PSI Information To Build On
Engineering • Consulting • Testing

Exhibit P Prelim Geo Tech

August 9, 2002

H+M Architects/Engineers, Inc.
50 Security Drive
Jackson, Tennessee 38305

Attn.: Mr. Brad Anderson, P.E.

Re: Preliminary Geotechnical Engineering Report
Proposed Manufacturing Facility
W 10th Street Near its Intersection with
Airline Highway
Reserve, Louisiana
PSI File No.: 254-25107-1

Dear Brad:

Professional Service Industries, Inc. is pleased to submit our Preliminary Geotechnical Engineering Report for the above referenced project. This preliminary report includes the results of field and laboratory testing, preliminary recommendations for foundation and pavement design, as well as general site development.

We appreciate the opportunity to perform this Preliminary Geotechnical Study, and look forward to continued participation during Final Geotechnical Study, and the design and construction phases of this project. If you have any questions pertaining to this preliminary report, or if we may be of further service, please contact our office.

Respectfully submitted,

PROFESSIONAL SERVICE INDUSTRIES, INC.

Katie Stachowiak, P.E.
Project Engineer

STATE OF LOUISIANA
Katherine C. Stachowiak
REG. No. 29933
REGISTERED
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

John Gordon
Chief Engineer

PRELIMINARY GEOTECHNICAL ENGINEERING REPORT

PROPOSED MANUFACTURING FACILITY
WEST 10TH STREET NEAR ITS INTERSECTION WITH
AIRLINE HIGHWAY
RESERVE, LOUISIANA

PSI FILE NO. 254-25107-1

PREPARED FOR

H+M ARCHITECTS/ENGINEERS, INC.
50 SECURITY DRIVE
JACKSON, TENNESSEE 38305

AUGUST 9, 2002

BY

PROFESSIONAL SERVICE INDUSTRIES, INC.
724 CENTRAL AVENUE
JEFFERSON, LOUISIANA 70121

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EXECUTIVE SUMMARY

A preliminary exploration and evaluation of the subsurface conditions has been completed for the proposed Manufacturing Facility to be constructed on West 10th Street near its intersection with Airline Highway in Reserve, Louisiana Soil borings have been drilled, and selected soil samples have been tested in the laboratory. As directed by Mr. Anderson of H+M, the soil borings for this preliminary study were drilled in the existing roadways traversing the cane field to minimize damage to the sugar cane. Due to site access limitations, we only drilled one (1) boring to a depth of 50 feet in the footprint of the building and five (5) borings to 10 feet in the gravel lots.

At boring B-1, a surficial layer of fill or reworked natural soils was encountered at the ground surface, and extended to about two (2) feet below existing site grades. The fill/reworked natural soils consisted of stiff fat clay, with traces of gravel and brick fragments. As stated above, this boring was drilled in an existing dirt roadway. Beneath the upper fill/reworked natural soils at boring B-1 and at the ground surface at the remaining borings, very stiff to firm fat to lean clay was encountered, and extended to depths ranging from six (6) to 10 feet below existing site grades. Soft fat clay was then encountered, and extended to about 34 feet. Below this depth, Pleistocene aged stiff to very stiff fat clay was encountered, and extended to at least 50 feet, the maximum depth explored. Groundwater was encountered at borings B-1 and P-1 at about eight (8) feet below existing site grades.

Analyses based on field data and laboratory test results indicate that a shallow foundation system would experience excessive settlement caused by the structural loads of the proposed building and the addition of up to two (2) feet of fill material. Therefore, a driven pile foundation system is recommended to support the proposed structure including the floor slab. Details related to site preparation and development, foundation and pavement design, and construction considerations are included in the subsequent sections of this report.

The owner/designer should not rely solely on this Executive Summary and must read and evaluate the entire contents of this preliminary report. Additional soil borings will be required so that the geotechnical recommendations for this site can be finalized. Prior to finalization of the geotechnical report, we should also be provided with a schematic of the storage of pipes and coils for analysis.

PROJECT INFORMATION

Project Authorization

Professional Service Industries, Inc. (PSI) has completed a preliminary geotechnical exploration for the proposed Manufacturing Facility to be constructed on West 10th Street in Reserve, Louisiana. Our services were performed in general accordance with PSI Proposal number 254-2152 dated July 25, 2002. The project was authorized with Purchase Order No.: S-2439, dated 7/31/02, which was signed by the President of H+M.

Project Description

Based upon information provided by Mr. Brad Anderson, P.E., of H+M, it is understood that a pipe manufacturing facility will be constructed at the proposed site in Reserve, Louisiana. Large steel coils that are approximately six (6) feet in diameter and weigh 40 tons will be delivered to the site and stockpiled on a gravel lot The coils will be picked up by a front-end loader, driven across the gravel lot, and dropped off at the northern entrance of the building. A large crane will pick up the coils and place them on a conveyor belt, and manufacturing of the pipe will commence. At the southern end of the building, the finished product, 40 to 80 feet long pipe, will be transported to a gravel pipe storage lot by front-end loaders.

The project is in the very early stages of development, and few details about the construction of the project are available at this time. It is understood that the Manufacturing Facility will be a single story tall, with a footprint of about 111,300 square feet. Based upon information provided by Mr. Brad Anderson, P.E., of H+M, it is understood that the column loads will be a maximum of 100 kips. It is anticipated that less than two (2) feet of fill will be required to bring the site to grade.

Mr. Anderson also provided traffic design information for construction of the proposed drives and gravel lots. Concrete, asphalt, and gravel lots and drives will be constructed over much of the site. It is understood that a medium duty concrete drive will connect the site to W. 10th Street, and will be traveled by 40 18-wheeler trucks per day, 365 days a year. A heavy duty concrete drive and gravel lot will be constructed to the west and south of the medium duty drive, and will be traveled by 15 passes per day (365 days a year) of front-end loaders carrying the 40 ton coils in addition to the 18-wheelers traveling on the medium duty drives. It is understood that the front axles of the front-end loaders traveling in the heavy-duty area will be subjected to a 190,000-pound load, and the front axle will have four- eight (8) foot diameter and three (3) foot wide wheels. No information regarding the front-end loader tire pressure (pounds per square inch) was provided, so a pressure value of 120 psi was assumed. Additionally, a tire spacing of 30 inches was assumed for the tires on either side of the axle. The heavy-duty drive and lot will be used for the raw material storage area.

Just south of the proposed building, a medium duty pipe transport gravel lot will be constructed. The medium duty area will be traversed by front-end loaders carrying pipe. The front-end loaders will have 70,000 pound axle loads supported on two eight (8) foot diameter and three (3) feet wide wheels on the front axle, making 100 passes per day, 365 days a year.

To the west of the medium duty pipe transport area, a light duty gravel pipe storage lot will be constructed. The light duty lot will traversed by the same front end loaders carrying pipe as described above, with only 33 passes per day, 365 days a year.

To the west of the gravel pipe storage lot, a heavy duty asphalt drive will be constructed. It is understood that the drive will be traveled by 40 18-wheeler trucks/day, 365 days a year. Additionally, a light-duty asphalt parking lot will be constructed to the east of the proposed building. The lot will be traveled by 200 cars/light pick-up trucks per day.

At the present time, the site is currently an operating sugar cane field with two dirt roadways traversing the site. For the purpose of preparing our preliminary recommendations, soil borings were drilled along the existing dirt roads since we were not permitted to clear the sugar cane. Additional soil borings will be required so that we may finalize our geotechnical recommendations.

Purpose and Scope of Services

The purpose of this preliminary study was to determine the general subsurface conditions present at the site to enable a preliminary evaluation of acceptable foundation and pavement systems for the Manufacturing Facility. Due to site access limitations, we drilled only one (1) boring in the footprint of the Manufacturing Facility to a depth of 50 feet and five (5) borings in the gravel lots to a depth of 10 feet. The scope of services also included conducting laboratory tests on selected samples recovered from the soil borings and preparing this geotechnical report. This preliminary report briefly outlines the testing procedures, presents available project information, describes the site and subsurface conditions, and presents preliminary recommendations regarding the following:

- Preliminary grading procedures for site development.
- Preliminary foundation type, depth, allowable pile capacities, and an estimate of potential settlement.
- Retaining wall design coefficients for active, passive, and "at rest" conditions.
- Preliminary general pavement design criteria and pavement subgrade preparation.
- Preliminary comments regarding factors that will impact construction and performance of the proposed construction.

The scope of preliminary geotechnical services did not include an environmental site 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. It is recommended that an environmental assessment be performed prior to commencing construction at this site.

SITE AND SUBSURFACE CONDITIONS

Site Location and Description

The proposed Manufacturing Facility will be constructed on West 10th Street south of its intersection with Airline Highway in Reserve, Louisiana. The site is currently an operating sugar cane field and has two main dirt roadways bisecting the site. The site appeared relatively flat, however no grading information was available at this time. The site is bordered to the north by railroad tracks, to the east by West 10th Street, to the south by a Pepsi plant, and to the west by Rosenwald Street.

