



ECS Southeast, LLC

Geotechnical Engineering Report

Express Oil – Ocean Springs, MS

Bienville Blvd.

Ocean Springs, Jackson County, Mississippi

ECS Project No. 65:1978

January 23, 2026





ECS SOUTHEAST, LLC

Geotechnical • Construction Materials • Environmental • Facilities

January 23, 2026

Mr. Justin Duck
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1880 Southpark Drive
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ECS Project No. 65:1978

Reference: Geotechnical Engineering Report
Express Oil – Ocean Springs, MS
Bienville Blvd.
Ocean Springs, Jackson County, Mississippi

Mr. Duck:

ECS Southeast, LLC (ECS) has completed the subsurface exploration, laboratory testing, and geotechnical engineering analyses for the above-mentioned project. Our services were performed in accordance with our agreed to scope of work. This report presents our geotechnical analysis of the project along with the results of the field exploration and laboratory testing conducted, and our design and construction recommendations.

It has been our pleasure to be of service to Express Oil Change during the design phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase, and we would like to provide our services during construction phase operations as well to evaluate subsurface conditions assumed for this report. Should you have any questions concerning the information contained in this report, or if we can be of further assistance to you, please feel free to contact us.

Respectfully submitted,

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- Site Location Diagram
- Boring Location Diagram

Appendix B – Field Operations

- Reference Notes for Boring Logs
- Boring Logs B-01 to B-02, P-01 to P-06

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EXECUTIVE SUMMARY

The following summarizes the main findings of the exploration, particularly those that may have a cost impact on the planned development. Further, our principal foundation recommendations are summarized. Information gleaned from the Executive Summary should not be utilized in lieu of reading the entire geotechnical report.

PROJECT UNDERSTANDING:

- Structure Information: Approx. 5,600 sq-ft steel framed building with maintenance pit.
- Assumed Loading: Max. 25-kip column load and 2.5-kips per linear foot wall load.
- Considerations: Existing development. Removal of the existing pavement section.

SUBSURFACE CONDITIONS:

- Surface Material: Silty Sand (SM)
- Probable Fill: Not encountered
- Expected Undercut: No topsoil encountered. No undercut expected.
- Natural Material: Silty Sand (SM) and Poorly Graded Sand with Silt (SP-SM)
- Swell Potential (PVR): Low, less than 1-inch
- Groundwater: Approximately 17-ft below ground surface (bgs) at B-01.

DESIGN & CONSTRUCTION RECOMMENDATIONS:

- Shallow Foundations: Max. Net Allowable Bearing Capacity of 2,000 psf for spread footings
- Slab-on-Grade: Modulus of Subgrade Reaction of 115 pci
- Seismic Site Class: IBC Site Class "D"

ECS should be retained to review all project documents to confirm conformance with our recommendations, and to perform CMT testing for earthwork and foundation construction activities to document that our recommendations are strictly followed. This also allows us to quickly provide recommendations for remedial activities, where necessary.

1.0 INTRODUCTION

The purpose of this study was to provide geotechnical information for the design of a new Express Oil location in Ocean Springs, MS. The project will include a one-story building with associated maintenance pit area. We anticipate the plan area of the building to encompass approximately 5,600 square feet. The recommendations developed for this report are based on project information supplied by Express Oil Engineers via email, or estimations made by ECS.

Our services were provided in accordance with our Proposal No. 65-3425-GP, dated November 17, 2025, as authorized by Mr. Justin Duck with Express Oil Change, LLC on November 17, 2025, which includes our Terms and Conditions of Service.

This report contains the procedures and results of our subsurface exploration and laboratory testing programs, review of existing site conditions, engineering analyses, and recommendations for the design and construction of the project.

2.0 PROJECT INFORMATION

2.1 PROJECT LOCATION/CURRENT SITE USE/PAST SITE USE

The project is located off Bienville Blvd. in Ocean Springs, MS. Based on the most recently available aerial imagery, the site appeared to be cleared and graded prior to our investigation. The topography of the site is relatively flat with surface at about +22 feet MSL. The elevations and topographic variations were estimated from Google Earth, Figure 2.1.1.



FIGURE 2.1.1: General Site Location Outlined in Red

2.2 PROPOSED CONSTRUCTION

The following table explains our understanding of the planned development including proposed buildings and related infrastructure. If ECS's understanding of the project is not correct, especially if the structural loads or elevations are different, please contact ECS so that we may review these changes and revise our recommendations, as appropriate.

Subject	Design Information/Understandings
Building Footprint	Approximately 5,600 Square Feet
Number of Stories	One with maintenance pit
Usage	Automotive maintenance
Framing	Steel
Provided Column Loads	25 kips Maximum
Provided Wall Loads	2.5 Kips Per Linear Foot (klf) Maximum
Lowest Finish Floor Elevation	±2 feet from existing site grades

3.0 FIELD EXPLORATION AND LABORATORY TESTING

3.1 FIELD EXPLORATION PROGRAM

The field exploration scope was to characterize the project site in general geotechnical and geological terms and to evaluate subsequent field and laboratory data to assist in the determination of geotechnical recommendations.

3.1.1 Soil Borings

Our scope of work included performing a total of eight (8) test locations. One (1) boring within the footprint of the proposed maintenance pit was advanced to a depth of 20 feet below existing site grades. One (1) boring was performed within the building footprint and was advanced to a depth of 15 feet below existing site grades. Six (6) pavement area borings were advanced to a depth of 10 feet below existing site grades. Our locations were located with a handheld GPS unit, and their approximate locations are shown on the Boring Location Diagram in Appendix A. The approximate ground surface elevations noted in this report were estimated from Google Earth.

Field logs of the soils encountered in the borings were maintained by the drill crew. After recovery, each geotechnical soil sample was removed for the sampler and visually classified. Representative portions of each soil sample were then wrapped in plastic and transported to our laboratory for further visual examination and laboratory testing. After completion of the drilling operations, the boreholes were backfilled with cuttings to the existing ground surface.

3.2 SUBSURFACE CHARACTERIZATION

The following text provides generalized characterizations of the soil strata encountered during our subsurface exploration. For specific subsurface information, please refer to the Boring Logs in Appendix B:

Approximate Depth (ft)	Stratum No.	Soil Description
0.0 – 4.0 ft	I	SILTY SAND (SM) , Very Loose to Loose, Brown and Gray
4.0 – 18.0 ft	II	SILTY SAND (SM) or POORLY GRADED SAND WITH SILT (SP-SM) , Loose to Medium Dense, Brown and Gray
18.0 – 20.0 ft	III	LEAN CLAY (CL) , Medium Stiff, Gray

Notes:

- (1) Soil descriptions show generalized strata to 20'. Strata in the borings vary with depth, please see attached Boring Logs in Appendix B.

Please refer to the attached boring logs and laboratory data summary for this field exploration for a more detailed description of the subsurface conditions encountered in the borings as the stratification descriptions above are generalized for presentation purposes.

3.3 GROUNDWATER OBSERVATIONS

Groundwater levels, if observed, were made in the borings during and shortly after drilling operations. In auger drilling operations, water is not introduced into the borehole and the groundwater position can often be evaluated by observing water flowing into and out of the excavation. Furthermore, visual observation of soil samples retrieved can often be used in evaluating the groundwater conditions.

Groundwater was encountered 17 feet below existing grade at Boring B-01 at the time of drilling.

The highest groundwater observations are normally encountered in the late winter or early spring or following seasonal heavy rainfall events. Fluctuations in the location of the long-term water table may occur due to changes in precipitation, evaporation, surface water runoff and other factors not immediately apparent at the time of this exploration. Therefore, the groundwater conditions at this site are expected to be significantly influenced by surface water runoff and seasonal rainfall.

3.4 LABORATORY TESTING

The laboratory testing consisted of selected tests performed on samples obtained during our field exploration operations. Classification and index property tests were performed on representative soil samples. The soil samples were tested for Moisture Content (ASTM D2216), Atterberg Limits (ASTM D4318), and Percent Passing Standard No.

Each sample was visually classified based on texture and plasticity in accordance with ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedures) and including USCS classification symbols. After classification, the samples were grouped in the major zones noted on the boring logs in Appendix B. The group symbols for each soil type are indicated in parentheses along with the soil descriptions. The stratification lines between strata on the logs are approximate; in situ, the transitions may be gradual.

