



TESTING & ENGINEERING CO., INC.

1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

October 21, 2024

82 Canal Street Lofts
9525 Wexcroft Drive
Brentwood, Tennessee 37027

Attn: Mr. Jim Sari

Re: Report of Geotechnical Exploration
Old Leavelle Renovation
82 Canal Street
Graniteville, South Carolina
CSRA Report No.: B-120.24

Dear Mr. Sari:

CSRA Testing & Engineering Company, Inc., (CSRA) is pleased to submit this report of our exploration services for the proposed project. Our services were provided in accordance with your signed authorization of our proposal. This report presents a review of the information provided to us, a discussion of the site and subsurface conditions, and our foundation and earthwork recommendations. The Appendix contains a Boring Location Plan and the results of our field testing.

Project Information

Based on the information provided, the project involves the renovation of the old Leavelle School into loft-style apartments and the construction of a new apartment building at 82 Canal Street in Graniteville, South Carolina. We understand the new building will be a three-story, wood-framed structure. The foundation system is expected to consist of shallow footings with a concrete slab on grade. A post tension slab may be utilized. While no grading plan was provided, based on conversations with the architect, we understand approximately 1 foot of fill will be required to reach final grades in the proposed building area.

Purpose of Exploration

The purpose of this exploration was to obtain specific subsurface data at the site and to provide foundation and earthwork recommendations for the proposed project.

Site Conditions

We conducted a site reconnaissance to observe and document surface conditions at the site. Information gathered was used to help us interpret the subsurface data and to detect conditions which could affect our recommendations.

The site is located at 82 Canal Street in Graniteville, South Carolina. At the time of our field work, the proposed construction area was an old asphalt-paved parking lot which was fairly level to gently sloping. No surface water was noted on the site at the time of our field work.

Site Geologic Conditions

The project site is located in the Coastal Plain Physiographic Province. The Coastal Plain consists mainly of marine sediments which were deposited during successive periods of fluctuating sea level and moving shoreline. The formations dip slightly seaward, and several are exposed at the surface in bands paralleling the coast. Many beds exist only as fragmental erosional remnants sandwiched between more continuous strata above and below. Based on published literature, the site is underlain by Coastal Plain sediments consisting of interbedded silts, sands, and clays.

Subsurface Conditions

The subsurface conditions were explored with widely spaced soil test borings drilled according to the procedures presented in the Appendix. The boring locations and depths were selected by CSRA. The actual field boring locations were determined by our field crew by taped distances relative to the existing site features. The boring locations shown in the Appendix should be considered accurate only to the degree implied by the method used.

The subsurface conditions encountered at the boring locations are shown on the test boring records in the Appendix. These boring records represent our interpretation of the subsurface conditions based on the field logs and visual examination of field samples by our geotechnical engineer. The lines designating the interface between various strata on the boring records represent the approximate interface location.

Three (3) test borings were drilled in the proposed new building area to depths of 30 to 50 feet below the existing ground surface. The borings revealed a subsurface profile consisting of approximately 6.0 to 7.5 feet of previous fill soils underlain by virgin Coastal Plain deposits. The previous fills consisted of silty and clayey sands (SM and SC), which were noted to be very loose to firm in consistency. Standard penetration resistances in the fills ranged from 3 to 14 blows per foot. The virgin soils were mostly silty sands (SM) with some interbedded sandy, clayey silts (ML). The virgin SM soils were very loose to dense in consistency with standard penetration resistances from 4 to 47 blows per foot. The ML soils were very stiff to hard in consistency with standard penetration resistances from 17 to 31 blows per foot.

Groundwater Conditions

Groundwater was encountered in borings B-1 and B-2 at a depth of 28 feet at the time of drilling. In silty sands, the water levels can usually be determined accurately near the time of drilling. In fine grained soils and clayey sands, it may take several days for water levels to stabilize. Fluctuations in the groundwater level can occur due to variations in rainfall, evaporation, construction activity, surface runoff, and other site-specific factors. The highest groundwater levels are generally encountered in early spring and the lowest in late summer. The likelihood of groundwater in the near surface soils at the site can be expected to increase following periods of wet weather due to water infiltration through the upper sands.

Site Preparation Recommendations

All topsoil, vegetation, debris, pavement, and surface soils containing organic material, should be removed from the construction area and either wasted from the site or used as topsoil in areas to be landscaped. The depth of asphalt pavement encountered in our borings was approximately 4 inches. All existing utilities should also be rerouted outside from the proposed new building area.