Subsurface Conditions

This preliminary geotechnical investigation consisted of drilling one (1) boring (B-1) in the proposed building to a depth of 50 feet and five (5) borings in the proposed gravel lots (P-1 through P-5) to a depth of 10 feet. As stated previously, we were required to drill our soil borings in the existing dirt roadways since the site is currently an operating sugarcane field. Once the cane has been harvested and the site is accessible, we should be contacted to perform additional geotechnical exploration (including borings, laboratory testing, and additional analyses) for the building and lots/drives so that our geotechnical recommendations can be finalized.

The borings were located in the field using a surveyor's wheel and the *Preliminary Facility Site Plan,* dated 7/22/02, Sheet CE-1.1, produced by H+M. A boring location diagram indicating the approximate boring locations is provided in the Appendix of this report. The borings were generally advanced using wet rotary techniques for the building boring and hollow stem auger techniques for the drive/lot borings, and soil samples were routinely obtained during the drilling process. Drilling and sampling techniques were accomplished in general accordance with ASTM procedures.

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 D 1587) These samples were extruded in the field with a hydraulic ram. Undisturbed and disturbed samples were identified according to boring number and depth, were placed in polyethylene plastic wrapping to protect against moisture loss, and were transported to the laboratory in special containers to prevent disturbance.

In addition to the field exploration, a supplemental laboratory testing program was conducted to evaluate additional pertinent engineering characteristics of the foundation materials necessary in analyzing the behavior of the foundation system for the proposed Manufacturing Facility and surrounding gravel lots and pavements. The testing program included visual classification and water content tests on the soil samples. In addition, selected samples were subjected to unconfined compression testing and Atterberg Limits determination. Additional estimates of shear strength were also determined through the use of a torvane and hand penetrometer. The laboratory testing program was conducted in general accordance with applicable ASTM Specifications. The results of these tests can be found on the accompanying boring logs located in the Appendix.

At boring B-1, a surficial layer of fill or reworked natural soils was encountered at the ground surface, and extended to about two (2) feet below existing site grades. The fill/reworked natural soils consisted of stiff fat clay, with traces of gravel and brick fragments. As stated above, this boring was drilled in an existing dirt roadway. Beneath the upper fill/reworked natural soils at boring B-1 and at the ground surface at the remaining borings, very stiff to firm fat to lean clay was encountered, and extended to depths ranging from six (6) to 10 feet below existing site grades. Soft fat clay was then encountered, and extended to about 34 feet. Below this depth, Pleistocene aged stiff to very stiff fat clay was encountered, and extended to at least 50 feet, the maximum depth explored.

The above subsurface description is generalized in 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 individual boring locations. These records include soil descriptions, stratifications, locations of the samples, and laboratory test data. The stratification shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratification represent the approximate boundary between subsurface materials and the actual transition may be gradual. Water level information obtained during field operations is also shown on these boring logs. The samples which were not altered by laboratory testing will be retained for 60 days from the date of this report and discarded unless we are directed otherwise.

Groundwater Information

Groundwater was encountered at borings B-1 and P-1 at a depth of eight (8) feet below existing site grades. Groundwater was not encountered at the remaining parking borings. The groundwater levels presented in this report are the levels that were measured at the time of our field activities and the groundwater level may not have stabilized in the borehole. Furthermore, groundwater levels may vary due to seasonal conditions and recent rain fall or temperature effects. It is recommended that the contractor determine the depth to groundwater at the time of construction

PRELIMINARY EVALUATION AND RECOMMENDATIONS

Background

As stated previously, we were required to drill the soil borings for this preliminary investigation along the existing dirt roadways that bisect the sugarcane field. Due to the limited site access, we drilled only one (1) soil boring in the footprint of the Manufacturing Facility to a depth of 50 feet and five (5) soil borings in the gravel lot areas to a depth of 10 feet. Based upon the size of the development, additional borings will be required prior to the finalization of our geotechnical recommendations. Once access to the entire site is gained, we should be contacted and asked to perform the additional borings and finalize our geotechnical recommendations. It is important to note that the soil conditions may change beyond the boring locations, and therefore, the recommendations contained in our final report may vary from the preliminary recommendations contained herein due to the limited soil data currently available. Additionally, we should be provided with schematics detailing the storage of the pipes and coils.

Potential Vertical Rise

When the additional soil borings are drilled, we will obtain information regarding the delayed groundwater level at the site and determine if remediation is necessary to reduce the Potential Vertical Rise (PVR) to acceptable levels. Based upon the site's proximity to the Mississippi River, it is anticipated that the groundwater will be shallower than the eight (8) feet observed while drilling, and that PVR will not be an issue for the floor slabs at this site. However, PVR will be analyzed in the final report.

Preliminary Foundation System

Based upon the information obtained from this limited investigation, we preliminarily recommend that a driven pile foundation system be used to support the proposed Manufacturing Facility including the floor slab. It is recommended that treated timber piles be used to support the structure and floor slab. It is important to note that the recommended pile depths and capacities may change in the final geotechnical report due to the soil conditions encountered at the borings yet to be drilled.

Consequently, it is recommended that the building and floor slab be structurally supported on piles driven to a minimum depth of 35 feet below existing site grades. The treated timber sections should conform to ASTM D25 for material quality and have the minimum tip and butt diameters specified below. The recommended driven length and estimated corresponding allowable compression capacities for treated timber piles are provided below. The piles will generally derive their support through "skin friction" along their embedded lengths. The estimated allowable pile capacities are as follows:

Pile Type	*Driven Depth (Ft.)	Allowable Compressive Capacity (Tons)	Allowable Tensile Capacity (Tons)
ASTM D25 Treated Timber with a 6" tip and 8" butt	30	5	3
	35	5.5	4
	40	8	5
ASTM D25 Treated Timber with a 7" tip and 12" butt	50	17	11

*Pile penetration measured from existing ground surface. Additional pile lengths should be provided to accommodate the fill thickness.

The estimated pile capacities are based on a factor of safety of two (2) in compression and three (3) in tension. Furthermore, additional pile capacities for different pile types and different driven lengths other than the pile listed can also be provided upon request. It is recommended that only one pile type and length be used to support the structure and floor slab.

Floor Slabs

Preliminary soils information indicates that the building floor slabs, including the sidewalks and landings immediately adjacent to the building and any truck docks, should be pile supported. It is also recommended that a polyethylene sheeting vapor barrier be provided at the floor slab/fill soil interface.

All utility lines in the building area should be hung from the slab. Flexible connections must be provided to accommodate at least eight (8) inches of settlement where the lines enter/exit pile supported and non-pile supported areas. Hangers and connections used should be made of stainless steel, meeting the applicable Building Code.

Preliminary Light Pole Foundation

Due to the soft soil conditions encountered on this site during the preliminary investigation, it is recommended that a pile foundation system consisting of ASTM D25 southern yellow pine treated timber piles be used to support the light poles. The piles should have minimum 6-inch tip and 8-inch butt diameters with a minimum embedded length of 30 feet. Furthermore, it is recommended that a minimum 3-pile cap be used for each light pole to provide lateral stability. The compressive and tensile capacities for the recommended piles are provided above.

Retaining Walls

We understand that retaining walls may be constructed at this Manufacturing Facility. It is recommended that piles be used to support the retaining walls if constructed, and that the foundations be designed to match those supporting the structure. The planned walls must also be designed to resist lateral earth pressures which will be induced by the weight of the backfill materials, hydrostatic pressures on the walls and any adjacent slab surcharge loads exerted on the walls. It is recommended that the walls be backfilled with a free draining material such as clean sand. A drainage system should be provided near, or at the base of the walls to collect and remove groundwater and prevent build-up of hydrostatic pressures.

For design purposes, equivalent fluid pressures of 58 pounds per square foot and 89 pounds per square foot per foot of wall height may be used as the horizontal components of the at-rest earth pressure on the retaining walls, above and below the groundwater, respectively.

The following assumptions were made:

MATERIAL	UNIT WEIGHT, PCF	FRICTION ANGLE, ϕ	COEFFICIENT OF EARTH PRESSURE			FRICTION COEFFICIENT
			Ko	Ka	Kp	
Free Draining Granular fill	115	30°	0.5	0.33	3.0	0.42

Preliminary Settlement

Based upon the limited drilling performed to date, it is estimated that total settlement of piles installed at a minimum penetration depth of 30 feet will be on the order of one (1) inch. This estimate assumes that less than two (2) feet of fill will be placed to bring the building to grade. However, settlement will depend on the amount of fill placed on the site. The fill depth should be minimized to reduce potential settlement from negative skin friction.