The soil samples will be retained in our laboratory for a period of 60 days, after which, they will be discarded unless other instructions are received as to their disposition.

4.0 DESIGN RECOMMENDATIONS

The following recommendations have been developed based on Sections 2 and 3. If there are any changes to the project characteristics or if different subsurface conditions are encountered during construction, ECS should be consulted so that the recommendations of this report can be reviewed. Site grading information was not provided during this report; however, we have assumed that the finished floor elevation will be less than 2 feet above existing site elevations. If the finished floor elevation deviates from this assumed site grades, the recommendations provided below should be evaluated by our office.

4.1 GEOTECHNICAL CONSIDERATIONS

Based on the subsurface conditions encountered in the borings, the anticipated loading conditions and the lowest level bearing elevation, the site appears suited for the proposed development provided the recommendations herein are strictly adhered to.

Considerations must be made for subgrade preparation following the demolition of the existing concrete pavement section covering the footprint of the proposed construction. Recommendations are provided for the maintenance pit design in Section 4.6 for Below Grade Structures.

4.1.1 Presence of Expansive Soils

Based on the laboratory test results, the subsurface soils encountered within the building pad and pavement areas generally have a low swelling potential. Soils with swelling potential located above the water table and within depths that are subject to changes in moisture are expected to experience volume change and were considered in our potential vertical rise (PVR) estimation. **The potential vertical rise (PVR) is estimated to be less than 1 inch using an applied load of 1.0 psi.**

Generally, one (1) inch of PVR is acceptable as the maximum allowable value used for design and construction. However, the structural engineer must confirm if these PVR values are within acceptable limits for the specific project. These PVR estimations assume that the soils are allowed to increase/decrease in moisture content from a relatively dry condition to a relatively wet condition over a depth of approximately 10 feet from the existing ground surface at the time of field exploration.

4.1.2 Moisture Sensitive Soils

Based on the laboratory test results, fine grained soils were disclosed directly beneath the surface layer across the site. These soils are moisture sensitive, subject to volume changes and will become inadequate when wet of their optimum moisture content as evaluated by ASTM D698 and may be prone to desiccation cracking that can cause degradation over seasonal wetting and drying periods. Effective site drainage should be implemented into the final designs, the onset of construction, and maintained throughout the construction process. Care should be taken to keep construction traffic to a minimum across the site during wet periods. Water should not be allowed to pond on construction areas (building pads or pavement subgrade) or near foundational supports.

4.1.3 Perimeter Conditions

Positive drainage away from the structure should be provided during construction and maintained throughout the life of the proposed project. Water should not be allowed to infiltrate into the excavations during construction. Foundation soils should not be allowed to become wet. Grades must be sloped to provide effective drainage away from the building during and after construction. Adjacent concrete sidewalks and pavements should be sloped to provide drainage away from the building, and joints should be sealed; close attention should be paid to those directly abutting the building.

Roof runoff and surface drainage should be collected and discharged away from the structure to prevent wetting of the foundation soils. Roof gutters should be installed and connected to downspouts and pipes directing roof runoff into stormwater collection systems or discharged onto positively sloped pavements.

4.2 SHALLOW FOUNDATIONS

For structures with maximum column loads of 25 kips or less and provided subgrades and engineered fills are prepared as recommended in this report, the proposed structure can be supported by shallow foundations. For column loads greater than 25 kips, ECS should be consulted to provide additional recommendations. We recommend that the foundation design use the following parameters:

Design Parameter	Column Footing	Wall Footing
Net Allowable Bearing Pressure ⁽¹⁾	2,000 psf	
Acceptable Bearing Soil Material	Compacted Engineered Fill or Stiff Native Soil	
Minimum Width	24 inches	18 inches
Min. Footing Embedment Depth (below slab/finished grade) ⁽²⁾	24 inches	18 inches
Estimated Total Settlement ⁽³⁾	About 1- inch	About 1- inch
Estimated Differential Settlement ⁽⁴⁾	Less than 1/2 inches between columns	Less than 1/2 inches

Notes:

- (1) Net allowable bearing pressure is the applied pressure in excess of the surrounding overburden soils above the base of the foundation.
- (2) For bearing considerations and expansive soil concerns.
- (3) The estimated total settlement is for up to a 5 ft x 5 ft square footing at a maximum imposed bearing pressure of 2,000 psf. If final column loads are greater than 25 kips, ECS must be contacted to approve foundation recommendations and update settlement calculations, if needed.
- (4) Based on maximum column/wall loads and variability in borings. Differential settlement can be re-evaluated once the foundation plans are more complete.

Potential Undercuts: Many of the soils at the foundation bearing elevation are anticipated to be adequate for support of the proposed structure without remediation. If soft or loose soils are observed during footing observations, the footings should be extended to adequate bearing soils. Undercut areas should be backfilled with compacted engineered fill or lean concrete ($f'c \geq 1,000$ psi at 28 days) to the original design bottom of footing elevation; the original footing should be constructed on top of the hardened lean concrete or engineered fill, seen in Figure 4.2.2. If engineered fill is used to backfill the undercut footing, the over-excavated footings should be widened accordingly on all sides for each one (1) foot of over excavation in Figure 4.2.2. If lean concrete is used for backfill, the over-excavation does not require widening.

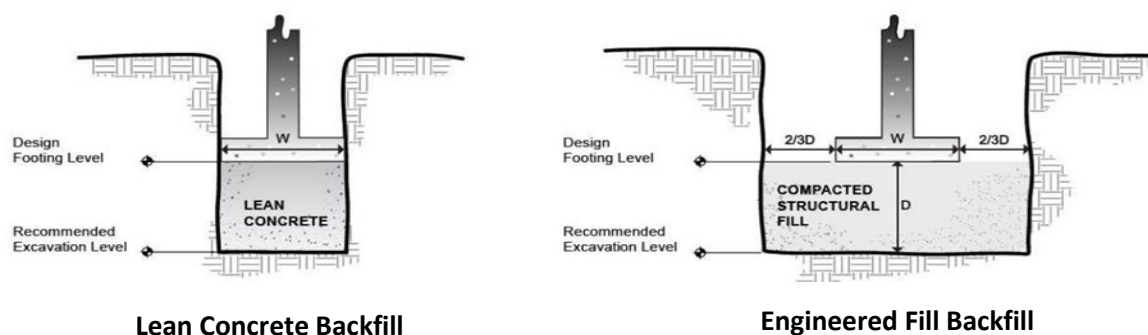


Figure 4.2.2: Undercut backfill schematic.

The net allowable soil bearing pressure refers to that pressure which may be transmitted to the foundation bearing soils in excess of the final minimum surrounding overburden pressure. The final footing elevation should be evaluated by ECS's geotechnical engineering personnel to evaluate that the bearing soils can support the recommended net allowable bearing pressure and adequate for foundation construction. These evaluations should include visual observations using a T-probe or static cone penetrometer, or with the use of a Dynamic Cone Penetrometer (DCP), if necessary. Evaluations should be performed within each column footing excavation (minimum of 2 tests per column footing) and at intervals not greater than 25 feet in continuous footings. The DCP testing should extend at least 2 feet below the final foundation subgrade. A minimum DCP value of 10 blows should be used for the evaluation of the foundations.

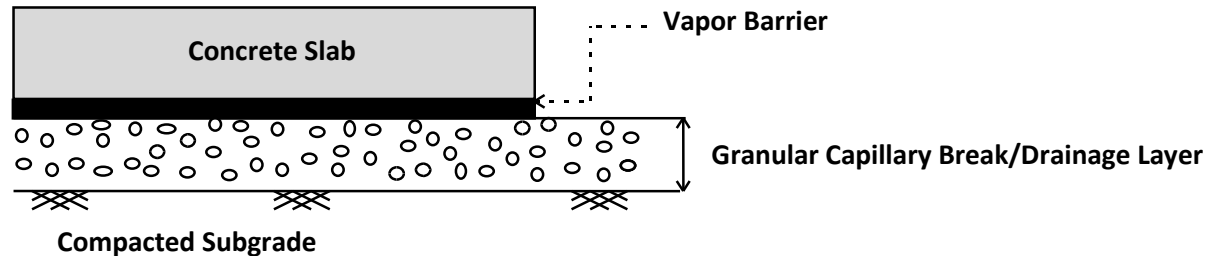
The settlement of a structure is a function of the compressibility of the bearing materials, bearing pressure, actual structural loads, fill depths, and the bearing elevation of footings with respect to the final ground surface elevation. Estimates of settlement for foundations bearing on engineered or non-engineered fills are strongly dependent on the quality of fill placed. Factors that may affect the quality of fill include loose lift thickness of the fills placed and the amount of compactive effort placed on each lift. If the recommendations outlined in this report are followed, we expect total settlements for the proposed construction to be in the range of 1 inch or less, while the differential settlement will be approximately half of the anticipated total settlement. This evaluation is based on our engineering experience and the anticipated loadings for this type of structure and is intended to aid the structural engineer with the design.

