
TAKE														
AILL														
616														
AI -														
12:21														
21/1														
7-10														
19.10														
PINI														
A OO														
	N - ST				TRA	TION	TES	TRE	SISTA	NCE				REMARKS:
CINIO 1	г - РС Т - ТХ	DO	TC	ONE PEI	NETF	ATIC		ESIS	TANCE					GPS Coordinates: 32* 50' 19.78" N, -93* 57' 5.30" W
	к - RC RQD -		CC	QUALIT	Y DE	RY		DN						** Sample disturbed upon extrusion.