Group Effect

All piles should have a minimum center-to-center spacing of at least three (3) feet. Group effect should be minimal for piles in clusters of up to six (6) piles spaced at a minimum of three (3) feet. For larger pile clusters, group effect could become a factor and should be evaluated in accordance with the building code and the criteria given in the Appendix.

Lateral Loads

For deep foundations, the lateral loads are resisted by the soil as well as the rigidity of the pile. Analyses can be performed by methods ranging from chart solutions to finite difference methods. If needed, after we have drilled additional soil borings, finalized our recommendations, and once the pile type and group dimensions are determined, PSI can perform a lateral load analysis including a detailed computer analysis based on finite difference methods

Pile Load Test Information

After additional soil borings have been drilled on the site and our geotechnical recommendations finalized, it is recommended that the pile capacity be verified by field load testing a test pile prior to construction. We will provide additional information about the Pile Load Test in our final geotechnical report.

Pile Installation and Monitoring Information

Pile driving hammers used to drive foundation piles should be selected according to pile type, length, size, and weight of the pile, as well as potential vibrations resulting from pile driving operations. Care should be taken to assure that the hammer selected is capable of achieving the desired penetration without causing damage to the piles or causing excessive vibrations which could damage existing nearby structures. Hammers having a rated energy in the range of 15,000 to 20,000 foot-pounds are satisfactory for the recommended composite piles. Smaller hammers with a rated energy of 7,500 to 12,000 foot pounds would be appropriate for the small treated timber piles recommended for the light pole foundations. Further information regarding pile installation will be provided in our final geotechnical report.

We recommend that pile driving be monitored by the Geotechnical Engineer or his representative. Sometimes, premature refusal occurs due to poor performance of the hammer rather than from soil resistance. Any changes in hammer blow counts should be carefully examined before making any decisions about the pile penetration.

Preliminary Site Preparation

General

It is recommended that the vegetation, sugarcane, roots, topsoil, organics, deleterious material, and any loose or soft soil zones encountered be stripped from the site and wasted. We could not drill soil borings in the existing sugarcane field, therefore, we have no information regarding the variation in the topsoil thickness. Based upon our previous experience, we anticipate that at least 12 inches of topsoil will be present at this site. Additional excavations in excess of the anticipated 12 inch topsoil removal will likely be required, especially where organics or deeper topsoil is present. Once the additional soil borings have been drilled, we can provide a better estimate as to how much topsoil is present on the site. It is recommended that the actual depth of any additional topsoil removal required be determined in the field by the Geotechnical Engineer or by his representative at the time of construction.

Building Pad

After stripping and excavation to the proposed subgrade level, fill may be placed as necessary If the structural fill is cohesive in nature, it should be free of organic or other deleterious materials, have a maximum particle size less than 2 inches, and have a liquid limit less than 40 and a plasticity index between eight (8) and 18. If the imported fill is granular in nature, it is recommended that the structural fill consist of pumped river sand that is free of organic or other deleterious material, have a maximum particle size of two (2) inches, and have less than 10 percent fines (material passing the #200 sieve). All fill soils placed in the building pad should be mechanically compacted, and care should be taken to apply compactive effort throughout the fill. Compaction testing of the fill material beneath the building may be waived since it is pile supported.

Parking Lot

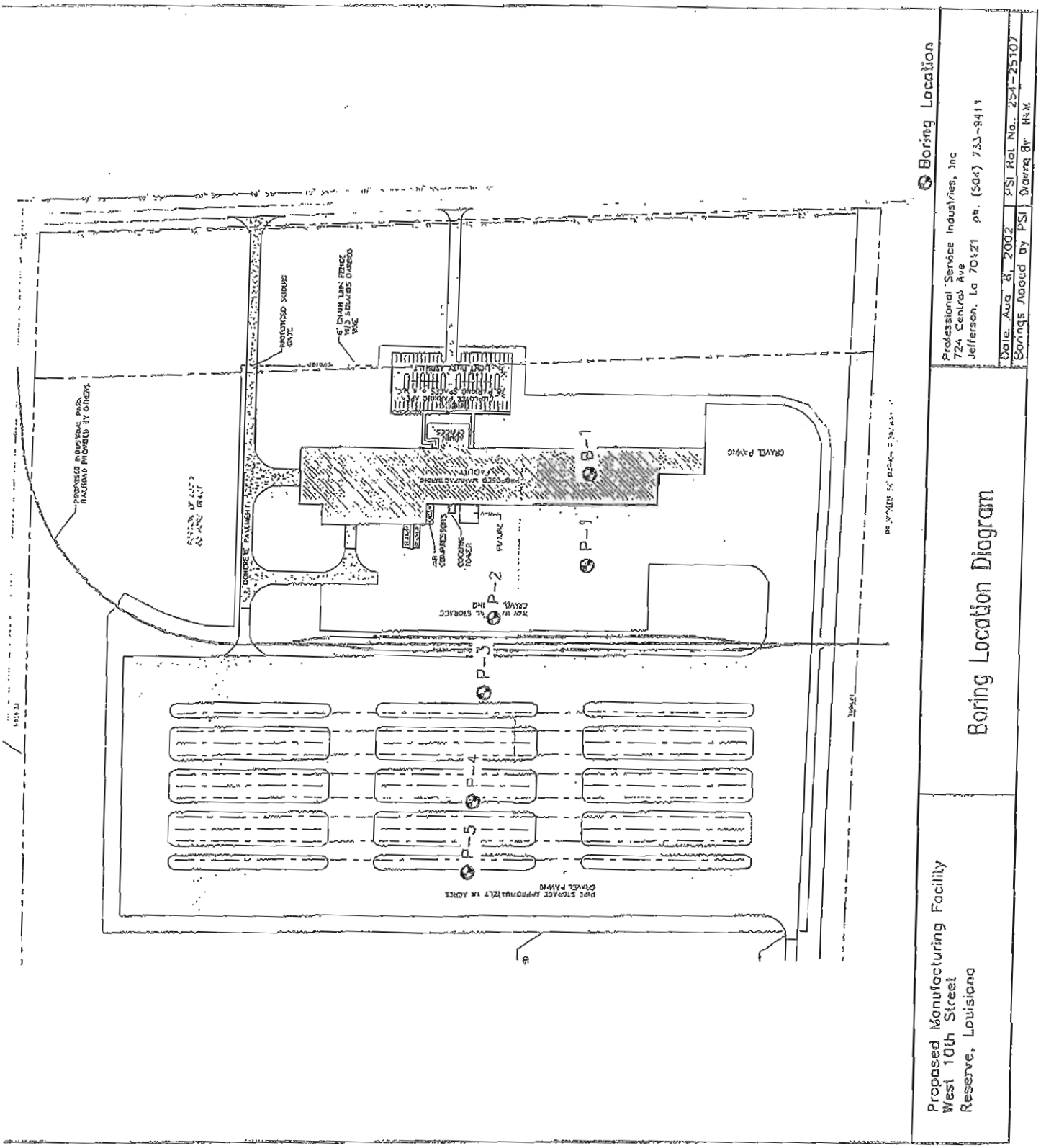
Following stripping and excavating as outlined above, it is recommended that the subgrade be proofrolled with a loaded tandem axle dump truck or similar heavy rubber tired vehicle. Soils which are observed to rut or deflect excessively under the moving load should be undercut and replaced with properly compacted fill. The proofrolling, undercutting, and filling activities should be witnessed by a representative of the geotechnical engineer and should be performed during a period of dry weather.

Heavy Duty Concrete Area

Following successful proofrolling, it is recommended that at least 12 inches of granular structural fill material be placed and cement stabilized and compacted as outlined in Section 302 of the *Louisiana Standard Specifications for Roads and Bridges*, latest edition.

All Other Concrete, Asphalt and Gravel Areas

Following successful proofrolling, the exposed 12 inches of soil present in the pavement areas should be stabilized with lime as per Section 304, Type C treatment, as outlined in the *Louisiana Standard Specifications for Roads and Bridges*, latest edition. The exact percentage of lime required to stabilize the soils (i.e reduce the Plasticity Index to less than 20) should be determined after all of the parking borings have been drilled, and lime series tests have been run After spreading the lime, initial mixing, watering, sealing and mellowing for a minimum of 48 hours, and mixing until pulverization, the 12 inches of lime stabilized soil should be compacted to at least 95 percent of the maximum dry density as determined by the standard Proctor (ASTM D-698) at -1 to +3 percent of the optimum moisture content. Following successful lime treatment, construction of the paved and gravel lots and drives can be performed.


