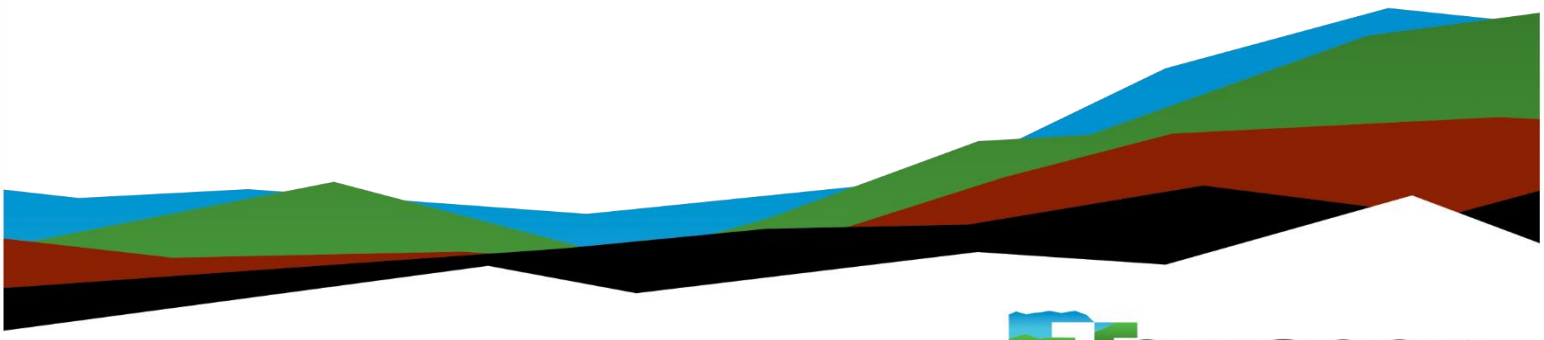
Santa Maria Considine

Preliminary Geotechnical Engineering Report

October 10, 2023 | Terracon Project No. N1235237

Prepared for:

Santa Maria Community Services, Inc
1826 Race Street
Cincinnati, Ohio, 45202



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October 10, 2023

Santa Maria Community Services, Inc
1826 Race Street
Cincinnati, Ohio, 45202

Attn: Jason Chamlee
P: 513.559.5896
E: jchamlee@modelgroup.net

Re: Preliminary Geotechnical Engineering Report
Santa Maria Considine
1048 Considine Ave
Cincinnati, Ohio
Terracon Project No. N1235237

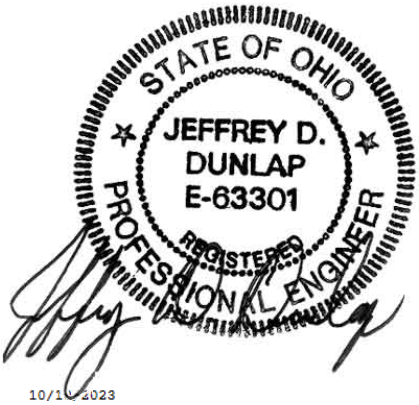
Dear Mr. Chamlee:

We have completed the scope of Preliminary Geotechnical Engineering services for the above-referenced project in general accordance with Terracon Proposal No. PN235237 dated August 17, 2023. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations and floor slabs for the proposed project. The data in this report supplements our geophysical exploration report dated August 26, 2022.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon



Ayanda T. Ncube, EIT
Geotechnical Staff Engineer

Jeffrey D. Dunlap, PE
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Attachments

Note: This report was originally delivered in a web-based format. **Blue Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the terracon logo will bring you

back to this page. For more interactive features, please view your project online at **client.terracon.com**.

Refer to each individual Attachment for a listing of contents.

Introduction

This report presents the results of our subsurface exploration and Preliminary Geotechnical Engineering services performed for the proposed school buildings and possible apartments to be located at 1048 Considine Ave in Cincinnati, Ohio. The purpose of these services was to provide information and preliminary geotechnical engineering recommendations relative to:

- Subsurface soil and rock conditions
- Groundwater conditions
- Seismic site classification per IBC
- Site preparation and earthwork
- Foundation design and construction
- Floor slab design and construction
- Lateral earth pressure
- Pavement design and construction

The geotechnical engineering Scope of Services for this project included the advancement of test borings, laboratory testing, engineering analysis, and preparation of this report.

Drawings showing the site and boring locations are shown on the **Site Location** and **Exploration Plan**, respectively. The results of the laboratory testing performed on soil samples obtained from the site during our field exploration are included on the boring logs and/or as separate graphs in the **Exploration Results** section.