Exposure to the environment may weaken the soils at the foundation bearing level if the foundation excavations remain exposed during periods of inclement weather. Therefore, foundation concrete should be placed the same day that final excavation is achieved, and the design bearing pressure verified. If the bearing soils are softened by surface water absorption or exposure to the environment, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the foundation excavation must remain open overnight, or if rainfall is apparent while the bearing soils are exposed, we recommend that a 1 to 3-inch thick "mud mat" of "lean" concrete be placed over the exposed bearing soils before the placement of reinforcing steel.

4.3 SLABS ON GRADE

Provided subgrades and engineered fills are prepared as discussed herein, the proposed floor slabs can be constructed as Ground Supported Slabs (or Slab-On-Grade) on lean natural soils, newly placed

engineered fill, or lime treated soils. Based on the assumed finished floor elevation, it appears that the slabs will bear on native clay material or newly placed engineered fill. Figure 4.2.1 depicts our soil-supported slab recommendations with positive drainage away from the concrete slab:



1. Drainage Layer Thickness: 4 inches
2. Drainage Layer Material: GRAVEL (GP, GW), SAND (SP, SW)

FIGURE 4.2.1: Slab on Grade Detail

Soft or yielding soils may be encountered in some areas. Those soils should be removed and replaced with compacted Engineered Fill in accordance with the recommendations included in this report.

Subgrade Modulus: Provided the engineered fill and granular drainage layer are constructed in accordance with our recommendations, the slab may be designed assuming a modulus of subgrade reaction, k_1 of **90 pci (lbs./cu. inch)**. The modulus of subgrade reaction value is based on a 1 ft by 1 ft plate load test basis.

Vapor Barrier: Before the placement of concrete, a vapor barrier may be placed on top of the granular drainage layer to provide additional protection against moisture penetration through the floor slab. When a vapor barrier is used, special attention should be given to surface curing of the slab to reduce the potential for uneven drying, curling and/or cracking of the slab. Depending on proposed flooring material types, the structural engineer and/or the architect may choose to eliminate the vapor barrier.

Slab Isolation: Soil-supported slabs should be isolated from the foundations and foundation-supported elements of the structure so that differential movement between the foundations and slab will not induce excessive shear and bending stresses in the floor slab. Where the structural configuration prevents the use of a free-floating slab such as in a drop-down footing/monolithic slab configuration, the slab should be designed with adequate reinforcement and load transfer devices to reduce risk of overstressing of the slab.

4.4 SEISMIC DESIGN CONSIDERATIONS

Seismic Site Classification: The International Building Code (IBC) 2024 requires site classification for seismic design based on the upper 100 feet of a soil profile. The methods are utilized in classifying sites, namely the shear wave velocity (v_s) method; the unconfined compressive strength (s_u) method; and the Standard Penetration Resistance (N-value) method. The unconfined compressive strength (s_u) method was used in classifying this site.

Site Class	Soil Profile Name	Shear Wave Velocity, Vs, (ft./s)	Soil Undrained Shear Strength (psf)
A	Hard Rock	$V_s > 5,000$ fps	N/A
B	Rock	$2,500 < V_s \leq 5,000$ fps	N/A
C	Very dense soil and soft rock	$1,200 < V_s \leq 2,500$ fps	≥ 2000
D	Stiff Soil Profile	$600 \leq V_s \leq 1,200$ fps	$1000 \leq S_u \leq 2000$
E	Soft Soil Profile	$V_s < 600$ fps	< 1000

Based upon our interpretation of the subsurface conditions, the appropriate **Seismic Site Classification** is “**D**” as shown in the table above.

The Site Class definition should not be confused with the Seismic Design Category designation which the Structural Engineer typically assesses. If a higher site classification is beneficial to the project, we can provide additional testing methods that may yield more favorable results.

4.5 PAVEMENTS

Subgrade Characteristics: Based on the results of our borings, it appears that the pavement subgrade will consist mainly of lean clay or fat clay soils. The soils across the site are moisture sensitive and will become difficult to work with when wet. Care should be taken if construction is performed during wet weather periods.

California Bearing Ratio [CBR] testing was not performed as part of this study. Therefore, we have assumed a CBR value of the onsite subsoil to be 3 for preliminary design purposes.

We were not provided traffic loading information, so we have assumed loadings typical of this type of project. We assumed a maximum daily traffic volume of 500 automobiles and 12 buses/delivery trucks for medium duty pavement areas, and a maximum daily traffic volume of 250 automobiles, and three buses/delivery trucks for light duty pavement areas. Our pavement section recommendations for medium duty (drives) pavements should accommodate occasional heavier loadings due to trash trucks, delivery vehicles and light truck traffic and may be considered for main drives. Typical pavement sections are presented in the table below. Actual pavements sections and joint spacing, if applicable, should be designed based on specific traffic loads.

RECOMMENDED MINIMUM PAVEMENT SECTIONS (INCHES)					
MATERIAL	FLEXIBLE PAVEMENT		RIGID PAVEMENT		
	Medium Duty	Light Duty	Heavy Duty ⁴	Medium Duty	Light Duty
Portland Cement Concrete ¹	-	-	8	6	5
Asphaltic Surface and Binder Course	4	3	-		-
Graded Aggregate Base Course ^{2,3}	6	6	4	4	4
Prepared Subgrade ⁵	12	12	12	12	12

Notes:

1. 4,000 psi concrete at 28 days
2. 12-inches of lime treated fill may be used as an alternative to aggregate base course for rigid pavements. Review Section 5.2.1 for additional information.
3. Should be a No. 610 limestone or similarly graded alternative compacted to 95% of its max dry density. See Section 5.2.3 for more details.
4. We recommend that dumpster pads and entrances/exits be considered heavy-duty pavement areas.

5. Properly compacted engineered fill material, as described in Section 5.2.3.

Pavement Considerations: In regions of improper surface and/or subsurface drainage, a softening of the subgrade and other problems related to the deterioration of the pavement can be expected. Positive drainage will reduce the possibility of the subgrade materials becoming saturated during the normal service period of the pavement.

The reinforced pavement in the trash pick-up area should extend to a minimum of 5 feet past the location of the expected wheel loads. When traffic loading becomes available, ECS or the Civil Engineer can design the pavements. Appropriate jointing should also be incorporated into the design of the PCC pavement which should be specified, constructed, and tested to meet the following requirements:

1. Proper pavement joint spacing and saw-cutting will be required to prevent excessive slab curling and shrinkage cracking. Joints should be sealed to prevent entry of foreign material and dowelled where necessary for load transfer and saw cutting should be performed while the concrete is in its “green” state. The design engineer should refer to ACI330R-08 for more detailed for the design of rigid pavement.
2. Portland Cement Concrete: Minimum compressive strength of 4,000 psi at 28 days.
3. Hot Mix asphaltic concrete should conform to the 2017 MSSRB Section 400. Engineered fill should meet the criteria for material properties and compaction recommended in Section 5.1 of this report.
4. Crushed aggregate base should be compacted to maximum lift height of eight inches to a minimum of 95 percent of the Standard Proctor (ASTM D698) maximum dry density. Aggregate should conform to the latest edition of the Mississippi Standard Specifications for Roads and Bridge Construction (MSSRB) Section 703.

Representative soil samples should be collected from the upper 2 feet of the final pavement subgrade to assess the suitability of the in-situ CBR values, prior to implementation of the pavement sections provided herein. Often during construction and preparation of the roadway subgrade, the soil materials may be improved and can sometimes yield reduced pavement sections based on the actual CBR values and traffic loads.