As previously noted, fill soils were encountered in the upper 6.0 to 7.5 feet of the test borings. The standard penetration resistances in the fills indicate they were inconsistently/poorly compacted during original placement. Excessive settlements will likely occur unless remedial action is taken. Therefore, we recommend the upper 4 feet of soil in the proposed building area be removed. The undercutting should extend a lateral distance equivalent to the excavation depth from the edge of the proposed foundations. The newly exposed surface should then be moisture conditioned and densified to 100 percent of the Standard Proctor maximum dry density.

The construction testing agency should be retained to monitor the remedial activities. We recommend tests be performed using a hand-auger and a dynamic cone penetrometer after the newly exposed surface has been densified to ensure that the deeper unconsolidated soils have been sufficiently compacted. The geotechnical engineer should review the results of this testing prior to the backfilling of the excavation and construction of foundations to confirm the pad's suitability to support the expected loads.

Positive surface drainage should be maintained to prevent the accumulation of water. If the exposed subgrade becomes excessively wet or frozen, or if conditions are encountered different from those described previously in this report, the geotechnical engineer should be contacted.

After undercutting and backfilling, we recommend the subgrade be proofrolled prior to excavation of foundations. The proofrolling operation should be observed and documented by the construction testing agency. If unsuitable conditions are encountered at the subgrade level, recommendations for dealing with the conditions should be provided to the owner's representative by the geotechnical engineer. Any excessively soft and wet soils encountered should be excavated and replaced with properly compacted fill.

Foundation Recommendations

A system of shallow spread footings can be utilized to support the proposed structure. Based on expected grades, shallow footings will bear in newly densified sands. Footings bearing in this material can be designed for a maximum allowable bearing pressure of 2,000 psf if the Site Preparation Recommendations and Compacted Fill Recommendations sections of this report are followed.

The maximum net allowable bearing pressure recommended is based on our previous experience and correlations made previously between standard penetration test resistances and the performance of foundations supported by soils similar to those at this site. We expect total settlements on the order of 1 inch and differential settlements of up to 0.5 inch.

We recommend the minimum widths for individual column and continuous wall footings be 24 and 16 inches, respectively. The minimum widths are recommended to provide a margin of safety against a local or punching shear failure of the foundation soils. Exterior footings should bear at least 18 inches below final exterior grade. The depths of interior footings should be a minimum of 12 inches below the top of the floor slab. This embedment is necessary to provide adequate confinement of the bearing soils and to achieve the recommended bearing pressure.

Foundation concrete should be placed the same day that excavations are dug, if possible. If the bearing soils are softened by surface water intrusion or exposure, the softened soils 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, we suggest a 2 to 4-inch thick "mud-mat" of "lean" (2,000 psi) concrete be placed on the bearing soils before the placement of reinforcing steel.

We recommend the construction testing agency observe the footing excavations immediately prior to placing concrete. They should compare the soils exposed with those encountered in the soil test borings and document the results. Any significant differences should be brought to the attention of the owners' representative along with appropriate recommendations. The foundation bearing area should be level or suitably benched. It should also be free of loose soil, ponded water, and debris prior to the inspection.

Grade Slab Recommendations

We understand a soil supported grade slab may be used for the proposed structure. The grade slab should be jointed around columns and along footing supported walls so that the slab and foundations can settle differentially without damage. Joints containing dowels or keys may be used in the slab to permit rotational movement between parts of the slab without cracking or sharp vertical displacements.

A 4 to 6 inch layer of clean gravel or free draining sand covered with an impermeable membrane should be placed beneath the grade slab to provide a vapor barrier and permit lateral drainage beneath the slab.

Piping underneath the grade slab should be avoided whenever possible. Where absolutely necessary, pipe joints must be tight to prevent leakage. Leakage from under floor piping is often the source of excessive soil moisture which can lead to damage due to potential soil expansion or erosion.

Construction activities and exposure to the environment can cause deterioration of prepared subgrades. Therefore, we recommend density and moisture content tests be conducted on the final subgrade soils immediately prior to grade slab construction to determine their condition.

Compacted Fill Recommendations

We recommend soils used as compacted fills be free of debris and have less than 3% by weight fibrous organic material. They should have a maximum dry density of at least 90 pcf, a liquid limit of less than 50 and a plasticity index of less than 20. Before filling operations begin, representative samples of each proposed fill material should be collected. The samples should be tested to determine the maximum dry density, optimum moisture content, natural moisture content, gradation, and plasticity of the soil. These tests are needed for quality control during compaction and also to determine if the fill material is acceptable. Visual observation indicates on-site soils that are free of debris and organics can be re-used as compacted fills.

