

# Exhibit AA. Lacombe Business Park Preliminary Geotechnical Engineering Report







December 12, 2023

St. Tammany Corporation 21489 Koop Drive, Suite 7 Mandeville, Louisiana 70471

Attn: Mr. Keith Espadron

## Lacombe Business Park Preliminary Geotechnical Engineering Report

Re: Preliminary Geotechnical Engineering Report LED Site Characterization Lacombe Business Park St. Tammany Parish, Louisiana SE Project No. G23-099

Dear Mr. Espadron:

Stratum Engineering, LLC (SE) is pleased to submit our Preliminary Geotechnical Engineering Report for the above referenced project. The report includes the results of field and laboratory testing, as well as preliminary recommendations regarding the suitability of the site for future industrial developments.

We appreciate the opportunity to perform this geotechnical study and look forward to the development of the property and our continued involvement with this project. If you have any questions pertaining to this report, or if we may be of further service, please contact our office.

Respectfully submitted, STRATUM ENGINEERING, LLC

William "Dean" McInnis, P.E. Senior Project Manager

WDM/TYM:sqw

Tony Y. Maroun, P.E. Principal

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#### **PROJECT INFORMATION**

#### **Project Authorization**

Stratum Engineering, LLC (SE) has completed a limited geotechnical exploration to characterize the Lacombe Business Park for a potential future development in St. Tammany Parish in support of the Louisiana Economic Development (LED) Site Certification process. The exploration was accomplished in general accordance with SE Proposal No. G23-073, dated April 11, 2023.

#### **Project Description**

Generally, industrial developments could consist of single or multiple structures with associated light and heavy duty pavements. Typical LED project assumptions for this site include the construction of a 100,000 square foot building which could be either a single or multi-story structure with steel frame and load bearing masonry or tilt up walls. Maximum interior column and wall loads could be on the order of 100 kips and 5 kips per foot, respectively. Floor loads are assumed to be between 200 and 500 psf. The structure may be grade supported or dock high, requiring 4 to 5 feet of fill to reach the building finished floor elevation.

Traffic associated with industrial facilities of this size could consist of heavy tractor trailers with an average daily traffic (ADT) of 20 to 50 trucks per day for a design life of 20 years. For these types of facilities, rigid pavements are widely considered for their longevity and ability to support the high volume of traffic.

#### Purpose and Scope of Services

The purpose of this study was to explore the subsurface conditions at the site in order to enable an evaluation of a suitable foundation system for potential future industrial facilities.

Based on the parcel size and the criteria provided by CSRS, the scope of services included drilling three (3) borings to a depth ranging from 30 to 100 feet at accessible locations across the site. The borings were located in the field by a Stratum Engineering representative using normal taping from existing landmarks as indicated on the attached Boring Location Plan which is a reproduction of an aerial photograph of the property.

In addition to drilling the soil borings, our scope of services included a reconnaissance of the project site, select laboratory testing, and preparation of this preliminary geotechnical report. The report briefly outlines the testing procedures, presents available project information, describes the site and subsurface conditions, and provides results of analysis and recommendations regarding the following:

- Preliminary foundation types, depths, allowable bearing capacities, allowable pile capacities, and estimate of settlements;
- Seismic site classification;
- Typical soil parameters for flexible and rigid pavements.

The scope of geotechnical services did not include an environmental assessment for determining the presence or absence of wetlands, or hazardous or toxic materials in the soil, surface water, groundwater, or air on or below, or around this site. Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes.

#### SITE AND SUBSURFACE CONDITIONS

#### **Site Description and Location**

The site is situated on the west side of LA Highway 434 just south of LBP Boulevard on the south side of Interstate 12. It encompasses approximately 69 acres of undeveloped property located south of the Coastal Environmental Services Facility. The property was heavily wooded and required some limited clearing of pathways to access the boring locations.

Detailed grading information was not available at the time this report was prepared. However, it was assumed that two (2) to 3 feet of fill may be needed to reach the design grades.