4.6 BELOW GRADE STRUCTURES

The project requires the construction of a below grade maintenance pit. The primary geotechnical considerations affecting the design and construction of the below grade pit are excavation stability and design of reliable underdrain systems to prevent uplift conditions caused by hydrostatic pressure. The hydrostatic pressure is the governing geotechnical factor in the design rather than bearing capacity or settlement. Areas of mass excavation, trenches and pits should meet the requirements of the most current Occupational Safety and Health Administration (OSHA) 29 CFR Part 1926, “Occupational Safety and Health Standards-Excavations”. Site excavation safety should be solely the responsibility of the contractor and his subcontractors.

Typically, subsurface structures should be designed to provide a minimum factor of safety of 1.2 for uplift with groundwater considered at the top of ground, unless a dewatering system to ensure groundwater stays below the depth of the excavation is implemented. Therefore, an aggregate underdrain system should be placed below the excavation to collect any water that infiltrates into the pit area, preventing any uplift conditions caused by hydrostatic pressures. The bottom of the excavation should be sloped towards the collection point and removed by a sump pump system to the existing storm drain system. The underdrain should consist of a 12-inch cylinder of clean AASHTO No. 57 stone within a non-woven geotextile fabric.

We recommend that permanent below grade walls be designed to withstand lateral earth pressures and surcharge loads from soil, adjacent building foundations, or streets. We recommend that walls that are restrained from movement at the top be designed for a linearly increasing lateral earth pressure.

The following Figure depicts the suggested lateral earth pressure condition for an “undrained condition” with restrained wall tops:

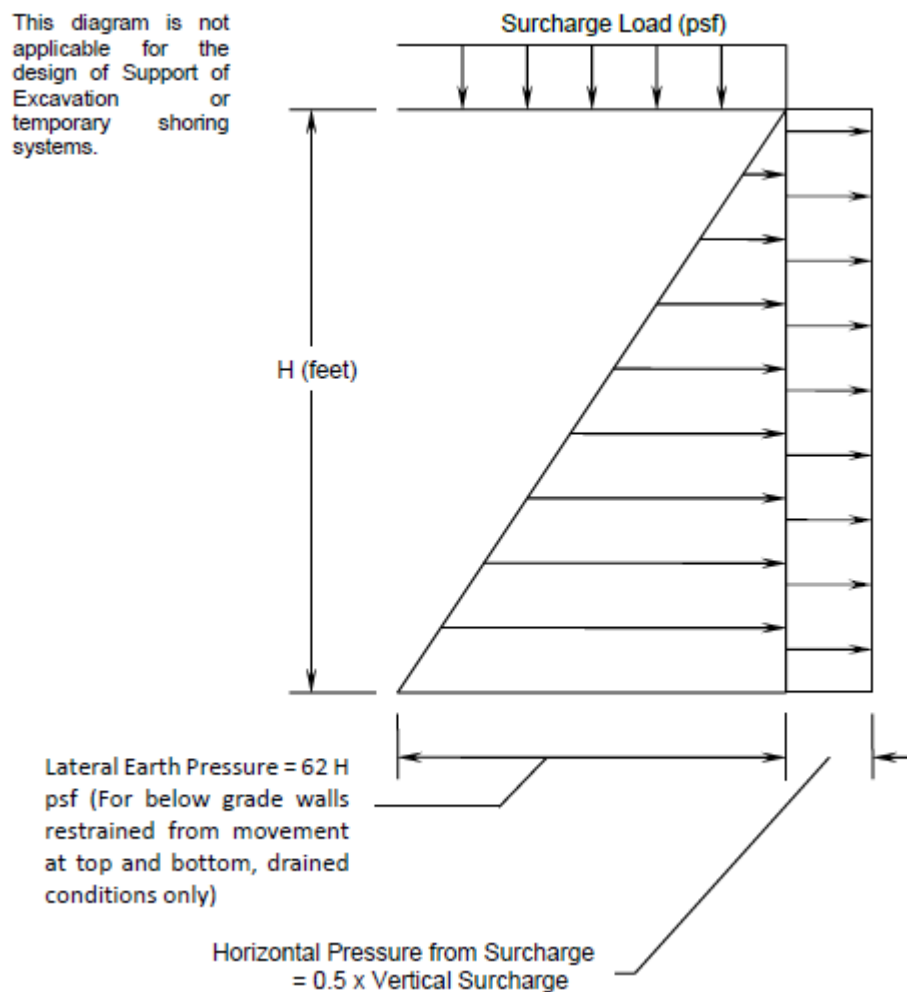


FIGURE 4.6.1: Undrained Condition Lateral Earth Pressure Diagram

Surcharge loads imposed within a 45-degree slope of the base of the wall should be considered in the below grade wall design. The influence of these surcharge loads on the below grade walls should be based on an at-rest pressure coefficient, k_0 , of 0.5 in the case of restrained walls. The figure above depicts a wall with freely draining fill material behind the wall face.

Lateral Earth Pressures: Below grade walls should be designed to withstand the lateral earth pressures exerted by the backfill. The pressure diagram is triangular. For design of below grade retaining wall structures, the following soil parameters can be utilized. These parameters assume that “drained” granular soils meeting the requirements recommended herein for retaining wall backfill will comprise the backfill in the critical zone. The critical zone is defined as the area between the back of the retaining wall structure and an imaginary line projected upward and rearward from the bottom back edge of the wall footing at a 45-degree angle.

Retaining Wall Backfill in Critical Zone		
Soil Parameter	Est. Values – Select Granular Fill	Est. Values – AASHTO No. 57 Stone
Coefficient of At Rest Earth Pressure (K_0)	0.47	0.35
Coefficient of Active Earth Pressure (K_a)	0.31	0.22
Coefficient of Passive Earth Pressure (K_p)	3.25	4.6
Retained Soil Wet Unit Weight (γ)	125 pcf	105 pcf
Cohesion (C)	-	-
Internal Friction Angle (ϕ)	32	40
Friction Coefficient (μ)	0.50	0.50
Equivalent Fluid Pressure – At Rest	62(H) psf	38(H) psf
Equivalent Fluid Pressure – Active	40(H) psf	23(H) psf
Equivalent Fluid Pressure - Passive	425(H) psf	485(H) psf

Retaining Wall Backfill: Backfill of below-grade walls may consist of well-graded granular materials (SC, SM, SW, GC, GM or GW) may be used. Select granular backfill should consist of clean sands or gravel. ECS’s geotechnical engineer should review the laboratory data for the proposed backfill material, prior to backfill placement, to determine whether the material is consistent with the recommended lateral earth pressures. The first layer of fill should be placed in a relatively uniform horizontal lift and be adequately keyed into the stripped and scarified subgrade soils. The backfill materials should be placed in 8-inch-thick loose layers and compacted to at least 95 percent of the Standard Proctor maximum dry density. We recommend that backfill directly behind the walls be compacted with hand-held compactors. Heavy compactors and grading equipment should not be allowed to operate within 5 to 10 feet of the wall during backfilling to avoid developing excessive temporary lateral soil pressures.

5.0 SITE CONSTRUCTION RECOMMENDATIONS

5.1 SUBGRADE PREPARATION

The existing soils are moisture sensitive and will become inadequate when above their optimum moisture content as evaluated by ASTM D698. Effective site drainage should be implemented at the beginning of and maintained throughout construction activities. Care should be taken to keep construction traffic to a minimum during and immediately after times of inclement weather.

ECS should be on-site full-time during earthwork and foundation construction activities to document that our recommendations are strictly followed and to provide recommendations for remedial activities, if necessary.

5.1.1 Stripping and Grubbing

The subgrade preparation should consist of stripping any soft or yielding materials from the 10-foot expanded building limits, and 5 feet beyond the toe of engineered fills.

Note: Following stripping and grubbing the entire construction area should be proofrolled as outlined in Section 5.1.2 of this report. Soils observed to rut or deflect greater than an inch in depth should be undercut and replaced or otherwise mitigated.

Deeper topsoil or organic laden soils may be present in wet, low-lying, and poorly drained areas. In wooded areas, the root balls may extend as deep as about 2 feet and will require additional localized stripping depth to completely remove the organics. ECS should be retained to evaluate that topsoil and poor surficial materials have been removed prior to the placement of Engineered Fill or construction of structures.

5.1.2 Proofrolling

Following clearing activities and prior to fill placement or other construction on subgrades, the subgrades should be evaluated by an ECS field technician. The exposed subgrade should be thoroughly proofrolled with a half loaded tandem-axle dump truck or similar construction equipment weighing a minimum of 15 tons. Proofrolling should be traversed in two perpendicular directions with overlapping passes of the vehicle under the observation of an ECS technician. This procedure is intended to assist in identifying localized yielding materials.