We recommend all compacted fill be constructed by spreading acceptable soil in loose layers not more than 10 inches thick. The fill should be compacted in thin lifts to at least 95 percent of the Standard Proctor maximum dry density (ASTM D-698). The moisture content of the fill soils should be maintained within +3 and -3 percentage points of the optimum moisture content as determined from the Proctor compaction test. This provision may require the contractor to dry the soils during periods of wet weather or wet the soils during the hot summer months.

We recommend the fill placement and compaction be observed and documented by the construction testing agency. Significant deviations, either from specifications or good practice, should be brought to the attention of the owner's representative, along with appropriate recommendations. At least one (1) field density test should be performed in each 4,000 square feet of fill for each fill layer.

Site Seismic Recommendations

We recommend a site classification 'D' be utilized for seismic design for this project per the International Building Code (IBC). This is based on the weighted average of the 'N' values obtained and on known geologic conditions within the upper 100 feet of soil below the site. The weighted average 'N' value was calculated to be approximately 20 blows per foot. This correlates to a site classification of 'D' per the IBC.

Basis For Recommendations

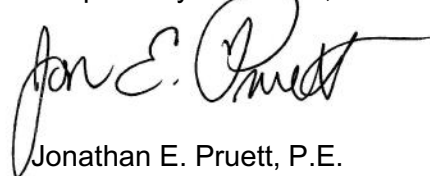
The recommendations provided are based in part on project information provided to us and they only apply to the specific project and site discussed in this report. If the project information section in this report contains incorrect information or if additional information is available, you should convey the correct or additional information to us and retain us to review our recommendations. We can then modify our recommendations if they are inappropriate for the proposed project.

Regardless of the thoroughness of a geotechnical exploration, there is always a possibility conditions between borings will be different from those at specific boring locations and conditions will not be as anticipated by the designers or contractors. In addition, the construction process may itself alter soil conditions. Therefore, experienced geotechnical personnel should observe and document the construction procedures used and the conditions encountered. Unanticipated conditions and inadequate procedures should be reported to the design team along with timely recommendations to solve the problems created. We recommend the owner retain CSRA to provide this service based upon our familiarity with the project, the subsurface conditions, and the intent of the recommendations.

We wish to remind you our exploration services include storing the samples collected and making them available for inspection for 60 days. The samples are then discarded unless you request otherwise.

We will be happy to discuss our recommendations with you and would welcome the opportunity to provide the additional studies or services necessary to complete this project. We appreciate the opportunity to provide our professional services and look forward to working with you on the remainder of this project and on future projects. If you have any questions concerning this report or wish to have further discussions, please contact us at (706) 733-6960.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Jon E. Pruett", with a stylized flourish extending from the end of the name.

Jonathan E. Pruett, P.E.

APPENDICES

APPENDIX I
Boring Location Plan



Source: Drawing taken from Conceptual Site Plan of Old Leavelle Reno. dated 5/21/21 by Martin Riley Associates-Architects, P.C.

csra

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Boring Location Plan

Old Leavelle Renovation
82 Canal Street
Graniteville, South Carolina

JOB NO.	DESIGNED BY
B-120.24	
SCALE	DRAWN BY
NTS	JEP
DATE	CHECKED BY
10/21/24	MWP

APPENDIX II
Soil Boring Logs



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PROJECT Old Leavelle Renovation

BORING NO. B-1

LOCATION 82 Canal Street, Graniteville, SC

DATE October 14, 2024

DEPTH FEET	VISUAL SOIL DESCRIPTION	PENETRATION VALUE (N)	VISUAL UNIFIED CLASS.	PERCENT MOISTURE
	Loose, Brownish-Tan Silty Sand (Fill)	7 @ 1'	SM	
5'	Very Loose, Reddish-Tan Clayey Sand (Fill)	4 @ 3.5'	SC	
		5 @ 6'		
10'	Loose to Firm, Tan and Red Slightly Clayey Silty Sand	6 @ 8.5'	SM	
		13 @ 13.5'		
15'				
20'	Firm, Brown and Tan Silty Sand	11 @ 18.5'	SM	
		27 @ 23.5'	ML	
25'	Very Stiff, Tan, Red, and Gray Sandy Clayey Silt			
	Dense, Tan and Red Silty Sand	47 @ 28.5'	SM	
30'	Boring Terminated at 30 feet. Upper 4" is Asphalt.			
35'				
40'				

N Value is number of blows of 140 pound hammer required to drive 2" split-tube sampler one foot after seated.