#### **Drilling and Sampling**

The borings were drilled with an All-Terrain Vehicle (ATV) mounted drilling rig. Auger and wet rotary drilling techniques were used to advance the borings. Samples were generally obtained continuously from the ground surface to a depth of ten feet and at maximum five foot intervals thereafter. Drilling and sampling techniques were accomplished in general accordance with ASTM Standards.

Undisturbed samples of cohesive soils were generally obtained using thin-wall tube sampling procedures in general accordance with the procedures for "Thin-Walled Tube Geotechnical Sampling of Soils" (ASTM D1587). These samples were extruded in the field with a hydraulic ram and were wrapped in aluminum foil prior to placement in a plastic wrapping to preserve moisture. The samples were transported to the laboratory in containers to prevent disturbance.

For cohesionless soils and semi-cohesive soils, Standard Penetration Tests (SPT) were performed to obtain standard penetration values of the soil. The standard penetration value (N) is defined as the number of blows of a 140 pound hammer, falling 30 inches, required to advance the split-barrel sampler one (1) foot into the soil. Samples of granular soils were obtained utilizing a two (2) inch O.D. split-barrel sampler in general accordance with procedures for "Penetration Test and Split-Barrel Sampling of Soils" (ASTM D1586). To perform the test and obtain a sample, the sampler is lowered to the bottom of the previously cleaned drill hole and advanced by blows from the hammer. The number of blows is recorded for each of three (3) successive increments of six (6) inches penetration. The "N" value is obtained by adding the second and third incremental numbers. The results of the standard penetration test indicate the relative density of cohesionless soils and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components. The split spoon samples were identified according to the project number, boring number and depth, and were also placed in polyethylene plastic wrapping to protect against moisture loss.

The laboratory testing program included supplementary visual classification and water content tests on all of the soil samples. In addition, selected samples were subjected to unconfined compression testing, percent passing the #200 sieve and Atterberg Limits determination. Additional estimates of unconfined compressive strength were made using a hand penetrometer. The laboratory testing was performed in general accordance with ASTM Standard Procedures.

#### **Subsurface Conditions**

Based on the borings, about 12 inches of silty topsoil with organics covered the surface. The topsoil was generally underlain by about 24 inches of sandy silt or silty clayey sand followed by very stiff reddish tan sandy lean or sandy fat clay extending to a depth of 4 to 8 feet. Below this depth, very dense silty sand and poorly graded sand were encountered and extended to a depth of 27 to 32 feet. The sand was underlain by stiff to very stiff gray fat clay to a depth of 72 feet and was followed by a thin layer of firm bluish gray sandy silty clay to a depth of 77 feet. Beyond this depth, medium dense to very dense silty sand and poorly graded sand were noted in the deep boring which extended to at least 100 feet, the maximum depth explored.

The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs included in the Appendix should be reviewed for specific information at the boring locations. These records include soil descriptions, stratification, penetration resistances, and locations of the samples and laboratory test data. The stratification shown on the boring logs represents the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratification represents the approximate boundary between subsurface materials and the actual transition may be gradual. Water level information obtained during field operations is also shown on the boring logs. The samples, which were not altered by laboratory testing, will be retained for 60 days from the date of this report and then will be discarded.

#### **Groundwater Conditions**

Groundwater was initially encountered in the borings at a depth of 12 to  $12 \frac{1}{2}$  feet during drilling and was measured at a depth of about 11 feet upon completion of drilling operation. However, it should be noted that groundwater levels will fluctuate with seasonal variations in rainfall, extended periods of drought or surface runoff. Therefore, it is recommended that the actual groundwater level at the site be determined by the contractor at the time of the construction activities, if needed.

#### **IBC Site Classification**

*The International Building Code (IBC), 2021 Edition,* was reviewed to determine the site classification for seismic design. Based on the soils encountered in the borings and our experience in the general vicinity, the site can be classified as Site Class "D" as outlined in Section 1613.2.2 of the Building Code.

#### **EVALUATION AND RECOMMENDATIONS**

#### **General**

The type and depth of foundation suitable for a given structure primarily depends on several factors including the subsurface conditions, the function of the structure, the loads it may carry, the cost of the foundation and the criteria set by the Design Engineer with respect to vertical and differential movement which the structure can withstand without damage.