Boring Location
B-1
P-1
P-2
P-3
P-4
P-5
Professional Service Industries, Inc
724 Central Ave
Jefferson, La 70121 ph. (504) 733-9411
Date: Aug 8, 2002
PSI Rpt No. 254-25107
Borings Taped by PSI
Drawn By: HKM
Boring Location Diagram
Proposed Manufacturing Facility
West 10th Street
Reserve, Louisiana

LOG OF BORING B-1

PROPOSED MANUFACTURING FACILITY
WEST 10TH STREET
RESERVE, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: SEE APPENDIX | PSI PROJECT NO. : 254-25107

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			FILL/REWORKED NATURAL SOILS: Stiff, reddish-brown, Fat Clay, trace gravel and brick			1.5			33	72	56	
			Firm, gray, Fat Clay, trace organics and gravel, with silt seams			1			39	86	56	
5			-trace gravel, 4' to 8'		0.52		0.35	73	48			
			Soft, gray, Fat Clay, trace organics, with silt seams ▽				0.2		59			
10			-slickensides, 8' to 30'		0.33		0.35	55	57			
15			-gray mottled with brown and trace organics, 13' to 15'		0.27		0.2	66	52			
20			-blocky with trace organics, 18' to 20'		0.3		0.30	71	49			
25			-blocky with trace organics, sand and shells, 23' to 25'				0.35		52	102	76	
30			-with shell seams and trace sand, 28' to 30'				0.15		34			
35			Stiff to very stiff to stiff, greenish-gray to brown, Fat Clay, trace organics		1.3	2		106	21			
40						3			21			
45			-slickensides, 43' to 46'		2.3	2.75		107	21			
50			-with trace organics and slickensides, 48' to 50'		1.3	1.5		88	32			
			Boring Terminated at 50'									

GROUNDWATER: ENCOUNTERED AT 8'

DEPTH OF BORING: 50 Feet

DATE: 8/2/02

LOG OF BORING P-1

PROPOSED MANUFACTURING FACILITY
WEST 10TH STREET
RESERVE, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: SEE APPENDIX | PSI PROJECT NO.: 254-25107

DEPTH, FT	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			Very stiff to firm, gray mottled with brown, Fat Clay, trace organics and silt seams, with slickensides		2.2	2.75		96	25	56	37	
					1.4	1.5		95	27			
5							0.45		34			
			-with silt seams, 6' to 10' ▽			1			36			
			Soft, gray to brown, Fat Clay, trace organics				0.2		79			
10			Boring Terminated at 10'									
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 10 Feet

GROUNDWATER: MEASURED AT 8' UPON COMPLETION

DATE: 8/2/02

PSI Geotechnical Consulting Services
Jefferson, Louisiana

LOG OF BORING P-2

PROPOSED MANUFACTURING FACILITY
WEST 10TH STREET
RESERVE, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: SEE APPENDIX | PSI PROJECT NO.: 254-25107

DEPTH, FT	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			Very stiff, gray to brown, Fat Clay, trace organics			2.5			23			
			Firm, gray to brown, Lean Clay, with silt seams				0.4		30			
5			Stiff to firm, gray to brown, Fat Clay, with silt seams				0.55		42			
							0.3		51			
							0.45		62			
10			Boring Terminated at 10'									
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 10 Feet
GROUNDWATER: NOT ENCOUNTERED
DATE: 8/2/02

PSI Geotechnical Consulting Services
Jefferson, Louisiana

LOG OF BORING P-3

PROPOSED MANUFACTURING FACILITY
WEST 10TH STREET
RESERVE, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: SEE APPENDIX | PSI PROJECT NO.: 254-25107

DEPTH, FT	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			Stiff to firm, gray to brown, Fat Clay, trace organics		1.3	1.25		89	27	57	37	
			-with silt seams, 2' to 10'		0.72		0.4	80	36	56	36	
5					0.68		0.3	76	44			
							0.35		54			
			-with organics, 8' to 10'				0.5		43			
10			Boring Terminated at 10'									
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 10 Feet
GROUNDWATER: NOT ENCOUNTERED
DATE: 8/2/02

LOG OF BORING P-4

PROPOSED MANUFACTURING FACILITY
WEST 10TH STREET
RESERVE, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: SEE APPENDIX | PSI PROJECT NO. : 254-25107

DEPTH, FT	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			Stiff to firm, gray to brown, Fat Clay, trace organics			2			31			
			-with silt seams, 2' to 10'			0.5			33			
5							0.5		36			
							0.4		48			
10							0.4		48			
			Boring Terminated at 10'									
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 10 Feet | GROUNDWATER: NOT ENCOUNTERED

DATE: 8/2/02

PSI Geotechnical Consulting Services
Jefferson, Louisiana

LOG OF BORING P-5

PROPOSED MANUFACTURING FACILITY
WEST 10TH STREET
RESERVE, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: SEE APPENDIX | PSI PROJECT NO.: 254-25107

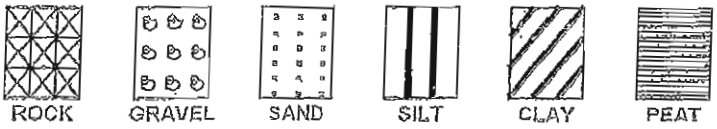
DEPTH, FT	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			Stiff, brown to gray, Fat Clay, trace organics, with silt seams		1.9	2		100	26	51	32	
			Firm, brown to gray, Lean Clay, with silt seams		0.61		0.3	81	34			
5			Firm, gray to brown, Fat Clay, with silt seams				0.4		38			
							0.4		58			
			-trace organics, 8' to 10'				0.45		51			
10			Boring Terminated at 10'									
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 10 Feet
GROUNDWATER: NOT ENCOUNTERED
DATE: 8/2/02

PSI
Geotechnical Consulting Services
Jefferson, Louisiana

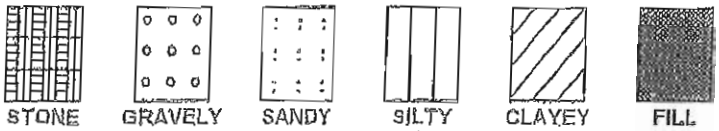
KEY TO TERMS AND SYMBOLS USED ON LOGS

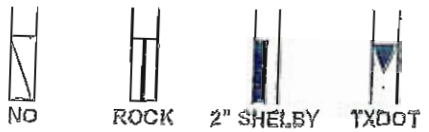
SOIL TYPE



SAMPLER TYPE

MODIFIERS





UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D 2487 (1980)

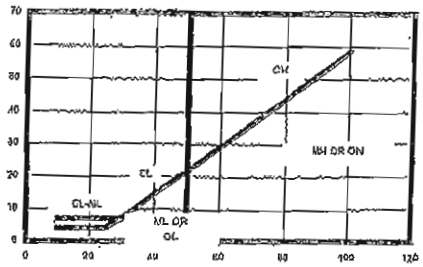
MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL & GRAVELLY SOILS	CLEAN GRAVEL	GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		W/ APPRECIA BLE FINES	GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS	CLEAN SANDS	SW	WELL GRADED SAND, GRAVELLY SAND (LITTLE FINES)
			SP	POORLY GRADED SANDS, GRAVELLY SAND (LITTLE FINES)
		SANDS WITH APPREC. FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS		ML	INORGANIC SILTS & VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS W/ LOW PI
			CL	INORGANIC CLAY OF LOW TO MEDIUM PI, LEAN CLAY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS
			OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PI
	SILTS AND CLAYS		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MED TO HIGH PI, ORGANIC SILT
HIGHLY ORGANIC SOIL			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS
UNCLASSIFIED FILL MATERIALS			ARTIFICIALLY DEPOSITED AND OTHER UNCLASSIFIED SOILS AND MAN-MADE SOIL MIXTURES	

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	SHEAR STRENGTH IN TONS/FT²
VERY SOFT	0. TO 0.125
SOFT	0.125 TO 0.25
FIRM	0.25 TO 0.5
STIFF	0.5 TO 1.0
VERY STIFF	1.0 TO 2.0
HARD	> 2.0 OR 2.0+

RELATIVE DENSITY - GRANULAR SOILS

CONSISTENCY	N-VALUE (BLOWS/FOOT)
VERY LOOSE	0-4
LOOSE	4-9
MEDIUM DENSE	10-29
DENSE	30-49
VERY DENSE	> 50 OR 50+



ABBREVIATIONS

HP - HAND PENETROMETER
TV - TORVANE
MV - MINIATURE VANE
UC - UNCONFINED COMPRESSION TEST
UU - UNCONSOLIDATED UNDRAINED TRAIXIAL
CU - CONSOLIDATED UNDRAINED

NOTE: PLOT INDICATES SHEAR STRENGTH AS OBTAINED BY ABOVE TESTS

▼ DELAYED GROUNDWATER LVL

▽ LEVEL GROUNDWATER ENCOUNTERED

CLASSIFICATION OF GRANULAR SOILS

U.S. STANDARD SIEVE SIZE(S)

6"	3"	3/4"	4	10	40	200

BOULDERS	COBBLES	GRAVEL COARSE	GRAVEL FINE	SAND COARSE	SAND MEDIUM	SAND FINE	SILT OR CLAY	CLAY

152	76.2	19.1	4.76	2.0	0.42	0.074	0.002

GRAIN SIZE IN MM

ALLOWABLE GROUP PILE CAPACITY*

$$Q_a = \frac{PxLxC}{(FSF)} + \frac{2.6\, q_u\, (1 + 0.2\ w/b)A}{(FSB)}$$

Q_a = Allowable load carrying capacity of group pile (pounds)

P = Perimeter distance of pile group (feet)

L = Length of pile, (feet)

C = Average weighted cohesion of soil along length of pile (PSF)

q_u = Average unconfined compressive strength of soil below pile tip (PSF)

w = Width of base of pile group, (feet)

b = Length of base of pile group, (feet)

A = Base area of pile group, (square feet)

(FSF) = Factor of safety for the friction area = 2

(FSB) = Factor of safety for the base area = 3

* The recommended single pile capacity should not be exceeded.

