EXHIBIT 16
PRELIMINARY GEOTECHNICAL INVESTIGATION SERVICES REPORT

(Narrative Report Only)
(Full Report is in Volume 2)

GTL Report No. 01-15-012

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TABLE OF CONTENTS

Introduction: 1
Project Authorization: 1
Project Description: 1

Site and Subsurface Conditions: 2
Subsurface Stratigraphy: 2
Groundwater Conditions: 2

Foundation Recommendations: 2
Shallow Foundations: 3
Select Fill: 4
Deep Foundations: 4
Driven Piles: 4
Seismicity: 5

Pavements: 5
Lime Treatment: 5
Geogrid 5
Base: 6
Asphaltic Pavement Materials: 6
Portland Cement Concrete: 6
Subbase: 6
Traffic and Design Data: 6
Recommended Pavement Sections: 7
Geotechnical Risk: 7

Limitations: 7

APPENDIX

Plan of Borings
Boring Logs and Test Results

Preliminary Geotechnical Investigation Services
England Air Park Site W-2 Industrial Certification
Alexandria, Rapides Parish, Louisiana
GTL Report No. 01-15-012

Introduction:

This report transmits the findings of a geotechnical investigation performed for the above-referenced project. The purpose of this investigation was to define and evaluate the general subsurface conditions in the general vicinity of a planned new industrial complex. Specifically, the study was planned to determine the following:

- Subsurface stratigraphy within the limits of our exploratory borings.
- Classification, strength, and compressibility characteristics of the foundation strata.
- Suitable foundation systems and allowable soil bearing pressures.
- Preliminary recommendations for rigid and flexible pavements below unspecified traffic.

The purpose of this report is to provide the owner, structural engineer, civil engineer, and other design team professionals with preliminary recommendations to consider for the design and construction of the proposed project. This report should not be used by the contractor in lieu of project plans and specifications.

Project Authorization:

Formal authorization to perform the work on behalf of the Central Louisiana Economic and Development Alliance (CLEDA) (Client), was provided by Mr. Thomas C. David, Jr., P.E. with Pan American Engineers, Inc., by accepting our December 11, 2014 written proposal. Authorization to proceed was provided on December 12, 2014. Field procedures were conducted between January 27 and February 13, 2015 and were delayed due to site access. To accomplish the intended purposes, a three-phase study program was conducted which included:

- a field investigation consisting of 14 exploratory test borings with samples obtained at selected intervals;
- a lab testing program designed to evaluate the expansive and strength characteristics of the subsurface soils; and,
- an engineering analysis of the field and laboratory test data for preliminary foundation design recommendations.

No additional analysis was requested. A brief description of the field and laboratory test procedures are provided in the Appendix.

Project Description:

The project will be the development of an industrial park site. We understand that the industrial park could consist of a number of structures varying from one (1) story to four (4) stories in height. Preliminary structural information was not available at the time this report was prepared. The proposed buildings should consist of either steel or wood framing and could be supported on either shallow foundations, or on drilled shafts bearing at depths sufficient to resist the anticipated loadings. The pavements will most likely consist of light duty pavements for passenger cars and pickup trucks and heavy duty pavements for tractor-trailer trucks.

For the purpose of this report, we have assumed that column loads could be between 25 and 150 kips, and that maximum continuous wall loads will be between one (1) and four (4) kips per linear foot. Maximum uniform and isolated concentrated floor loads are expected to be 125 psf and five (5) kips, respectively. Grade changes are expected to be nominal with no more than two (2) to three (3) feet of cut or fill.

If any of this information should change significantly or be in error, it should be brought to our attention so that we may review recommendations made in this report.

Site and Subsurface Conditions:

The project site is located northwest of the intersection of State Highway 1202 and Jimmy Brown Road in Alexandria, Rapides Parish, Louisiana. Elevation data obtained from Google Earth indicates the site slopes downward to the north with estimated elevation differences on the order of nine (9) feet. At the time of drilling, the site was utilized as farmland. The drilling rig experienced moderate difficulty moving about the site.

Subsurface Stratigraphy:

The subsurface conditions at the proposed building site were explored by drilling a total of 14 borings to depths between approximately 30 and 100 feet. The borings were located in the field by the drilling crew as shown on the Plan of Borings included in the Appendix of this report.

The stratification of the soils encountered during field drilling operations is presented on the boring logs in the Appendix. The stratification of the subsurface materials shown on the boring logs represents the subsurface conditions encountered at the actual boring locations and variations may occur across the site. The lines of demarcation represent the approximate boundary between the soil types, but the actual transition may be gradual. The following subsurface descriptions are of a generalized nature to highlight the major stratification features. The boring logs should be reviewed for more detailed information.