Where proofrolling identifies areas of yielding or “pumping” subgrade those areas should be repaired prior to the placement of subsequent engineered fill or other construction materials. Observations of yielding or “pumping” should be addressed with ECS to establish the appropriate remediation as outlined in Section 5.2.

5.2 EARTHWORK OPERATIONS

5.2.1 Subgrade Stabilization

Methods of stabilization include undercutting, moisture conditioning, or chemical stabilization. Test pits may be excavated to explore the shallow subsurface materials to help in determining the cause of the observed inadequate materials, and to assist in the evaluation of appropriate remedial actions to stabilize the subgrade. Anticipated methods of subgrade stabilization of the near surface soils are provided below:

Moisture Conditioning: If it is established that high moisture content is the cause of the inadequate subgrade, the geotechnical engineer may require the earthwork contractor process the upper 12 to 18

inches of in-situ subgrade by windrowing with a dozer or plowing with a set of heavy-duty disk harrows until soil moisture is observed to be within 2 percent of its optimum moisture content as evaluated by ASTM D698 to improve subgrade conditions before consideration other mitigation approaches. The drying effort should begin after the exposed subgrade is free of standing water and the windrowing/disking should be continuous during a period of dry weather. ECS should be onsite to periodically perform soil moisture testing. The processed areas should be sealed with compaction equipment and a flat drum roller or dozer blade at the end of the day in case of overnight rain. If weather conditions do not allow appropriate time to dry the native subgrade, the geotechnical engineer may recommend chemical treatment with lime or cement in order to provide an adequate working surface for fill placement.

Lime Stabilization: We do not anticipate lime treatment of the onsite sandy soils; however, lime stabilization may be used to modify onsite clay soils to achieve an adequate working surface and achieve PIs between 10 and 25 for reuse as engineered fill. The amount of lime necessary to achieve lime stabilization will vary depending on the clay mineral, plasticity and type of lime used for stabilization. For estimating purposes 6% percent of lime by volume should be used; however, a laboratory lime series should be performed at the time of construction to establish the optimum lime content. Surficial samples should be collected from across the site and testing should be conducted on the composite sample. Lime treatment should conform to MDOT Division 300 (Bases) – Section 200. An ECS Field Engineer or Senior Technician should be present during lime treatment activities to observe lime quantities and document that treated areas are in conformance with the project requirements. Please note that caution should be used when powdered lime is used in closely populated areas. To control dust, a lime slurry or pelletized lime may be used where dust must be controlled. In addition, pelletized lime will generally require 2 to 3 times the effort to properly pulverize and mix into the clay soils than a powder or slurry.

Cement Stabilization: When soils have PI values of 15 or below, cement stabilization should be used in lieu of lime treatment. Additionally, 12 inches of cement stabilized soil can be used as an alternative to aggregate base course for light and medium duty flexible pavement. A minimum of 10% by volume of cement is recommended to use for a cement stabilized base course. The treated soil should be compacted at least 95% of maximum dry density $\pm$ 3% the optimum moisture content. Cement treatment activities should be performed in accordance with the Mississippi Standard Specifications for Roads and Bridges (MSSRB).

Undercutting: If other means of soil stabilization are not practical, the undercutting or removal of the inadequate subsurface material may be required. The undercutting of such material will be conducted, inspected, and tested in accordance with Section 5.1.

5.2.2 Probable Fill

Based on the results of the field operation, probable fill material was not encountered. If encountered during grading or construction, ECS recommends removing the existing fill and debris in its entirety and replacing it with well compacted engineered fill meeting the parameters outlined in this report.

5.2.3 Engineered Fill

Prior to placement of engineered fill, representative bulk samples (approximately 50 pounds) of on-site and/or off-site borrow should be submitted to ECS for laboratory testing, which will typically include

Atterberg limits, natural moisture content, grain-size distribution, and moisture-density relationships (i.e., Proctors) for compaction. Import materials should be tested prior to being hauled to the site to evaluate if they meet project specifications. Alternatively, Proctor data from other accredited laboratories can be submitted if the test results are within the last 90 days.

Satisfactory Engineered Fill Materials: Materials satisfactory for use as Engineered Fill should consist of inorganic soils and conform to the criteria below.

ENGINEERED FILL INDEX PROPERTIES		
Soil Type	USCS Classification	Property
Imported Clay Fill	CL, SC	LL < 45, 10 < PI < 25
Imported Sand Fill	SP, SP-SM	Less than 10% passing #200 sieve
Aggregate Base	GP	MDOT Division 703 (Aggregates) crushed limestone or similarly graded recycled aggregates
On-Site Soils	CL/CH	Most of the lean clay soils in the appear to meet the requirements for reuse as engineered fill. The fat clay soils do not meet the requirements without lime treatment due to avg. LL's greater than 45.

ENGINEERED FILL COMPACTION REQUIREMENTS	
Subject	Requirement
Compaction Standard	Standard Proctor, ASTM D698
Required Compaction	95% of Max. Dry Density
Moisture Content	Optimum to +3 % Points of the Soil's Optimum Value
Loose Thickness	8 Inches Prior to Compaction

Fill Placement: Excessively wet fill soils or aggregates should be scarified, aerated, and moisture conditioned prior to compaction.

On-Site Borrow Suitability: Natural deposits of soils that meet the definition above may be used as engineered fill on the site.

5.3 FOUNDATION AND SLAB OBSERVATIONS

Protection of Foundation Excavations: Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open; therefore, foundation concrete should be placed the same day that excavations are made. Bearing soils that are weakened by surface water intrusion or exposure must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, a 1 to 3-inch thick "mud mat" of "lean" concrete should be placed on the bearing soils before the placement of reinforcing steel.

Footing Subgrade Observations: Most of the soils at the foundation bearing elevation are anticipated to be adequate for support of the proposed structure. ECS should observe the foundation subgrade prior to placing foundation concrete, to confirm the bearing soils are as recommended.

Slab Subgrade Verification: Prior to placement of a drainage layer, the subgrade should be prepared in accordance with the recommendations found in Section 5.1.

5.4 UTILITY INSTALLATIONS

Utility Subgrades: The soils encountered in our exploration are expected to be generally adequate for support of utility pipes. The pipe subgrades should be observed and probed for stability by ECS. Loose or inadequate materials encountered should be removed and replaced with adequate compacted Engineered Fill, or pipe stone bedding material.

Utility Backfilling: The granular bedding material (often AASHTO No. 57 stone) should be at least 4 inches thick, but not less than that specified by the civil engineer's project drawings and specifications. We recommend that the bedding materials be placed up to the springline of the pipe. Fill placed for support of the utilities, as well as backfill over the utilities, should conform to Section 5.2.

Excavation Safety: Excavations and slopes should be constructed and maintained in accordance with OSHA excavation safety standards. The contractor is solely responsible for designing, constructing, and maintaining adequate excavations and slopes. 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. ECS is providing this information solely as a service to our client. ECS is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

6.0 CLOSING

ECS has prepared this report to guide the geotechnical-related design and construction aspects of the project. We performed these services in accordance with the standard of care expected of professionals in the industry performing similar services on projects of like size and complexity at this time in the region. No other representation expressed or implied, and no warranty or guarantee is included or intended in this report.

The description of the proposed project is based on information provided to ECS by Express Oil Change and Tire Engineers. If any of this information is inaccurate or changes, either because of our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted so we can review our recommendations and provide additional or alternate recommendations that reflect the proposed construction.