PILE SPACING**

In order to facilitate driving, minimum pile spacing shall be either 3 feet or as computed by the following formula, whichever is greater:

$SPAC = 0.05\ (L_1) + 0.025\ (L_2) + 0.0125\ (L_3)$

SPAC = Center to Center of Pile (feet)

L_1 = Pile Penetration up to 100 feet

L_2 = Pile Penetration from 101 to 200 feet

L_3 = Pile Penetration pass 201 feet

** Greater pile spacing than the minimum value may be required in order to satisfy group effect as given by the above allowable group pile capacity formula.

After subgrade preparation and observation have been completed, fill placement may begin as necessary. Structural fill materials placed in the parking area should consist of imported structural fill meeting the requirements outlined above. The structural fill should be compacted to at least 95 percent of standard Proctor maximum dry density as determined by ASTM Designation D698.

Fill should be placed in maximum lifts of 8 inches of loose material and should be compacted within the range of 1 percentage point below to 3 percentage points above the optimum moisture content value. If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying. Each lift of compacted engineered fill should be tested by a representative of the geotechnical engineer prior to placement of subsequent lifts. Care should be taken to apply compactive effort throughout the fill.

Preliminary Pavement Recommendations

Due to site access restrictions, were we only able to drill five (5) borings along the existing roadways in the proposed gravel lot areas. Additional borings will be required to finalize our pavement recommendations. As stated previously, it is possible that the soil conditions will vary beyond the boring locations, thus resulting in revised pavement recommendations in the final geotechnical report.

The performance of pavements depends upon several factors including (1) the characteristics of the supporting soils; (2) the magnitude and frequency of wheel load applications; (3) quality of construction materials; (4) the contractor's placement and workmanship abilities, and (5) the desired period of design life. PSI has evaluated both flexible and rigid pavements for use at this site.

The general pavement design information presented in this report is based on information published by AASHTO and the Portland Cement Association as well as past experience in this area. The published information was utilized in conjunction with the available field and laboratory test data to develop general pavement recommendations.

CBR (Lime Treated)	4
Modulus of subgrade reaction with 12" Cement Stabilized Granular Soils	790 pci
Reliability	85%
Deviation	0.45 Asphalt 0.35 Rigid
Initial Serviceability	4.2
Terminal Serviceability	2.0
Modulus of Rupture	570 psi

Modulus of Elasticity	3.8×10^6 psi
Load Transfer	3.2 Dowels or Keys
Drainage Coefficient	1.0
Design Life	20 Years
Layer Coefficients	0.41 Asphalt
	0.14 Base Course
	0.07 Lime Stabilized Soils

Mr. Brad Anderson of H+M provided PSI with the traffic and loading information for the various pavement recommendations needed, which are summarized in the following sections. Additionally, it is understood that the gravel lots will be fine-graded as necessary during the lifetime of the lots.

Medium Duty Concrete

A medium duty concrete drive is planned to connect W. 40th Street to the Manufacturing Facility This medium duty drive will be traveled by 40 18-wheeler trucks per day, 365 days a year. Considering a 20 year lifetime for the pavement, we estimate that the Equivalent 18-kip Single Axle Loads (ESALs) will be on the order of 1.2 million. Based upon the estimated ESALs and above design factors, we preliminarily recommend the following pavement section:

MEDIUM DUTY AREAS RIGID PAVEMENT MINIMUM THICKNESS (INCHES)	
Pavement Materials	
Portland Cement Concrete	8
Lime Stabilized Subgrade Soils	12

The exposed 12 inches of subgrade soil should be stabilized with lime as per Section 304, Type C treatment, as outlined in the *Louisiana Standard Specifications for Roads and Bridges*, latest edition The exact percentage of lime required to stabilize the soils (i.e. reduce the Plasticity Index to less than 20) should be determined after all of the parking borings have been drilled, and lime series tests have been run. After spreading the lime, initial mixing, watering, sealing and mellowing for a minimum of 48 hours, and mixing until pulverization as outlined in Section 304, the 12 inches of lime stabilized soil should be compacted to at least 95 percent of the maximum dry density as determined by the standard Proctor (ASTM D-698) at -1 to +3 percent of the optimum moisture content. Following successful lime treatment, imported compacted structural fill may be placed as necessary to raise pavement grades. The structural fill should meet the material and compaction requirements outlined in the *Site Preparation* section of this report.

Proper finishing of concrete pavement requires the use of appropriate construction joints to reduce the potential for cracking. Construction joints and reinforcing should be designed in accordance with current Portland Cement Association and the American Concrete Institute guidelines. Construction joints should be closely spaced for crack control. Joints should be sealed to reduce the potential for water infiltration into pavement joints and subsequent infiltration into the supporting soils. Load transfer devices at the pavement joints should be designed in accordance with accepted codes. The concrete should have a minimum compressive strength of 4,000 psi at 28 days The concrete should also be designed with 5 $\pm$ 1 percent entrained air to improve workability and durability.

Heavy Duty Concrete

A heavy duty concrete drive will be constructed to the west of the medium duty drive. It is understood that the heavy duty drive will be traveled by the aforementioned 18-wheeler truck traffic traveling on the medium duty concrete in addition to large forklifts carrying the 40 ton steel coils. The forklifts will have 190,000 pound front axle loads, with four- eight (8) foot diameter and three (3) feet wide wheels on the front axle, making 15 passes a day on the concrete over 365 days a year. No information regarding the tire pressure of the front tires or the distance between the dual wheels was provided. Therefore, for the purpose of preparing this preliminary report, we assumed a tire pressure of 120 psi and a tire spacing of 30 inches. Prior to finalization of this report, we should be provided with the actual tire pressure and spacing.

HEAVY DUTY AREAS RIGID PAVEMENT MINIMUM THICKNESS (INCHES)	
Pavement Materials	
Portland Cement Concrete	14
In-Place Cement Stabilized Granular Structural Fill	12

After the soils have been prepared (i.e. topsoil removed, subgrade proofrolled, etc.) as outlined in the *Site Preparation* section of this report, it is recommended that at least 12 inches of granular structural fill material be placed and cement stabilized and compacted as outlined in Section 302 of the *Louisiana Standard Specifications for Roads and Bridges*, latest edition. The concrete should meet the requirements and be placed as recommended above in the *Medium Duty Concrete* section.

Light Duty Asphalt

A light duty asphalt parking lot will be constructed to the east of the Manufacturing Facility. Assuming that the roadway will be subjected to 50,000 ESALs and considering the above design inputs, we preliminarily recommend the following section:

LIGHT DUTY FLEXIBLE PAVEMENT MINIMUM THICKNESS (INCHES)	
Pavement Materials	
Asphaltic Concrete Wearing Course	3
Base Course (Crushed Limestone)	8
Lime Stabilized Soils	12

Asphaltic concrete should meet the requirements of the latest edition of the Louisiana Standard Specification for Roads and Bridges (LSSRB), and should be compacted to a minimum of 95 percent of the density of the laboratory molded specimen.

The crushed limestone base should conform to the Louisiana Standard Specification for Roads and Bridges (LSSRB) Section 1003.03, and be compacted to at least 95 percent of the maximum dry density determined by ASTM D 698 (Standard Proctor) at -1 to +3 percent of optimum moisture content. The subgrade soils should be lime stabilized as directed in the *Medium Duty Concrete* recommendations above.

Heavy Duty Asphalt

A heavy-duty asphalt drive will be constructed to connect a planned Port Connector Road to the pipe storage area. Based on 40 passes per day by 18-wheeler trucks, it is estimated that the roadway should be designed for 700,000 ESALS. Considering the design ESALs and the design inputs, we preliminarily recommend the following pavement section:

HEAVY DUTY FLEXIBLE PAVEMENT MINIMUM THICKNESS (INCHES)	
Pavement Materials	
Asphaltic Concrete Wearing Course	4.5
Base Course (Crushed Limestone)	12
Lime Stabilized Soils	12

The soils should be stabilized as outlined above in the *Medium Duty Concrete* section, and the asphalt and base should meet the material requirements and compactions outlined above in the *Light Duty Asphalt* section.