In order of increasing depth, the borings generally encountered the following soil strata beneath the surface: lean clay (CL), lean to fat clay (CL-CH),m slightly clayey silt (CL-ML), sandy silt (ML), fat clay (CH), silty sand to sandy silt (SM/ML), silt (ML), silty sand (SM), and poorly graded sand (SP-SM).

Groundwater Conditions:

Seepage was observed at depths of six (6) to 20 feet during advancement of the test borings. Groundwater was measured at depths of five (5) to 15 feet below existing ground surface upon completion of the borings. A 48 hour water level reading obtained in Boring B-2 indicated a hydrostatic water level at 4.5 feet. The subsurface water regime is subject to change with variations in climatic conditions. Future construction activities may also alter the surface and/or subsurface drainage patterns of this site. Therefore, groundwater conditions should be explored at the start of construction by others. If there is a noticeable variance from the observations reported herein, then GTL should be notified immediately to review the effect, if any, such data may have on the design recommendations. It is not possible to predict future ground water conditions based upon short-term observations.

Foundation Recommendations:

The soil parameters presented below are based on single borings placed at irregular intervals across the site. The deviations between the boring locations indicate variable subsurface conditions across the site and should not be assumed as representative of the entire site. Thus, the findings presented herein should be considered preliminary in nature and should be confirmed through further investigation prior to development of the subject parcel. Prior to

developing any section of the tract, a specific subsurface investigation should be obtained and tailored to the individual project. This report should not be used in lieu of a final geotechnical investigation addressing site specific needs for the intended projects.

Detailed information on structural systems and planned grading is currently unavailable. Based on the size and type of anticipated structures, as well as the findings from this investigation, a system of shallow footings with an on-grade floor slab, in conjunction with the recommended subgrade preparation is believed to be the most practical and economical means of support. However, heavier building loads could result in the use of deep foundations. Recommendations for both foundation types are discusses separately below.

Potential Vertical Rise (PVR) values were estimated to vary between less than one (1) inch and approximately three (3) inches for this site. One (1) inch of PVR is generally accepted as the maximum allowable value for design and construction in the geographical area. The surficial soils encountered by the borings are considered to be moderately to highly expansive.

Shallow Foundations:

To remediate the loose soil conditions in the surficial zone, provide a consistent subgrade for slab support, and reduce the potential for active soils to affect the foundations, GTL recommends that a uniform layer of density-approved select fill be provided beneath the floor slabs. Areas where loose or soft soils are present will require further undercut to remediate the low strength within the supporting subgrade. Additional undercutting could reach depths of four (4) to five (5) feet.

The select fill for the building pads should extend at least five (5) feet beyond the perimeter of the buildings. The table below indicates the estimated undercut and select fill pad thickness to limit the PVR to a value of one (1) inch or less for the individual building pads in the vicinity of the boring locations.

Boring No.	Estimated PVR (inches)	Estimated Thickness of Select Fill Pad (feet)
1	1.0"	1.5
2	< 1.0	1.0
3	< 1.0	1.0
4	1.5	1.0
5	< 1.0	1.0
6	< 1.0	1.0
7	2.0	2.0
8	2.25	3.0
9	2.5	4.0
10	3.0	5.0
11	< 1.0	1.0
12	1.75	2.0
13	< 1.0	1.0
14	2.25	4.0

Shallow foundations may utilize individual or continuous footings bearing within the upper five (5) feet of the surficial zone. The provision of at least one (1) to two (2) feet of select fill should be anticipated to provide a suitable subgrade for the structures. Typical bearing capacity values

for shallow spread footings may vary from between approximately 1,500 psf to 2,500 psf for soils with consistencies of medium dense or medium stiff. Strip footings for continuous wall loads may be estimated between 1,150 and 2,000 pounds per linear foot.

Select Fill:

Select fill material should be free of organic or other deleterious materials, homogeneous mixture, have a maximum particle size of three (3) inches, have a liquid limit less than 40 and plasticity index between 8 and 20, and consist of silty-clayey sands (SM-SC), low plasticity sandy clays (CL), or clayey sands (SC) as defined by the Unified Soil Classification System. If a fine-grained material is used for fill, very close moisture content control will be required to achieve the recommended degree of compaction.

Deep Foundations:

Deep foundations may be considered for use at this site due to special equipment or building loads. Shafts should be founded at a minimum estimated depth of 20 feet below the existing ground surface. The table below presents the estimated allowable single shaft capacities for an 18 inch diameter shaft founded at depths between 20 and 50 feet below present ground surface. The factor of safety for these values is estimated to be 2.0.

Diameter of Shaft (inches)	Depth of Shaft (feet)	Allowable Compressive Single Shaft Capacity (kips)
18	20	15
	25	20
	30	25
	35	30
	40	35
	45	40
	50	45

Driven Piles:

The superstructure loads may be supported on Class B creosote treated timber piles founded at a minimum depth of 30 feet below the existing ground surface. The final depth of the piles may be selected from the following table after considering the estimated structural total loads.