It is our understanding the site will be marketed for development of potential industrial or petrochemical facilities. Typical structures could be grade supported or dock high facilities requiring 4 to 5 feet of fill to reach the design grade.

The results of the exploration indicate that the soils at the site are fair in bearing quality and suitable for supporting the potential improvements on a shallow foundation system. However, silty soils were encountered at the surface and extended to about 2 feet at the boring locations. These soils are moisture sensitive and can lose their support capabilities if they become saturated. Therefore, depending on the site condition at the time of construction, the moisture sensitive soils will have to be processed to dry or be removed and replaced with compacted structural fill. Details related to foundation recommendations and construction considerations are presented in subsequent sections of this report.

#### **Shallow Foundations**

Based on the field data and laboratory test results, the site is suitable to support typical industrial developments on shallow foundations bearing at least two (2) feet below the finished grade. Shallow spread and continuous wall footings bearing in the compacted structural fill or in the naturally occurring stiff clay can be designed for maximum allowable bearing pressures of 2,500 and 2,000 pounds per square foot, respectively. Minimum dimensions of 24 inches for spread footings and 18 inches for continuous footings should be used in the design, even if the resulting bearing pressure is less than the allowable bearing pressure, to minimize the possibility of a local bearing failure. The recommended preliminary bearing capacities include a factor of safety of three (3).

#### <u>Settlement</u>

Areal settlement under a building is generally caused by the amount of fill placed, the building footprint and the subsurface soil conditions encountered in the building area. Similarly, footing settlement depends on the footing size as well as the soil conditions below the footing. At the time this report was prepared, the type of structures had not been identified and the amount of fill needed to achieve the design grade was not known. However, based on the subsurface conditions encountered at the site, areal settlement is anticipated to be minimal with the addition of two (2) to 3 feet of fill. Furthermore, based on the assumed structural loads, foundation settlement will be less than one (1) inch provided the footings are designed for the recommended bearing pressures.

#### <u>Floor Slab</u>

A slab-on-grade may be supported on compacted low plasticity structural fill. While detailed site preparation recommendations were beyond the scope of this study, stripping of at least 12 inches should be anticipated to remove the topsoil, organics and other deleterious materials. Furthermore, depending on the site condition at the time of construction, some undercutting of the moisture sensitive soil to a stable subgrade may be necessary prior to fill placement. Proofrolling should be accomplished following the stripping to identify any soft or unstable soils which should be removed from the floor slab area prior to fill placement and/or floor slab construction. Any required structural fill should be placed in lifts and be compacted to meet the applicable project specifications.

#### **Deep Foundations**

Generally, deep foundations systems are used to support heavily loaded structures by transferring the structural loads through the surficial soils to more adequate bearing strata and hence minimizing long term settlements.

Typical deep foundation systems used in the area include timber piles and auger cast-inplace piles which will derive their support capabilities mainly from skin friction with minimal end bearing support unless the piles are embedded in the dense sand. However, due to the shallow sand encountered at this site, installation of timber piles will likely be difficult and will require pre-drilling through the upper sand to facilitate installation without compromising the integrity of the timber piles.

Large timber piles driven to a penetration depth of 40 feet could yield a maximum allowable compression capacity of about 25 tons while 14-inch diameter auger cast-in-place piles installed to a penetration depth of 65 feet could be designed for a maximum allowable compression capacity of 60 tons. Furthermore, the auger cast piles could be designed for an allowable capacity of about 90 tons when installed at a penetration depth of about 80 feet. The preliminary capacities presented in the report include a factor of safety of two (2) in compression.

#### Parameters for Pavement Design

Parking areas and drives associated with an industrial park are expected to consist generally of light duty pavement for employee parking as well as heavy duty pavement for large truck staging areas, parking areas and drives.