Heavy Duty Gravel

An area of heavy-duty gravel will be constructed to the northwest of the building. It is understood that the gravel lot will be subjected to the same 18-wheeler and front-end loader truck traffic outlined above in the *Heavy-Duty Concrete* section. No information regarding the tire pressure (psi) exerted on the ground was available. Therefore, to prepare this preliminary report, we assumed a tire pressure of 120 psi with a rut depth of 1.5 inches. Since the tire pressure influences the gravel lot design, we should be provided with actual tire pressure value prior to preparation of our final geotechnical report. Based upon the provided information, we preliminarily recommend the following heavy-duty gravel section:

HEAVY DUTY GRAVEL LOT MINIMUM THICKNESS (INCHES)	
Pavement Materials	
Base Course (Crushed Limestone)	24
BX 1200 Geogrid or Equivalent	Yes
Lime Stabilized Subgrade Soils	12

The subgrade soils should be lime stabilized as outlined in the *Medium Duty Concrete* recommendations provided above. Following lime stabilization, select fill material should be placed and compacted as necessary to bring the area to grade. After any necessary fill material has been placed and compacted, it is recommended that BX 1200 geogrid or equivalent be installed upon the subgrade or fill (as necessary depending on grades) and overlapped as recommended by the manufacturer. The crushed limestone base should conform to the Louisiana Standard Specification for Roads and Bridges (LSSRB) Section 1003.03, and be compacted in maximum eight (8) inch loose lifts to at least 95 percent of the maximum dry density determined by ASTM D 698 (Standard Proctor) within 3 percent of optimum moisture content.

The geogrid should meet or exceed the BX 1200 geogrid requirements, which are outlined below:

BX 1200 GEOGRID			
	Units	**MD Values**	**XMD Values**
Aperture Dimensions	in	1	1.3
Minimum Rib Thickness	in	0.05	0.05
True Initial Modulus in Use	lb/ft	27,420	44,550
True Tensile Strength @2% Strain	lb/ft	410	590
True Tensile Strength @ 5% Strain	lb/ft	810	1,340
Junction Efficiency	%	93	
Flexural Stiffness	mg-cm	750,000	
Aperture Stability	kg-cm/deg	6.5	
Resistance to Installation Damage	%SC/%SW/% GP	91/91/85	
Resistance to Long Term Degradation	%	100	

Medium Duty Gravel

An area of medium-duty gravel will be constructed to the southwest of the building. It is understood that the medium-duty gravel lot will be traversed by front-end loaders carrying pipe with 70,000 pound front axle loads 100 times per day, 365 days per year. The front axle has two eight (8) foot diameter, three (3) foot wide tires. No information regarding the tire pressure (psi) exerted on the ground was available. Therefore, to prepare this preliminary report, we assumed a tire pressure of 120 psi with a rut depth of 1.5 inches. Since the tire pressure greatly influences the gravel lot design, we should be provided with the actual tire pressure prior to preparation of our final geotechnical report. Based upon the provided information, we preliminarily recommend the following medium-duty gravel section:

MEDIUM DUTY GRAVEL LOT MINIMUM THICKNESS (INCHES)	
Pavement Materials	
Base Course (Crushed Limestone)	16
BX 1200 Geogrid or Equivalent	Yes
Lime Stabilized Subgrade Soils	12

Refer to the *Heavy Duty Gravel* recommendations above for information regarding the lime stabilization, grid, and gravel recommendations.

Light Duty Gravel

It is understood that a light duty gravel lot will be constructed where the pipes will be stored. This area will be subjected to 33 passes per day of the pipe loaders over 365 days. The front-end loaders carrying the pipe will have a front axle load of 70,000 pounds on two (2) eight (8) foot diameter and three (3) foot wide tires. No information regarding the tire pressure (psi) exerted on the ground was available. Therefore, we assumed a tire pressure of 120 psi, with a rut depth of 1.5 inches Since the tire pressure greatly influences the gravel lot design, we should be provided with the actual tire pressure prior to preparation of our final geotechnical recommendations. Based upon the provided information, we preliminarily recommend the following light-duty gravel section:

LIGHT DUTY GRAVEL LOT MINIMUM THICKNESS (INCHES)	
Pavement Materials	
Base Course (Crushed Limestone)	15
BX 1200 Geogrid or Equivalent	Yes
Lime Stabilized Subgrade Soils	12

Refer to the *Heavy Duty Gravel* recommendations above for information regarding the lime stabilization, grid, and gravel recommendations.

CONSTRUCTION CONSIDERATIONS

Observation and Testing

After the additional soil borings have been drilled and the geotechnical recommendations finalized, we recommend that PSI be retained to provide observation and testing of construction activities involved in the foundations and pavements, earthwork, and related activities of this project. PSI cannot accept any responsibility for any conditions which deviated from those described in this preliminary report or the final geotechnical report yet to be written, nor for the performance of the foundations and pavements if not engaged to also provide construction observation and testing for this project.

During site work, inspection of all stripping, proofrolling, and compaction of fill or subgrade soils in the building and pavement areas is recommended. Density tests should be performed to verify the compaction and moisture content of fill, subgrade soils, and base material. Each lift of fill or base material should be tested and approved by the soils engineer prior to the placement of subsequent lifts. As a guideline, it is recommended that field density tests be performed at a frequency of not less than one test per 5,000 square feet of surface area per lift in the pavement areas. Density testing may be waived in the pile supported areas.

It is also recommended that inspections be performed prior to and during concrete placement procedures. Foundation excavations should be observed by the Geotechnical Engineer or his representative to verify that the exposed materials are suitable for support of the foundations

Moisture Sensitive Soils/Weather Related Concerns

The upper soils encountered at this site are very sensitive to changes in moisture content and may significantly lose strength and support capability if allowed to become wet. In addition, soils that become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. Depending on weather conditions, immediately before and during construction, the upper soils encountered at this site may require stabilization with cement prior to placing fill or pavement, particularly in low areas. It will, therefore, 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 cement treatment. A representative of the soils engineer should be present during site work activities to evaluate the condition of the soil and verify the material is adequate to support the pavement.

Drainage and Groundwater Concerns

Groundwater was encountered at eight (8) feet below existing site grades at two (2) borings. Depending on site grading, groundwater infiltration into trench excavations could be possible. It is anticipated that groundwater infiltration could be effectively controlled with normal sump pumping. It is recommended that all excavations be backfilled as soon as possible in order to reduce the period in which the groundwater is lowered, which could result in area settlement. The methods, means and sequence of dewatering should be the responsibility of the general contractor, who should be experienced in this type of construction.

Water should not be allowed to collect in the foundation excavations, floor slab areas, or on prepared subgrades of the construction area either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater, or surface runoff. Positive site surface drainage should be provided to reduce infiltration of surface water around the perimeter of the building and beneath the floor slabs. The grades should be sloped away from the building and surface drainage should be collected and discharged such that water is not permitted to infiltrate the backfill and floor slab areas of the building. Any water accumulation should be removed from excavations by pumping Should excessive and uncontrolled amounts of seepage occur, the geotechnical engineer should be consulted

Excavations

In Federal Register, Volume 54, No 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better insure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavation or footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

We are providing this information solely as a service to our client. PSI does not assume responsibility for construction site safety or the contractor's or other parties compliance with local, state, and federal safety or other regulations.

PRELIMINARY REPORT LIMITATIONS

The preliminary recommendations submitted in this report are based on the available subsurface information obtained by PSI and design details furnished by Mr. Brad Anderson of H+M. Additional soil borings are required prior to finalizing our geotechnical recommendations for this site.

The geotechnical engineer warrants that the preliminary findings, preliminary 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 access to the entire site has been gained, we should be asked to drill the additional soil borings and finalize our geotechnical recommendations. Soil conditions could vary beyond the borings drilled for this preliminary report, and therefore, the final geotechnical recommendations may differ from the preliminary recommendations contained herein. This document is not intended for design purposes since only a limited number of soil borings was performed at the site for this preliminary document. This preliminary report has been prepared for the exclusive use of H+M for the specific application to the proposed Manufacturing Facility to be constructed on West 10th Street in Reserve, Louisiana.

APPENDIX

EUSTIS ENGINEERING COMPANY, INC.