Depth (feet)	Allowable Compressive Load (kips)
30	10
35	15
40	20
45	25
50	30

If the above allowable timber pile loads are found to be inadequate, consideration may be given to using 12-inch square per-cast, pre-stressed concrete piles. Such piles may be selected from the following table. The factor of safety for these and the above values is 2.0.

Depth (feet)	Allowable Compressive Load (kips)
30	20
35	25
40	30
45	35
50	40

Total settlement is estimated to be on the order of one (1) inch or less for driven piles. Differential settlements (between adjacent piles or clusters) are estimated to be on the order of 0.5 inch or less.

Seismicity:

Based on Section 1613 of the IBC-2012, a Site Class of D has been estimated for this site According to the USGS website for Seismic Hazard Design Parameters, the project site has a mapped 0.2 second spectral response acceleration (S_s) of 0.111 g. The project also has a mapped 1.0 second spectral response acceleration (S_1) of 0.062. The design spectral response accelerations, S_{DS} and S_{D1}, were determined to be 0.118 g and 0.100 g, respectively. Based on Tables 1613.3.5(1) and 1613.3.5(2), the site has an assigned Seismic Design Category of B for structures classified as Risk Categories I, II, and III. For structures classified as Risk Category IV, site has an assigned Seismic Design Category of C.

Pavements:

Information for this pavement analysis is inferred from the building borings. Our scope of services did not include extensive sampling and CBR testing of existing subgrade or potential sources of imported base material for the specific purpose of a detailed pavement analysis. Instead, we have assumed pavement related design parameters that are considered to be typical for the area soil types. It has been assumed that the constructed pavement subgrade will consist of well compacted soils. Based on experience, it is anticipated that the compacted native subgrade will yield a California Bearing Ratio (CBR) of between 2.0 and 5.0.

Lime Treatment:

A review of the boring logs indicates that the subgrade below the pavements will consist of highly plastic clays. Normally, these materials are considered to have poor support characteristics for pavements unless they are chemically treated to improve their engineering properties. Generally, soils with a PI value greater than 22 should be either removed to a depth of eight (8) inches and replaced with density approved select fill, or lime-treated as discussed below.

A bulk sample of the surficial clays was submitted to the laboratory for testing. Based on the results of our laboratory tests, it appears that the fat clay subgrade should be treated with a minimum of four (4) percent by dry weight of hydrated lime. Assuming an average dry unit soil weight of 92 pounds per cubic foot, the estimated weight of lime for field purposes should be 2.76 pounds per square yard per inch of compacted thickness. A copy of the Using pH to Estimate the Soil-Lime Proportion Requirement for Soil Stabilization is included in the Appendix of this report.

Lime treatment should be performed in accordance with the applicable provisions of Section 304 of the LA SSFRB, 2006 Edition.

Geogrid

We recommend placing geogrid below all heavy duty drives and heavy duty parking areas. The addition of the geogrid can significantly improve the performance of the pavements and extend the service life. All pavements receiving heavy duty traffic should receive a single layer of Tensar TriAx TX160 geogrid or equal. If a biaxial geogrid is considered, Tensar BX1200 geogrid or equal may be substituted. The placement and lap joints should be in accordance with the manufacturer's suggestions.

Base:

Granular base should meet the requirements for Item 1003.03(b) of the LA SSFRB for crushed stone or Item 1003.03(c) for recycled Portland cement concrete. The material should be compacted to 95 percent of the maximum density defined by the Modified Proctor (ASTM D-1557).

Asphaltic Pavement Materials:

Surface or wearing course asphaltic concrete should consist of a Type 3 Wearing Course Mixture contained in Item 501 of the LA SSFRB. Field density results should be based on the Theoretical Maximum Specific Gravity in accordance with DOTD TR 327. Minimum density requirements should be 89.0 percent for parking lots and shoulders and 92.0 percent for Travel Lane Wearing, Binder and Base Courses. Placement and processes should be in strict accordance with Part V of the above referenced specifications.

Portland Cement Concrete:

Concrete compressive strength should be a minimum of 3,500 psi at 28 days. The concrete should be designed with 5 percent (± 1 percent) entrained air to improve workability and durability. The design of steel reinforcement should be in accordance with local or accepted codes.

Subbase:

Consideration should be given to using a subbase below concrete pavements to provide a consistently firm surface upon which to place the concrete and reduce instability. The table below presents the options to reduce the likelihood of a pumping subgrade below the pavements.