Based on the field data and laboratory test results, the near surface soil consists of silty clay. Typical California Bearing Ratio (CBR) values for the existing silty subgrade or imported clayey sand structural fill were estimated to be on the order of 4 to 5 corresponding to a Modulus of Subgrade Reaction (k) of about 125 pci which may be used for the design of flexible and rigid pavements, respectively. These values may be used along with the frequency and magnitude of anticipated traffic loads associated with the type of facility being constructed to yield adequate pavement sections for the development. Class II Base, including crushed limestone or cement treated low plasticity clays, would be viable options for support of the flexible and/or rigid pavements.

#### **CONSTRUCTION CONSIDERATIONS**

#### **Moisture Sensitive Soils/Weather Related Concerns**

The upper silty soils encountered at the site are extremely sensitive to changes in moisture content and may lose significant strength if allowed to become saturated. In addition, soils that become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. During wet weather periods, increases in the moisture content of the upper soils can cause some reduction in the soil strength and support capabilities. Therefore, it will be advantageous to perform earthwork construction activities during dry weather. The site contractor shall be responsible for maintaining a firm, unyielding and stable subgrade condition. Should the near surface soils become wet, the contractor should be prepared to mitigate these conditions by repeated aeration and exposure to sunlight or by admixture treatment.

#### **REPORT LIMITATIONS**

The recommendations submitted in this report are based on the available subsurface information obtained by SE and provided typical design loads for industrial developments. These recommendations are preliminary and general in nature. They should not be used in the design of a specific structure without conducting a detailed project specific investigation to verify the subsurface soil condition and determine if revisions to the recommendations are necessary.

The Geotechnical Engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

Once specific plans for a potential development are prepared, Stratum Engineering may be retained and provided the opportunity to conduct a more thorough geotechnical investigation and analysis utilizing project specific plans and specifications under consideration.

This report has been prepared for the exclusive use of St. Tammany Corporation for marketing and planning of the Lacombe Business Park in St. Tammany Parish, Louisiana.

### APPENDIX







#### LOG OF BORING B-1 LED SITE CHARACTERIZATION

#### LACOMBE BUSINESS PARK

#### ST. TAMMANY PARISH, LOUISIANA

TYPE	OF	BORING:	WET ROTARY
	<b>U</b>	DOI:110.	

TYPE (	TYPE OF BORING: WET ROTARY					LOCATION: NORTH SIDE OF SITE						PROJECT NO.: G23-099				
DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	רוסחום רושוג	PLASTICITY INDEX	% PASSING #200 SIEVE				
			12" Silty Sandy Topsoil with organics						13							
	///		Very stiff reddish tan Sandy Lean Clay			4.50			12							
5					5.49	4.50		117	12							
			toppich grow at 6'			4 00			12	20	12					
			- tannish gray at o			4.00			13	29	13					
10			Medium dense tannish gray Silty Sand		0.43	1.25		108	12		NP	34				
	i i i															
			Dense to very dense tannish gray Poorly													
15		X	Graded Sand	36					4			6				
10		Ĥ														
		$\overline{A}$		50+					15							
20		Η														
			Dense tannish grav Silty Sand													
		$\square$		45					18			22				
25		Α														
		$\square$	- medium dense at 28'	12					25							
30		Й														
			Stiff to very stiff gray Fat Clay - with sand lenses, 33' to 50'		1.08	2.00		94	29							
35																
						1 50			29							
40																
		,														
			soft to firm with organics at 43'		0.40	0.50		99	25							
45			- solt to him with organics at 45		0.40	0.50		00	35							
	$\langle    $															
						4 00										
50			- Decomes IIIm to suff at 48			1.00			31							
	OF P		ING: 100 Feet	GPOI		. Measu	ed at 11	Feetlin	on Com	nletion o	f Drilling	1				
DATE:	10/31/	20	23	5.00		. wcasul	Jualii	, eer oh			יי היווויוע יי ביוווויוע	1				
				_												