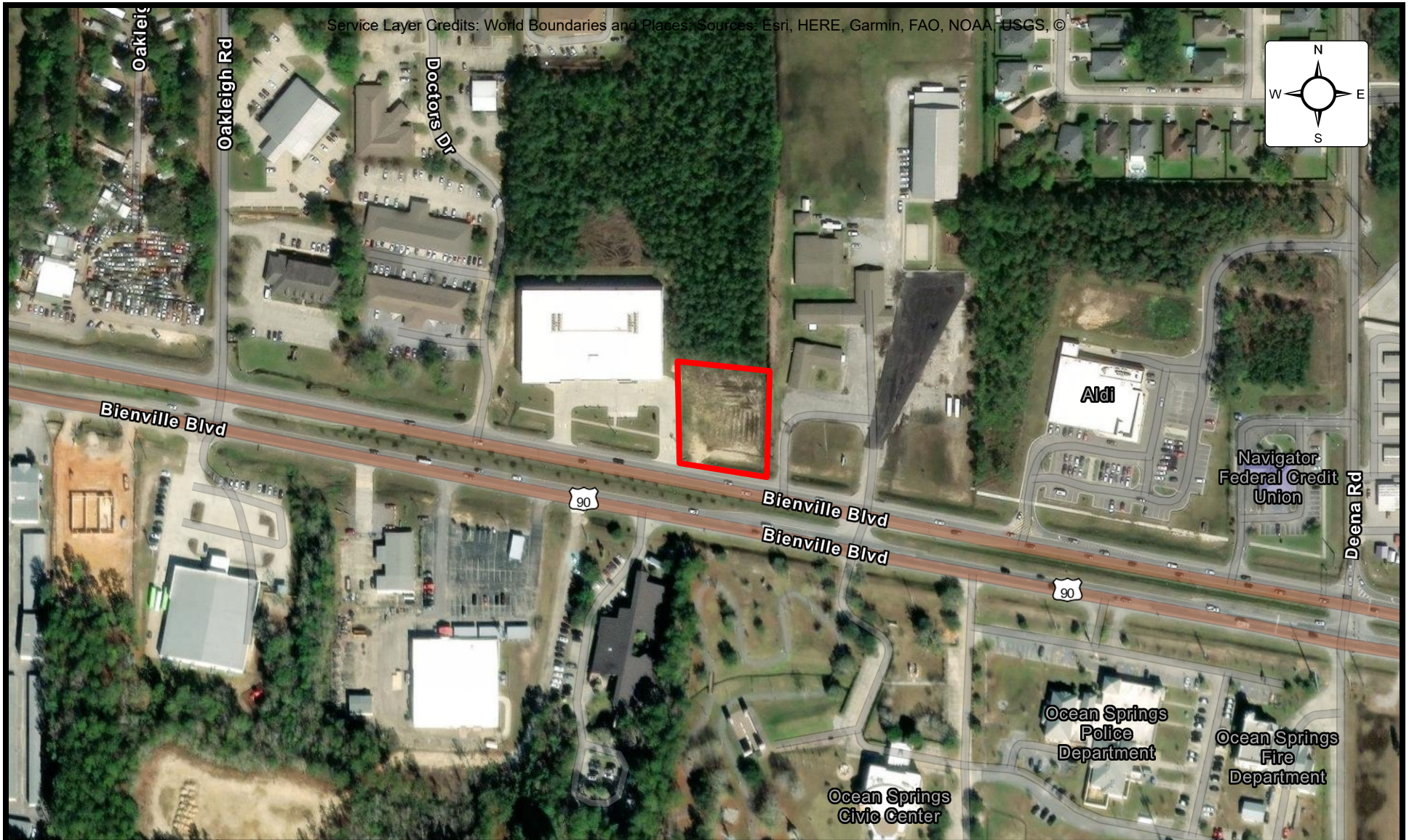
We recommend that ECS review the project plans and specifications so we can confirm that those plans/specifications are in accordance with the recommendations of this geotechnical report.

Field observations, and quality assurance testing during earthwork and foundation installation are an extension of, and integral to, the geotechnical design. We recommend that ECS be retained to apply our expertise throughout the geotechnical phases of construction, and to provide consultation and recommendation should issues arise.

ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

APPENDIX A – Diagrams & Reports

Site Location Diagram
Boring Location Diagram



SITE LOCATION DIAGRAM

Express Oil - Ocean Springs, MS

Bienville Blvd., Ocean Springs, Mississippi
Express Oil Change, LLC

ENGINEER JCC3
SCALE 1" = 250'
PROJECT NO. 65:1978
SHEET
DATE 1/20/2026



BORING LOCATION DIAGRAM

Express Oil - Ocean Springs, MS

Bienville Blvd., Ocean Springs, Mississippi
Express Oil Change, LLC

ENGINEER
JCC3

SCALE
1" = 250'

PROJECT NO.
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APPENDIX B – Field Operations

Reference Notes for Boring Logs
Boring Logs B-1 to B-2, P-1 to P-6



REFERENCE NOTES FOR BORING LOGS

MATERIAL^{1,2}

	ASPHALT
	CONCRETE
	GRAVEL
	TOPSOIL
	VOID
	BRICK
	AGGREGATE BASE COURSE
	GW WELL-GRADED GRAVEL gravel-sand mixtures, little or no fines
	GP POORLY-GRADED GRAVEL gravel-sand mixtures, little or no fines
	GM SILTY GRAVEL gravel-sand-silt mixtures
	GC CLAYEY GRAVEL gravel-sand-clay mixtures
	SW WELL-GRADED SAND gravelly sand, little or no fines
	SP POORLY-GRADED SAND gravelly sand, little or no fines
	SM SILTY SAND sand-silt mixtures
	SC CLAYEY SAND sand-clay mixtures
	ML SILT non-plastic to medium plasticity
	MH ELASTIC SILT high plasticity
	CL LEAN CLAY low to medium plasticity
	CH FAT CLAY high plasticity
	OL ORGANIC SILT or CLAY non-plastic to low plasticity
	OH ORGANIC SILT or CLAY high plasticity
	PT PEAT highly organic soils

DRILLING SAMPLING SYMBOLS & ABBREVIATIONS

SS	Split Spoon Sampler	PM	Pressuremeter Test
ST	Shelby Tube Sampler	RD	Rock Bit Drilling
WS	Wash Sample	RC	Rock Core, NX, BX, AX
BS	Bulk Sample of Cuttings	REC	Rock Sample Recovery %
PA	Power Auger (no sample)	RQD	Rock Quality Designation %
HSA	Hollow Stem Auger		

PARTICLE SIZE IDENTIFICATION

DESIGNATION	PARTICLE SIZES
Boulders	12 inches (300 mm) or larger
Cobbles	3 inches to 12 inches (75 mm to 300 mm)
Gravel: Coarse	¾ inch to 3 inches (19 mm to 75 mm)
Fine	4.75 mm to 19 mm (No. 4 sieve to ¾ inch)
Sand: Coarse	2.00 mm to 4.75 mm (No. 10 to No. 4 sieve)
Medium	0.425 mm to 2.00 mm (No. 40 to No. 10 sieve)
Fine	0.074 mm to 0.425 mm (No. 200 to No. 40 sieve)
Silt & Clay ("Fines")	<0.074 mm (smaller than a No. 200 sieve)

COHESIVE SILTS & CLAYS

UNCONFINED COMPRESSIVE STRENGTH, QP ⁴	SPT ⁵ (BPF)	CONSISTENCY ⁷ (COHESIVE)
<0.25	<2	Very Soft
0.25 - <0.50	3 - 4	Soft
0.50 - <1.00	5 - 8	Firm
1.00 - <2.00	9 - 15	Stiff
2.00 - <4.00	16 - 30	Very Stiff
4.00 - 8.00	31 - 50	Hard
>8.00	>50	Very Hard

RELATIVE AMOUNT ⁷	COARSE GRAINED (%) ⁸	FINE GRAINED (%) ⁸
Trace	≤5	≤5
With	10 - 20	10 - 25
Adjective (ex: "Silty")	25 - 45	30 - 45

GRAVELS, SANDS & NON-COHESIVE SILTS

SPT ⁵	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

WATER LEVELS⁶

	WL (First Encountered)
	WL (Completion)
	WL (Seasonal High Water)
	WL (Stabilized)

FILL AND ROCK

FILL	POSSIBLE FILL	PROBABLE FILL	ROCK

¹Classifications and symbols per ASTM D 2488-17 (Visual-Manual Procedure) unless noted otherwise.

²To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.

³Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-FILL)].

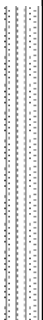
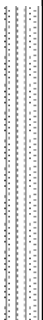
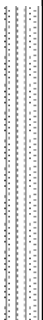
⁴Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

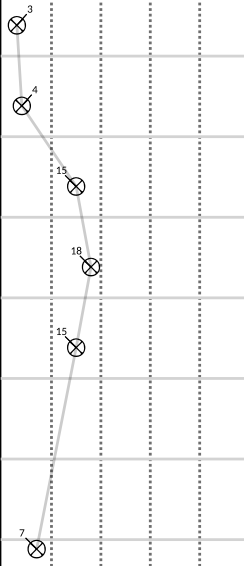
⁵Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf). SPT correlations per 7.4.2 Method B and need to be corrected if using an auto hammer.