28' WATER TABLE AT TIME OF BORING



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PROJECT Old Leavelle Renovation

BORING NO. B-2 (Page 1 of 2)

LOCATION 82 Canal Street, Graniteville, SC

DATE October 14, 2024

DEPTH FEET	VISUAL SOIL DESCRIPTION	PENETRATION VALUE (N)	VISUAL UNIFIED CLASS.	PERCENT MOISTURE
	Loose, Brown and Red Silty Sand (Fill)	9 @ 1'	SM	
5'	Very Loose, Dark Brown Silty Sand (Fill)	3 @ 3.5'	SM	
	Very Loose, Brown Silty Sand (Fill)	3 @ 6'	SM	
10'	Firm, Tan and Red Silty Sand	8 @ 8.5'	SM	
15'	Very Firm, White Tan Silty Sand	14 @ 13.5'	SM	
20'		24 @ 18.5'	SM	
25'		30 @ 23.5'	SM	
30'	Firm to Very Firm, Tan , Red, and White Slightly Clayey Silt	18 @ 23.5'	SM	
35'		21 @ 33.5'		
40'		18 @ 38.5'		

N Value is number of blows of 140 pound hammer required to drive 2" split-tube sampler one foot after seated.

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PROJECT Old Leavelle Renovation

BORING NO. B-2 (Page 2 of 2)

LOCATION 82 Canal Street, Graniteville, SC

DATE October 14, 2024

DEPTH FEET		PENETRATION VALUE (N)	VISUAL UNIFIED CLASS.	PERCENT MOISTURE
45'	Very Firm, Tan Silty Sand with Gravel	22 @ 43.5'	SM	
50'	Hard, White Sandy Clayey Silt	31 @ 48.5'	ML	
55'	Boring Terminated at 50 feet. Upper 4" is Asphalt.			
60'				
65'				
70'				
75'				
80'				

N Value is number of blows of 140 pound hammer required to drive 2" split-tube sampler one foot after seated.

28' WATER TABLE AT TIME OF BORING



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PROJECT Old Leavelle Renovation

BORING NO. B-3

LOCATION 82 Canal Street, Graniteville, SC

DATE October 14, 2024

DEPTH FEET	VISUAL SOIL DESCRIPTION	PENETRATION VALUE (N)	VISUAL UNIFIED CLASS.	PERCENT MOISTURE
5'	Loose, Brown and Red Silty Sand (Fill)	8 @ 1'	SM	
	Firm, Reddish-Tan and Brown Silty Sand (Fill)	14 @ 3.5'	SM	
	Loose, Brown Silty Sand (Fill)	7 @ 6'	SM	
	Loose, Reddish-Tan Silty Sand	4 @ 8.5'	SM	
10'	Very Loose, Tan Silty Sand		SM	
15'	Very Stiff, Tan Clayey Silt	17 @ 13.5'	ML	
	Very Firm, Tan and Red Clayey Silty Sand	22 @ 18.5'	SM	
20'				
25'	Very Firm, White, Tan, and Red Silty Sand	25 @ 23.5'	SM	
		18 @ 28.5'	ML	
30'	Very Stiff, White and Tan Sandy Silt			
35'	Boring Terminated at 30 feet. Upper 4" is Asphalt.			
40'				

N Value is number of blows of 140 pound hammer required to drive 2" split-tube sampler one foot after seated.

NO WATER TABLE AT TIME OF BORING

APPENDIX III
Field Testing Procedures

FIELD TESTING PROCEDURES

SOIL TEST BORINGS

Soil sampling and penetration testing were performed in general accordance with ASTM D 1586.

The borings were made by mechanically twisting a continuous steel flight hollow stem auger into the soil. At regular intervals, soil samples obtained with a standard 1.4 inch I.D., 2 inch O.D., split-barrel sampler. The sampler was first seated 6 inches to penetrate any loose cuttings, then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot was recorded as the "penetration resistance". The penetration resistance, when properly evaluated, is an index to the soil strength and foundation supporting capability.

Representative portions of the soil samples, obtained from the sampler, were placed in glass jars and transported to our laboratory. In the laboratory, the samples were examined by an engineer to verify the driller's field classifications. Test boring records are attached, graphically showing the soil descriptions and penetration resistances.