REDUCED PUMPING SUBBASES			
Recommended Thickness	**Type Material**	**LA SSFRB Designation**	**Maximum P.I.**
4.0"	Crushed Stone	Item 1003.03(b)	4
4.0"	Clean Sand	Item 1003.02(a)	N/P
6.0"	Sand-Clay-Gravel	Item 1003.04(b)	15

Granular base material should be compacted to 95 percent of the maximum density defined by the Modified Proctor (ASTM D-1557). Clean sand and sand-clay-gravel mixtures should be compacted to 95 percent of Standard Proctor density (ASTM D-698).

Traffic and Design Data:

The general pavement design information presented in this report is based on subsurface conditions inferred by the test borings, information published by The Asphalt Institute, the Portland Cement Association, and past experience in the locale. The published information was utilized in conjunction with the available field and laboratory test data to develop general pavement designs based on the AASHTO structural numbering system.

The sections shown below are not based upon anticipated traffic loads as these were not available at the time this report was prepared. For the purpose of our pavement analysis of this report, we assume that the industrial traffic could consist of up to 250 repetitions of light passenger cars and pick-up trucks, 25 medium-sized delivery trucks and vans, and up to 50 heavy tractor-trailer trucks per day.

Recommended Pavement Sections:

The table below presents a summary of both rigid and flexible pavement sections for light and heavy duty applications. It should be noted that the pavement sections as presented below are minimums. If it is desired to reduce potential cracking, greater thickness of select fill and/or greater pavement section thickness could be utilized. In addition, long term pavement performance requires good drainage and performance of periodic maintenance activities.

MINIMUM PAVEMENT RECOMMENDATIONS *		
Pavement Type	**Light Duty (Parking Stalls)**	**Heavy Duty (Entries, Drives & Parking)**
Portland Cement Concrete	5.0" Portland Cement Concrete 4.0" Item 1003.03 (b) Base 8.0" Lime-Treated Subgrade or Density Approved Imported Fill	8.0" Portland Cement Concrete 4.0" Item 1003.03 (b) Base One Layer Tensar TriAx TX160 Geogrid 8.0" Lime-Treated Subgrade or Density Approved Imported Fill
Asphalt Over Crushed Stone Base	2.0" Item 501 Type 3 Surface 6.0" Item 1003.03 (b) Base 8.0" Lime-Treated Subgrade or Density Approved Imported Fill	4.0" Item 501 Type 3 Surface 12.0" Item 1003.03 (b) Base One Layer Tensar TriAx TX160 Geogrid 8.0" Lime-Treated Subgrade or Density Approved Imported Fill
*Materials should meet general requirements of the Louisiana DOTD Standard Specifications for Construction of Roads & Bridges, and specific requirements listed herein.		

Concrete thickness at trash receptacles should be a minimum of seven (7) inches. All paving recommendations are based on stable subgrade. Subgrade areas which are unstable should be over-excavated and replaced, or otherwise rendered stable prior to proceeding with base material placement.

Geotechnical Risk:

The concept of risk is an important aspect of the geotechnical evaluation. The primary reason for this is that the analytical methods used to develop geotechnical recommendations do not comprise an exact science. The analytical tools which geotechnical engineers use are generally empirical and must be used in conjunction with engineering judgment and experience. Therefore, the solutions and recommendations presented in the geotechnical evaluation should not be considered risk-free and, more importantly, are not a guarantee that the interaction between the soils and the proposed structure will perform as planned. The engineering recommendations presented in the preceding sections constitutes GTL's professional estimate of those measures that are necessary for the proposed structure to perform according to the proposed design based on the information generated and referenced during this evaluation, and GTL's experience in working with these conditions.

Limitations:

The exploration and analysis of the site conditions reported herein are considered preliminary in detail and scope and are not intended to form a basis for pavement and foundation design. The information submitted is based on the available soil information only and not on design details for the intended projects.

The findings, recommendations or professional advice contained herein have been made after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology. No other warranties are implied or expressed.

The scope of services did not include any environmental assessment for 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, or unusual or suspicious items or conditions are strictly for the information of the client. Prior to purchase or development of this site, an environmental assessment is advisable.

The scope of services did not include a geologic investigation to address any faults, large scale subsidence, or other macro geologic features not specifically addressed in this report or the agreement between GTL and the client.

After plans are more complete, it is recommended that the soils and foundation engineer be retained to provided a subsurface investigation tailored to meet the specific needs of the project.

This report has been prepared for the exclusive use of our client for the general application for the referenced project. GTL cannot be responsible for interpretations, opinions, or recommendations made by others based on the data contained in this report.

This report was prepared for general purposes only and should not be considered sufficient for purposes of preparing accurate plans for construction. Contractors reviewing this report are advised that the discussions and recommendations contained herein were provided exclusively to and for use by the project owner.

END OF REPORT TEXT

SEE FOLLOWING APPENDIX w/BORING LOGS & TEST RESULTS

(Full Report is in Volume 2)