#### LOG OF BORING B-1 (continued) LED SITE CHARACTERIZATION LACOMBE BUSINESS PARK ST. TAMMANY PARISH, LOUISIANA

TYPE (	TYPE OF BORING: WET ROTARY				LOCATION: NORTH SIDE OF SITE					PROJECT NO.: G23-099			
<b>DEPTH, FT</b> .	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	רוסחום רואוג	PLASTICITY INDEX	% PASSING #200 SIEVE	
<u>55</u> 60			Firm to stiff gray Fat Clay - with shell fragments at 53'		0.56	1.00 1.00		71	50 63				
65					0.90	1.00		62	65				
70			Firm gray Sandy Fat Clay			0.75			28				
75			Firm bluish gray Sandy Silty Clay		0.68	0.75		108	22				
80		Χ	Medium dense to dense tannish gray Silty Sand	30					24			20	
85		X	- becomes very dense at 83'	50+					22				
90		X	Very dense tannish gray Poorly Graded Sand	50+					23			11	
95		X		50+					22				
100 DEPTH	OF B		<b>ING:</b> 100 Feet	50+					22			8	
DATE:	10/31/	20	23										



#### LOG OF BORING B-2 LED SITE CHARACTERIZATION

LACOMBE BUSINESS PARK

ST. TAMMANY PARISH, LOUISIANA

TYPE	OF	BORING:	WFT	ROTARY
	<u> </u>	Donato.		1.017.011

TYPE C	of Bor	ING: WEI ROTARY	L	OCATION:	EAST SIDE OF SITE			PRO	3-099		
<b>DEPTH, FT</b> .	SOIL TYPE		N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	ΓΙΦΛΙΡ ΓΙΜΙΤ	PLASTICITY INDEX	% PASSING #200 SIEVE
		12" Silty Sandy Topsoil with organics Reddish tan Silty Clayey Sand						11			
		Very stiff reddish tan Sandy Fat Clay			4.50			16			
5				4.20	4.50		119	14	58	41	50
		Dense reddish tan Silty Sand	40					11			25
10			43					11			
		 Dense to very dense tannish gray Poorly Graded Sand									
15		X	48					16			8
		- with gravel 12' to 20'	50+					17			
20			50+					11			
		$\overline{\mathcal{A}}$	50+					16			8
25											
30		X	50+					18			
		Firm to stiff gray Fat Clay	0					27			99
35			0					57			00
		- with shell fragments at 38'		0.62	1.00		70	48			
40		-									
45		- with organics at 43'		0.95	1.00		71	54			
		Dense tannish gray Poorly Graded Sand	AF					22			40
50		<u> </u>	40					23			10
DEPTH	OF BC	I RING: 50 Feet	GROL	JNDWATER	R: Measu	red at 11	Feet Up	on Com	pletion c	of Drillinç	g
DATE:	10/31/2	2023									



#### LOG OF BORING B-3 LED SITE CHARACTERIZATION

LACOMBE BUSINESS PARK

TYPE OF BORING: WET ROTARY

#### ST. TAMMANY PARISH, LOUISIANA LOCATION: NORTHWEST CORNER OF SITE PROJECT NO.: G23-099

<b>DEPTH, FT</b> .	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	ΓΙσυΙΡ ΓΙΜΙΤ	PLASTICITY INDEX	% PASSING #200 SIEVE
			12" Silty Topsoil with organics Tannish gray Sandy Silt						9			
			Very stiff reddish tan Sandy Lean Clay			4.50			9	32	14	52
5		$\overline{\mathbf{N}}$	Dense reddish tan Clayey Sand	40					8			
		$\left  \right\rangle$		42					12			23
	///	Å		38					19			
10		Д	•									
	///		Very dense tannish gray Bearly Graded Sand									
45		$\overline{A}$	very dense tannish gray Poony Graded Sand	50+					20			8
15		Α										
20		X		50+					25			
		Π										
			- with trace of gravel at 23'	50÷					21			6
25		Д							21			Ū
			Very stiff tannish gray Fat Clay			2.50			49			
30	///		Boring Terminated at 30 Feet									
35												
40												
45												
50												
50		<b>.</b>		_				_				
DEPTH DATE:	11/1/2	0 <b>R</b>	ING: 30 Feet 3	GROL	JNDWATER	: Measu	red at 11	Feet Up	on Com	pletion c	of Drilling	]