LOG OF BORING AND TEST RESULTS

(SHEET 2 OF 2)

Ground Elev.: Datum: Gr. Water Depth: See Text Job No.: 13492 Date Drilled: 5/19/95 Boring: 1 Refer To "Legends & Notes"

Scale in Feet	PP	SPT	Symbol	Visual Classification	USC	Sample Number	Depth in Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Ø	C	Atterberg Limits LL	PL	PI	Other Tests
				Stiff gray & tan clay	CH												
55	2.10			Very stiff greenish-gray & tan clay w/clayey silt lenses	CH	14	53-54										
60				Compact tan sandy silt w/clay lenses & layers	ML	15	58-59	27	96	121	CB	---	1945				
						16	61.5-62										
65		11		Medium dense reddish-brown silty sand	SM	17	63-64										
		15				18	65-67										
70		12		Stiff gray & tan clay	CH	19	69-70										
75	0.40			Medium stiff gray clay w/sand pockets & shell fragments	CH	20	73-74	48	74	109	UC	---	840				
80	0.40					21	78-79	82	91	120	UC	---	655				
85																	
90																	
95																	

EUSTIS ENGINEERING COMPANY, INC.

LOGS OF BORING AND TEST RESULTS

(SHEET 1 OF 2)

Ground Elev.: Datum: Gr. Water Depth: See Text Job No.: 13492 Date Drilled: 6/19/85 Boring: 1 Refer To "Legends & Notes"

Scale In Feet	PP	SPT	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Ø	C	Atterberg Limits LL	PL	PI	Other Tests
	0.80			Medium stiff gray & tan silty clay w/roots, brick fragments & glass	CL	1	0–0.5										
	0.25			Soft tan & gray silty clay w/clayey silt layers & roots	CL	2	2–3	31	85	111	UC	—	330				
5	0.25			Soft gray & brown silty clay w/clayey silt lenses	CL	3	5–6	38	81	112	UC	—	405				
						4	8–9	35	85	115	OB	—	310				
10	0.25			Very soft gray silty clay	CL	5	11–12	45	75	109	UC	—	290				
15				Very loose gray clayey silt	ML	6	14–15	33									
20	0.20			Soft gray clay w/few clayey silt lenses	CH	7	18–19	36	83	114	UC	—	495	72	23	49	
25	0.50			Medium stiff gray & tan clay w/clayey silt pockets & trace of organic matter	CH	8	23–24	32	87	115	UC	—	455				
30	0.50			Soft gray clay	CH	9	28–29	53	68	103	UC	—	330				
35	0.20			Soft dark gray clay w/fine sand lenses & shell fragments	CH	10	33–34	48	75	107	UC	—	435				
40	0.30			Medium stiff gray clay w/clayey silt lenses & pockets	CH	11	38–39	35						47	20	27	
45	0.40					12	43–44	39	81	113	UC	—	510				
	1.25			Stiff gray & tan clay	CH	13	48–49	23	101	125	UC	—	1295				

Industrial Two (I-2)

Sec. 113-383. - Purpose and intent.

The Industrial District Two (I2) is intended to provide for the location and grouping of uses of a medium industrial nature while at the same time reducing the impact to those districts and uses to adjacent nonindustrial uses.

(Code 1988, § 33:72A)

Sec. 113-384. - Permitted uses.

The following are permitted uses in the Industrial District Two (I2).

(1)

Manufacturing assembly, etc., of the following and similar uses:

a.

Assembly plants;

b.

Book binderies;

c.

Cellophane products manufacturing;

d.

Ceramic products;

e.

Confectionery manufacturing;

f.

Dairy products manufacturing;

g.

Electrical parts assembly and manufacturing electronics;

h.

Fiber products and manufacturing;

i.

Food products, manufacturing, except fish and meat products, sauerkraut, vinegar, yeast and rendering or refining of fats and oils;

j.

Fruit or vegetable canneries;

k.

Furniture manufacturing;

l.

Garment manufacturing;

m.

Glass products manufacturing;

n.

Pharmaceutical manufacturing;

o.

Tire retreading, recapping, or rebuilding;

p.

Tool manufacturing; and

q.

Toy manufacturing.

(2)

Miscellaneous uses, of the following and similar uses:

a.

Cleaning and dyeing works.

b.

Cold storage or refrigerating plants;

c.

Foundry casting lightweight nonferrous metal;

d.

Ironworks, ornamental;

e.

Millwork;

f.

Paint mixing and treatment;

g.

Sheet metal products;

h.

Ship building and repair; and

i.

Open storage of building material, lumber, coal, machinery and pipe

(3)

Wholesale business.

(4)

Well drilling service; and

(5)

Uses allowed in Industrial District One (I1).

(Code 1988, § 33:72A.1)

Sec. 113-385. - Accessory uses.

The following are accessory uses in the Industrial District Two (I2):

(1)

Uses, including retail sales, and structures that are customarily accessory and clearly incidental and subordinate to principal uses and structures.

(2)

No residential facilities shall be permitted in this district except for watchmen or caretakers whose work required residence on the premises.

(3)

Storage of petroleum products and gases that are clearly incidental and secondary to the principal use of the property, provided that all aboveground tanks contain a maximum of 000 gallons or less and are located no closer than 300 feet from all property lines. All storage tanks below ground shall contain a maximum of 12,000 gallons or less and shall locate no closer to any property line than the greatest dimension (diameter, length, height) of the buried tanks.

(Code 1988, § 33:72A.2)

Sec. 113-386. - Prohibited uses.

The following are prohibited uses in the Industrial District Two (I2):

(1)

Commercial uses not incidental to the principle industrial use;

(2)

Schools, churches, or public or private institutions;

(3)

No other residential uses except as provided for in section 113-385;

(4)

Land uses for the disposal of solid wastes, hazardous and/or toxic substances;

(5)

(5) Explosive manufacturing and storage;

(6) Petroleum refining;

(7) Paper or pulp manufacturing;

(8) Cement or lime manufacturing;

(9) Chlorine manufacturing;

(10) Creosote manufacturing;

(11) Glue or gelatin manufacturing;

(12) Rolling or blooming mills;

(13) Acid manufacturing;

(14) Melting of ore;

(15) Asphalt batch plants;

(16) All other uses not permitted herein;

(17) Electric generating plants and facilities; and

(18) Medical waste storage, treatment, or disposal facilities. Except that this provision shall not apply to any person that has obtained a certificate of zoning compliance from the parish, and has applied for any necessary permit from the state department of environmental quality prior to August 9, 1990.

(Code 1988, § 33:72A.3; Ord. No. 90-69, 8-9-1990; Ord. No. 91-80, 10-10-1991)

Sec. 113-387. - Area requirements.

(a) *Lot area.* The minimum lot area shall be 10,000 square feet.

(b) *Lot width.* There shall be a minimum lot width of 50 feet.

(c) *Front yard.* There shall be a minimum front yard of 25 feet. On corner and through lots, the required front yard requirements will be provided on both streets.

(d) *Side and rear yard.* No side and rear yard is required where an industrial district two use abuts an approved adjoining industrial use or district. Where an industrial district two use or district abuts a rural or residential or commercial district or use, side and rear yard are to be provided as follows:

(1) Fifteen feet for the first 100 feet of lot depth or width; and

(2) An additional ten feet for each additional 100 feet of depth or width.

(Code 1988, § 33:72A.4)

Sec. 113-388. - Buffer requirements.

Where an Industrial District Two (I2) or use abuts an existing residential, commercial, rural use or district, buffer zones shall be provided in the applicable abutting side or rear yard as follows:

(1)

A 100 percent sight-obscuring fence, a minimum of eight feet in height.

(2)

One large tree for each 15 feet of lot depth or width to be put in place in the side and rear yards for the purpose of screening.

(Code 1988, § 33:72A.5)

Sec. 113-389. - Locational criteria; performance standards.

In reaching recommendations and decisions as to rezoning land to an Industrial District Two (I2) or issuance of a use permit within a rural district, the planning commission and parish council shall apply the following locational criteria and performance standards.

(1)

Locational criteria.

a.

Relation to major transportation facilities. An industrial district two (I2) use area shall be so located with respect to major parish roadways, state or federal highways and other transportation facilities such as rail lines and river access as to provide direct access to such I2 district or use area without creating or generating traffic along a minor street or residential collector roadway in areas outside of the Industrial District Two (I2) or use area. An Industrial District Two (I2) or use area shall be so located a minimum of 1,000 feet away from a concentration of one dwelling unit per acre (gross) of gross land area.

b.

Relation to utilities, public facilities and services. The Industrial District Two (I2) or use shall not adversely impact sanitary sewers, water lines, structural surface drainage systems, and other utility systems. Any extension or enlargement of such systems shall be at the expense of the user, or where applicable, the user shall provide adequate utility systems on site.

(2)

Performance standards. An Industrial District Two (I2) or use area is provided to ensure protection of the environment and surrounding use areas by regulating air and water resources and the regulation of pollution thereof, radiation hazards, noise pollution and fire and explosive hazards.

a.

Exhaust emission. No industry in an Industrial District Two (I2) shall emit from any exhaust pipe, fire, chimney, or whatever, an emission that shall be deemed harmful by the state office of environmental affairs.

b.