⁶The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In clay and cohesive silts, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally employed.

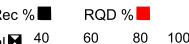
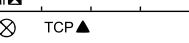
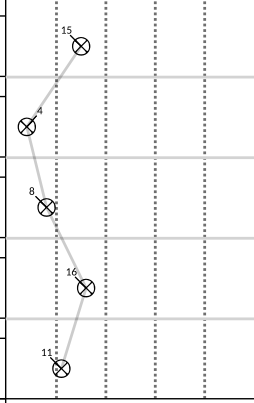
⁷Minor deviation from ASTM D 2488-17 Note 14.

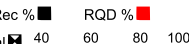
⁸Percentages are estimated to the nearest 5% per ASTM D 2488-17.

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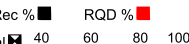
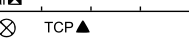
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LATITUDE: 30.41064				LONGITUDE: -88.767264				STRUCTURE: Building				SURFACE ELEVATION: 21				BOTTOM OF CASING											
DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	ELEVATION (FT)	WATER LEVELS	BLOWS/6" (TCP/MC/SPT N-VALUE)	Rec % 0 20 40 60 80 100 Modell 0 10 20 30 40 50 SPT TCP										LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	QP (TSF)	FINES CONTENT	DRY UNIT WEIGHT (PCF)	COMPRESSIVE STR. (TSF)	
5	1	SS	18	18	(SM) SILTY SAND - gray to brown, very loose.		20		1-1-2 (3)													15.0		25.1			
	2	SS	18	18					2-2-2 (4)	15.7																	
	3	SS	18	18	(SP-SM) POORLY GRADED SAND WITH SILT - brown, medium dense.		15		2-7-8 (15)	20.8																	
	4	SS	18	18					5-10-8 (18)	20.6	12.0																
	5	SS	18	18					2-5-10 (15)	22.6																	
	6	SS	18	18	(SM) SILTY SAND - gray, loose.					3-3-4 (7)	32.9	43.5															
					END OF BORING at 15.0 FT																						
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL																											
WL (First Encountered):								BORING STARTED: 12/02/2025				CAVE IN DEPTH: Not Observed															
WL (Completion):								BORING COMPLETED: 12/02/2025				HAMMER TYPE: Automatic															
WL (Seasonal High Water):								EQUIPMENT: ATV				LOGGED BY: Wgeo				DRILLING METHOD: Hollow Stem Auger (0'-15')											
WL (Stabilized):																											
GEOTECHNICAL BOREHOLE LOG																											

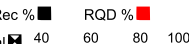
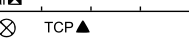
CLIENT: Express Oil Change, LLC				PROJECT NO.: 65:1978		BORING NO.: P-01		SHEET: 1 OF 1										
PROJECT NAME: Express Oil - Ocean Springs, MS				DRILLER/CONTRACTOR: ECS														
SITE LOCATION: Bienville Blvd., Ocean Springs, Mississippi, 39564								LOSS OF CIRCULATION										
LATITUDE: 30.410514		LONGITUDE: -88.767511		STRUCTURE: Pavement		SURFACE ELEVATION: 21		BOTTOM OF CASING										
DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	ELEVATION (FT)	WATER LEVELS	BLOWS/6" (TCP/MC/SPT-N-VALUE)	Rec % ☐ RQD % ☐ 0 Mod Cal 40 60 80 100 SPT ☒ TCP ☐ 0 10 20 30 40 50		LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	QP (TSF)	FINES CONTENT	DRY UNIT WEIGHT (PCF)	COMPRESSIVE STR. (TSF)
5	1	SS	18	18	(SM) SILTY SAND - gray, loose.		20		5-5-5 (10)	10				12.1				
	2	SS	18	18	(SM) SILTY SAND - brown, very loose.				1-1-1 (2)	2				15.7				
	3	SS	18	18	(SM) SILTY SAND - brown and red, medium dense.		15		2-6-6 (12)	12								
	4	SS	18	18	(SM) SILTY SAND - gray to brown, medium dense.				3-6-8 (14)	4								
	5	SS	18	18					3-8-10 (18)	18								
					END OF BORING at 10.0 FT													
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL																		
 WL (First Encountered):						BORING STARTED: 12/02/2025				CAVE IN DEPTH: Not Observed								
 WL (Completion):						BORING COMPLETED: 12/02/2025				HAMMER TYPE: Automatic								
 WL (Seasonal High Water):						EQUIPMENT:		LOGGED BY:		DRILLING METHOD:								
 WL (Stabilized):						ATV		Wgeo		Hollow Stem Auger (0'-10')								
GEOTECHNICAL BOREHOLE LOG																		

CLIENT: Express Oil Change, LLC				PROJECT NO.: 65:1978		BORING NO.: P-02		SHEET: 1 OF 1										
PROJECT NAME: Express Oil - Ocean Springs, MS				DRILLER/CONTRACTOR: ECS														
SITE LOCATION: Bienville Blvd., Ocean Springs, Mississippi, 39564								LOSS OF CIRCULATION										
LATITUDE: 30.410711		LONGITUDE: -88.767529		STRUCTURE: Pavement		SURFACE ELEVATION: 22		BOTTOM OF CASING										
DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	ELEVATION (FT)	WATER LEVELS	BLOWS/6" (TCP/MC/SPT-N-VALUE)	Rec %  RQD %  SPT  TCP 		LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	QP (TSF)	FINES CONTENT	DRY UNIT WEIGHT (PCF)	COMPRESSIVE STR. (TSF)
5	1	SS	18	18	(SM) SILTY SAND - gray, medium dense.		20		3-8-7 (15)				13.6					
	2	SS	18	18	(SM) SILTY SAND - brown, very loose to loose.			2-2-2 (4)			14.9							
	3	SS	18	18				2-4-4 (8)										
	4	SS	18	18	(SM) SILTY SAND - gray to brown, medium dense.		15	3-6-10 (16)										
	5	SS	18	18				4-5-6 (11)										
					END OF BORING at 10.0 FT													
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL																		
 WL (First Encountered):				BORING STARTED: 12/02/2025				CAVE IN DEPTH: Not Observed										
 WL (Completion):				BORING COMPLETED: 12/02/2025				HAMMER TYPE: Automatic										
 WL (Seasonal High Water):				EQUIPMENT:				LOGGED BY:				DRILLING METHODOD:						
 WL (Stabilized):				ATV				Wgeo				Hollow Stem Auger (0'-10')						
GEOTECHNICAL BOREHOLE LOG																		

CLIENT: Express Oil Change, LLC				PROJECT NO.: 65:1978		BORING NO.: P-03		SHEET: 1 OF 1											
PROJECT NAME: Express Oil - Ocean Springs, MS				DRILLER/CONTRACTOR: ECS															
SITE LOCATION: Bienville Blvd., Ocean Springs, Mississippi, 39564								LOSS OF CIRCULATION											
LATITUDE: 30.410853		LONGITUDE: -88.767545		STRUCTURE: Pavement		SURFACE ELEVATION: 22		BOTTOM OF CASING											
DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	ELEVATION (FT)	WATER LEVELS	BLOWS/6" (TCP/MC/SPT-N-VALUE)	Rec %  RQD %  SPT  TCP 		LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	QP (TSF)	FINES CONTENT	DRY UNIT WEIGHT (PCF)	COMPRESSIVE STR. (TSF)	
5	1	SS	18	18	(SM) SILTY SAND - gray, very loose.		20		1-1-2 (3)					15.2	26.2				
	2	SS	18	18				1-1-1 (2)						17.0					
	3	SS	18	18	(SM) SILTY SAND - brown, loose to medium dense.			3-7-6 (13)											
	4	SS	18	18			5-10-10 (20)												
	5	SS	18	18				3-2-5 (7)											
					END OF BORING at 10.0 FT														
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL																			
 WL (First Encountered):						BORING STARTED: 12/02/2025				CAVE IN DEPTH: Not Observed									
 WL (Completion):						BORING COMPLETED: 12/02/2025				HAMMER TYPE: Automatic									
 WL (Seasonal High Water):						EQUIPMENT:		LOGGED BY:		DRILLING METHODOD:									
 WL (Stabilized):						ATV		Wgeo		Hollow Stem Auger (0'-10')									
GEOTECHNICAL BOREHOLE LOG																			