Project Description

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	Information on this project was provided via email and telephone correspondence with Jason Chamlee of Model Group in July and August 2023.

Item	Description
Project Description	The project is currently in phase 2 of the due diligence evaluation process. The project consists of two school buildings and possible future apartments or multi-occupant structures. The final location of the proposed buildings has not been finalized at this time.
Finished Floor Elevation	Unknown, the grading plans were not available at the time of this report.
Below-Grade Structures	None anticipated.
Free-Standing Retaining Walls	Retaining walls may be required as part of site development to achieve final grades.

Terracon should be notified if any of the above information is inconsistent with the preliminary planned construction. Once grading plans are available and building locations are determined, the recommendations in this report will need to be finalized, which may include additional test borings.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	■ The project is located at 1048 Considine Ave in Cincinnati, Ohio. ■ Latitude/Longitude (approximate) 39.11148, -84.56167 ■ See **Site Location**
Existing Structures/Conditions	Existing residential and apartment buildings with associated driveways to the north and south of the site, and a telecoms tower to the northwest of the site.

Item	Description
Existing Topography (from Hamilton Co. CAGIS)	Surface grades on-site range from approximately Elevation 880 to 890 feet, MSL, gently sloping upwards toward the center of the site from all directions. The north side of the site has a relatively steep 2H:1V (approximate) slope that is approximately 40 feet high. On the east side of the site, there is an existing approximately 1.3H:1V slope that is about 28 feet tall leading down to Grand Avenue. The slope on the east side of the site transitions to an approximate 2.5H:1V slope up to about 20 feet high further to the south.
Geology	The near-surface soils at the site are man-placed fill soils associated with past developments. Underneath the fill soils are native clay soils and residual soils. Residual soils are soils formed by the complete weathering of the underlying bedrock. Based on the review of published geologic literature and archive borings, the bedrock at this site belongs to the Ordovician Age Grant Lake and Fairview, Miamitown Shale Formations typically consisting of about 50% shale and 50% limestone. Bedrock was encountered as shallow as 6 feet below existing grades in the recent test borings.

Geotechnical Characterization

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual boring logs can be found in the **Exploration Results** and the GeoModel can be found in the **Figures** attachment of this report.

As part of our analyses, we identified the following model layers within the subsurface profile based on the recent test borings. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	Existing Cohesive Fill	Lean clay to fat clay, various rock, concrete and brick fragments, various sand and gravel, brown, dark brown, reddish brown and gray
2	Existing Granular Fill	Clayey sand with gravel, various coal, shale and brick fragments, light brown, brown and dark brown
3	Native Cohesive	Lean clay, various sand, and gravel, brown to olive brown, hard
4	Residuum	Lean clay to fat clay, various relic bedding planes, limestone fragments to layers, and shale seams, brown, olive brown and gray, very stiff to hard
5	Weathered Bedrock	Shale, brown to brown and gray, very weak to weak, highly weathered to moderately weathered, with interbedded limestone seams
6	Bedrock	Shale, gray, very weak to weak, moderately weathered to slightly weathered, with interbedded limestone seams

Groundwater Conditions

The boreholes were observed while drilling and after completion for the presence and level of groundwater. Several borings were left open overnight and next day groundwater readings were recorded prior to backfilling the boreholes. Groundwater seepage was not encountered within the maximum drilling depth at the time of our field exploration. Groundwater conditions may be different at the time of construction. Groundwater conditions may change because of seasonal variations in rainfall, runoff, and other conditions not apparent at the time of drilling.

In our experience, perched groundwater is oftentimes encountered within existing fill soils, at the interface of the existing fill/native soil, at the interface of the soil/bedrock interface and within fractures and seams within the bedrock. The chance of encountering perched bedrock increases during the historically wetter winter and spring months and after precipitation events.

Seismic Site Class

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the

site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC). Based on the soil/bedrock properties observed at the site and as described on the exploration logs and results, our professional opinion is for that a **Seismic Site Classification of C** be considered for the project. Subsurface explorations at this site were extended to a maximum depth of 37 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth.

Geotechnical Overview

This report provides information on the data collected and preliminary recommendations related to geotechnical aspects of the project including encountered subsurface conditions, earthwork, and foundations. All recommendations in this report are considered preliminary in nature, and final building locations, finished floor elevations and further subsurface investigation will be required to finalize the recommendations in this report. Our geotechnical exploration included a total of 19 borings drilled to depths between 10 feet and 37 feet below the existing ground surface. All but one boring terminated in bedrock. One boring terminated in residual soils. We have supplemented the recent geotechnical data with archive test borings and laboratory data from 1971 in our files.