Odor. The emission of obnoxious odors of any kind beyond the property boundaries shall not be permitted; and, particular industries may be required to present comprehensive statements of measures to be taken for the elimination of obnoxious odors, for planning commission and parish council approval, before the required building permits are granted. Odorous matter released from any operation or activity in an Industrial District Two (I2) shall not exceed the odor threshold concentration established by applicable state agencies beyond lot lines, measured at ground level or habitable level.

c.

Water quality. No industry shall emit harmful substances into a waterway or water disposal system in compliance with the Federal Water Pollution Control Act and the state water control law.

d.

Noise. No industry shall emit a noise level above 70 decibels (dBA) at the lot boundary line measured at ground level or habitable elevation. Applicable measurement standards shall be taken by an independent lab institute at the expense of the applicant or legal property owner. The parish council shall be the discretionary governing body to determine the frequency of decibel measurements taken annually.

e.

Radiation. No operation involving radiation hazards shall be conducted in an industrial district two (I2) that violates the standards of the Nuclear Energy and Radiation Control Law regulated by the state office of environmental affairs.

f.

Fire and explosive hazards. All uses in an Industrial District Two (I2) shall comply with applicable standards set forth in the rules and regulations of the state fire marshal.

g.

Administration and enforcement. As required by state law, the department of natural resources will administer, monitor and enforce the requirements of this subsection (2) exclusive of subsections (2)c, d and b of this section.

h.

If additional buffers required. Prior to issuance of a building permit by the parish council, additional buffer requirements may be necessary if noise, sight, sound and public safety factors relating to the proposed use warrant greater buffer requirements than is normally necessary and section 113-388. The secretary shall notify the applicant in writing if the proposed use may possibly warrant additional buffer requirements.

1.

The secretary shall arrange for a public hearing before the planning commission on the possible need for additional buffer. The planning commission may request additional information on the proposed use of the property. Necessary studies by an independent consultant or institute at the expense of the applicant or legal property owner may be requested by the planning commission.

2.

At the public hearing, the planning commission must decide if additional buffer requirements are necessary for the proposed use. The parish council shall consider the recommendations of the planning commission and make a final recommendation as to additional buffer requirements. Recommendations of the planning commission must be affirmed or denied in the same manner as any planning recommendation is denied or affirmed by the parish council. Additional buffer requirements, if any, shall become a part of the public record and the conditions under which the permit is issued; they must be indicated on the plans submitted as part of the permit application records. The permit may be issued only after a final decision on the requirement for an additional buffer is made by the parish council.

(Code 1988, § 33:72A.6)

Sec. 113-390. - Building permit acquisition.

Prior to issuance of a building permit, it is the responsibility of the applicant or owner of the property to provide written approval for the construction or written verification that no such approval is required from each of the following agencies:

(1)

Office of coastal zone management;

(2)

Department of environmental quality;

(3)

U.S. Army Corps of Engineers;

(4)

State wildlife and fisheries; and

(5)

State fire marshal.

(Code 1988, § 33:72A.7)

Sec. 113-391. - Parking/loading requirements.

The parking requirements are as provided for in article V, division 2 of this chapter.

(Code 1988, § 33:72A.8)

Sec. 113-392. - Height requirements.

There is no height regulation in the district except when a structure or building exceeds 45 feet in height, in which case there shall be an additional one-foot setback for every one foot of height over 45 feet from the nearest property line.

(Code 1988, § 33:72A.9)

Sec. 113-393. - Fire marshal approval.

A certificate attesting to the state fire marshal's approval of plans for all construction and improvements pursuant to the state fire code must be provided prior to the issuance of a building permit.

(Code 1988, § 33:72A.10)

Sec. 113-394. - Special permit uses; temporary residential housing.

Temporary residential housing may be permitted as a special permit use with approval of the planning commission and a supporting resolution by the parish council. An application for a temporary residential housing shall follow the special permit process. The application shall be subject to the following requirements:

(1)

Required application submissions. The applicant for a temporary residential housing development shall submit the following documents:

a.

Completed application executed by the applicant and also by the current property owner.

b.

When the applicant is a corporation, a resolution authorizing a person to act on behalf of the corporation shall accompany the application.

c.

Copy of the recorded deed or act of sale for the property.

d.

Names and addresses of adjoining property owners as listed in assessor's records.

e.

Site plan. Five copies of the site plan, stamped by an architect, signed and dated by the applicant, and drawn to scale to meet requirements listed in subsection (2) of this section.

f.

Driveway permit from the department of planning and zoning of the LA DOTD, where applicable.

g.

Permit or letter of no objection from the state department of health and hospitals for sanitary issues.

h.

Permit or letter of no objection from the state fire marshal, where applicable.

i.

A security contract to satisfy the requirements of subsection (3)b of this section.

j.

A solid waste contract to satisfy the requirements of subsection (3)c of this section.

k.

Security bond/irrevocable letter of credit. The developer shall provide for a surety bond, letter of credit, or other parish-approved security instrument executed in favor of the parish department of finance. The total amount of the bond, letter of credit, or other parish-approved security instrument shall be based on the cost of maintaining the required contracts for services required by the developer for a 36-month period. An additional percentage, to be determined at the time of application, may be included to cover administrative and legal expenses that may be incurred in having the units removed by court action. If all units are not removed within 90 days after the permit expires, the parish will collect the total amount of the bond money, letter of credit or whatever parish-approved security instrument is accepted to help assist in paying expenses involved in having the remaining units removed as well as to pay for any additional parish expenses incurred because of the nonremoval of the units. The parish may immediately redeem the bond, letter of credit or other parish-approved security instrument if the permit is revoked due to the developer's failure to maintain required contracts or to meet other obligations required by the planning commission and/or the parish council as stipulated during the approval process. The security instrument shall be submitted and approved by the parish legal services department before occupation of the development is permitted.

l.

A special permit application fee in the amount established in section 14-113(1)f and all applicable building code fees will apply.

(2)

Zoning/site, restrictions/density and spatial requirements. The developer shall submit a site plan, drawn to scale, that meets the following restrictions:

a.

Proposed site shall be a minimum of five acres.

b.

No unit shall be placed in required front, side, or rear yards of its respective zoning district.

c.

A minimum of 25 feet of open space shall be maintained between each unit in all direction and delineated explicitly on the site plan.

d.

Each unit site shall have an address assigned by 911 and shall be a minimum 35 feet wide, shall indicate a parking area for at least one vehicle, and shall abut an access drive. Sites may provide a pad improved with a porous, aggregate-type material; however, pads are not required.

e.

Owners are responsible for maintaining streets.

f.

Each unit shall be no further than 500 feet from a fire hydrant.

g.

Access roads shall be a minimum of 24 feet in width and shall be constructed with a porous, aggregate-type material.

h.

Location of streetlights.

i.

The location of all service, maintenance, utility and security structures shall be clearly indicated.

j.

In no case shall a site exceed 200 units.

k.

Where a permanent sewer system is not available a private sewer and disposal system shall be provided.

(3)

Parish review process; fee assessment. The department of planning and zoning shall submit site plans to the following departments/agencies for review, request for revisions, and/or calculation of fees:

a. Department of public works for drainage review and sewer development calculations.

b. Department of waterworks for water availability and fees.

c. Department of recreation.

d. Local fire district.

e. The parish sheriff's office.

f. 911 emergency services.

(4) *Operational requirements.*

a. *Fees.* All fees assessed under subsection (1) of this section shall be submitted to the department of planning and zoning before the site is permitted to operate.

b. *24-hour security.* 24-hour security shall be provided by the developer. The developer must contract with the parish sheriff's office or a licensed security service to provide service approved by the sheriff's office. A letter from the sheriff's office will suffice as proof that this obligation has been addressed. Occupancy of the site will not be allowed until the security obligation has commenced. Termination of the security contract prior to expiration of the permit shall result in the permit being revoked.

c. *Solid waste removal.* Dumpsters and disposal service shall be provided by the developer. The parish may request a review of the agreement. Occupancy of the site will not be allowed until the garbage/trash contract has commenced and the required dumpsters are located on site. Termination of the garbage service prior to expiration of the permit shall result in the permit being revoked.

d. *Time limit.* A special permit use for temporary housing development shall be issued for an initial period of up to 36 months. The department of planning and zoning shall send notices by certified mail to the applicant 60 days prior to the expiration date.

e. *Exception to the three-year limit.* This can be done by the planning commission's approval and a supporting resolution by the parish council. All extensions shall be for a six-month or less period. The planning commission and the parish council will determine the number of extensions allowed. All required contracts for security and garbage must be maintained and the surety bond/letter of credit must be maintained during subsequent disaster extensions.

(Code 1988, § 33:72A.11; Ord. No. 08-34, 6-24-2008)