CLIENT: Express Oil Change, LLC				PROJECT NO.: 65:1978		BORING NO.: P-04		SHEET: 1 OF 1										
PROJECT NAME: Express Oil - Ocean Springs, MS				DRILLER/CONTRACTOR: ECS														
SITE LOCATION: Bienville Blvd., Ocean Springs, Mississippi, 39564								LOSS OF CIRCULATION										
LATITUDE: 30.410777		LONGITUDE: -88.767365		STRUCTURE: Pavement		SURFACE ELEVATION: 22		BOTTOM OF CASING										
DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	ELEVATION (FT)	WATER LEVELS	BLOWS/6" (TCP/MC/SPT-N-VALUE)	Rec % 0 20 40 60 80 100 Mod Cal SPT TCP	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	QP (TSF)	FINES CONTENT	DRY UNIT WEIGHT (PCF)	COMPRESSIVE STR. (TSF)	
5	1	SS	18	18	(SM) SILTY SAND - gray and brown, very loose to loose.		20		1-1-3 (4)	4			24.4					
	2	SS	18	18			2-2-3 (5)	5						15.7				
	3	SS	18	18	(SM) SILTY SAND - brown and gray, loose to medium dense.		15		5-11-11 (22)	22								
	4	SS	18	18			7-13-13 (26)	26										
	5	SS	18	18			5-6-4 (10)	10										
					END OF BORING at 10.0 FT													
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL																		
WL (First Encountered):						BORING STARTED: 12/02/2025				CAVE IN DEPTH: Not Observed								
WL (Completion):						BORING COMPLETED: 12/02/2025				HAMMER TYPE: Automatic								
WL (Seasonal High Water):						EQUIPMENT:		LOGGED BY:		DRILLING METHODOD:								
WL (Stabilized):						ATV		Wgeo		Hollow Stem Auger (0'-10')								
GEOTECHNICAL BOREHOLE LOG																		

CLIENT: Express Oil Change, LLC				PROJECT NO.: 65:1978		BORING NO.: P-05		SHEET: 1 OF 1										
PROJECT NAME: Express Oil - Ocean Springs, MS				DRILLER/CONTRACTOR: ECS														
SITE LOCATION: Bienville Blvd., Ocean Springs, Mississippi, 39564								LOSS OF CIRCULATION										
LATITUDE: 30.410814		LONGITUDE: -88.767179		STRUCTURE: Pavement		SURFACE ELEVATION: 22		BOTTOM OF CASING										
DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	ELEVATION (FT)	WATER LEVELS	BLOWS/6" (TCP/MC/SPT-N-VALUE)	Rec %  RQD %  SPT  TCP 		LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	QP (TSF)	FINES CONTENT	DRY UNIT WEIGHT (PCF)	COMpressive STR. (TSF)
5	1	SS	18	18	(SM) SILTY SAND - brown, very loose.		20		1-1-3 (4)									
	2	SS	18	18	(SC-SM) SILTY CLAYEY SAND - brown, very loose.		15		1-1-2 (3)			23	5	19.1		29.1		
	3	SS	18	18	(SM) SILTY SAND - brown, medium dense.				4-8-6 (14)					19.6				
	4	SS	18	18					4-6-6 (12)									
	5	SS	18	18					2-2-11 (13)									
					END OF BORING at 10.0 FT													
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL																		
 WL (First Encountered):					BORING STARTED: 12/02/2025					CAVE IN DEPTH: Not Observed								
 WL (Completion):					BORING COMPLETED: 12/02/2025					HAMMER TYPE: Automatic								
 WL (Seasonal High Water):					EQUIPMENT:		LOGGED BY:		DRILLING METHODOD:									
 WL (Stabilized):					ATV		Wgeo		Hollow Stem Auger (0'-10')									
GEOTECHNICAL BOREHOLE LOG																		

CLIENT: Express Oil Change, LLC				PROJECT NO.: 65:1978		BORING NO.: P-06		SHEET: 1 OF 1										
PROJECT NAME: Express Oil - Ocean Springs, MS				DRILLER/CONTRACTOR: ECS														
SITE LOCATION: Bienville Blvd., Ocean Springs, Mississippi, 39564								LOSS OF CIRCULATION										
LATITUDE: 30.410513		LONGITUDE: -88.76721		STRUCTURE: Pavement		SURFACE ELEVATION: 22		BOTTOM OF CASING										
DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	ELEVATION (FT)	WATER LEVELS	BLOWS/6" (TCP/MC/SPT-N-VALUE)	Rec %  RQD %  SPT  TCP 		LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)	QP (TSF)	FINES CONTENT	DRY UNIT WEIGHT (PCF)	COMPRESSIVE STR. (TSF)
5	1	SS	18	18	(SM) SILTY SAND - gray to brown, very loose.		20		1-1-3 (4)					13.9		27.5		
	2	SS	18	18				2-2-2 (4)						15.4				
	3	SS	18	18	(SM) SILTY SAND - gray, medium dense.			3-8-9 (17)										
	4	SS	18	18				5-12-16 (28)										
	5	SS	18	18	(SM) SILTY SAND - brown, loose.					2-3-3 (6)								
					END OF BORING at 10.0 FT													
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL																		
 WL (First Encountered):						BORING STARTED: 12/02/2025				CAVE IN DEPTH: Not Observed								
 WL (Completion):						BORING COMPLETED: 12/02/2025				HAMMER TYPE: Automatic								
 WL (Seasonal High Water):						EQUIPMENT:		LOGGED BY:		DRILLING METHODOD: Hollow Stem Auger (0'-10')								
 WL (Stabilized):						ATV		Wgeo										
GEOTECHNICAL BOREHOLE LOG																		

APPENDIX C – Laboratory Testing

Laboratory Test Results Summary

Laboratory Testing Summary

Sample Location	Sample Number	Depth (ft)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)	0.1 in.	0.2 in.	
B-01	1	0.5-2.0	16.7										
B-01	2	2.5-4.0	12.6										
B-01	3	4.5-6.0	17.3					24.4					
B-01	4	6.5-8.0	19.6										
B-01	5	8.5-10.0	22.8					9.4					
B-01	6	13.5-15.0	25.3										
B-01	7	18.5-20.0	42.9	CL	40	19	21	89.3					
B-02	1	0.5-2.0	15.0										
B-02	2	2.5-4.0	15.7		NP	NP	NP	25.1					
B-02	3	4.5-6.0	20.8										

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

Project: Express Oil - Ocean Springs, MS
Client: Express Oil Change, LLC

Project No.: 65:1978
Date Reported: 1/15/2026



Office / Lab

Address

Office Number / Fax

ECS Southeast LLC - Baton Rouge

11211 Industriplex Blvd
Suite 300
Baton Rouge, LA 70809

(225)224-2583
(225)612-7062

Tested by	Checked by	Approved by	Date Received
Ivaldez	NBurke	NBurke	

Laboratory Testing Summary

Sample Location	Sample Number	Depth (ft)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)	0.1 in.	0.2 in.	
B-02	4	6.5-8.0	20.6		NP	NP	NP	12.0					
B-02	5	8.5-10.0	22.6										
B-02	6	13.5-15.0	32.9					43.5					
P-01	1	0.5-2.0	12.1										
P-01	2	2.5-4.0	15.7										
P-02	1	0.5-2.0	13.6										
P-02	2	2.5-4.0	14.9										
P-03	1	0.5-2.0	15.2		NP	NP	NP	26.2					
P-03	2	2.5-4.0	17.0										
P-04	1	0.5-2.0	24.4										

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

Project: Express Oil - Ocean Springs, MS
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Tested by	Checked by	Approved by	Date Received
Ivaldez	NBurke	NBurke	

Laboratory Testing Summary

Sample Location	Sample Number	Depth (ft)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)	0.1 in.	0.2 in.	
P-04	2	2.5-4.0	15.7										
P-05	2	2.5-4.0	19.1		23	18	5	29.1					
P-05	3	4.5-6.0	19.6										
P-06	1	0.5-2.0	13.9					27.5					
P-06	2	2.5-4.0	15.4										

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

Project: Express Oil - Ocean Springs, MS
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