Existing fill was encountered within the subsurface exploration depths and ranged in depth from 2.5 feet to 28.5 feet. Please note the depth of existing fill will vary at locations away from the borings. Please refer to the boring logs in the **Exploration Results** section of this report for a more detailed description of the encountered existing fill soils. We have been provided no records to indicate the degree of compaction and moisture control used during the placement of this existing fill. The moisture content of the tested existing fill samples from the recent borings varied from 6% to 33% and the plastic limit of the tested existing fill samples varied from 16% to 27%. Considering the lack of compaction documentation and the range of moisture content of the tested existing fill samples, it is our opinion that the existing fill should be considered undocumented fill and not suitable for direct support of building foundations and floor slabs.

In the western and eastern parts of the site, the very stiff to hard native soils (GeoModel Layers 3 and 4) are suitable for foundation support of the buildings. It should be noted that some undercut of existing fill soils up to 6 feet below existing grades will be required, in order for shallow foundations to be supported on firm native soils These soils are primarily residual soils or residuum. Residuum or residual soil is derived from the complete weathering of the underlying parent bedrock and is characterized by the

presence of relic bedding planes and shale or limestone layers and fragments indicative of the parent bedrock materials. Typically, the residual soils (GeoModel Layer 4) have moisture contents ranging from 2% to 19%. The liquid limits of the tested residual soil samples ranged from about 31% to 51% with liquid limit values ranging from 31 to 51 and plasticity limit values ranging from 15 to 21.

In the northern and southern parts of the site and at Boring 23-2-5, deep foundations such as drilled shafts that extend down to the bedrock should be anticipated. The laboratory test results, and descriptions of the recovered samples are presented in the **Exploration Results**.

The table below summarizes the approximate depths of the unsuitable GeoModel Layers 1 and 2 existing fill soils and the anticipated foundation type within the location of the test boring. Typically, undercut or 8 feet or more is not practical to construct shallow foundations and deep foundations are required. Please note that grading (cut and fill) could impact the anticipated foundations system. It is recommended that before construction commences at the site and estimated finished floor elevations are known, additional test borings and test pits be performed outside the final building perimeters to confirm building foundation-bearing elevations. The use of basements or crawl spaces could prove beneficial in some areas of the site, since the basement excavation would likely penetrate all if not most of the existing fill, with the exception of borings were more than about 10 feet of existing fill was encountered. Some variation between test borings should be anticipated.

Boring ID	Approximate Depth of Existing Fill (GeoModel Layers 1 & 2) (feet) [1]	Anticipated Foundation System
23-1-1	3.5	Shallow foundation
23-1-2	23.5	Deep Foundation
23-1-3	6	Shallow Foundation
23-1-4	6	Shallow Foundation
23-1-5	No fill encountered	Shallow Foundation
23-1-6	6	Shallow Foundation
23-1-7	6	Shallow Foundation
23-1-8	2.5	Shallow Foundation
23-1-9	8.5	Deep Foundation
23-1-10	8.5	Deep Foundation
23-1-11	18.5	Deep Foundation
23-2-1	28.5	Deep Foundation
23-2-2	13.5	Deep Foundation

Boring ID	Approximate Depth of Existing Fill (GeoModel Layers 1 & 2) (feet) [1]	Anticipated Foundation System
23-2-3	8.5	Deep Foundation
23-2-4	6	Shallow Foundation
23-2-5	13.5	Deep Foundation
23-2-6	3.5	Shallow Foundation
23-2-7	3.5	Shallow Foundation
23-2-8	6	Shallow Foundation

1. Below the existing ground surface.

It is recommended that all building structures be maintained at least beyond an imaginary 3H:1V projection upwards from the toe of any slope steeper than 2H:1V. This is the case along the north and northeast perimeter areas of the site.

Due to the deep existing fill conditions as Borings 23-1-2, 23-1-11, 23-2-1, and 23-2-2 and the adjacent steep slope, we recommend that the northern portion of the site be avoided as a potential building location. The depth of existing fill will increase the building foundation cost and the existing steep slope could result in unwanted lateral foundation movements.

For the slab-on-grade floor slab in the finalized building areas, where deep existing fill is encountered, we recommend that the floor slab be supported on a minimum of 3 feet of new structural fill below the proposed floor slab subgrade elevation. This will require some partial undercut of the existing fill soils (GeoModel Layers 1 and 2) within and 5 feet beyond the proposed building footprints. The minimum of 3 feet of new structural fill below the floor slab subgrade elevation is to provide more uniform support of the floor slab, as compared to a subgrade consisting of the variable existing fill soils. Where firm, native soils are encountered before achieving the 3-feet deep partial undercut, the partial undercut can be terminated on the firm native soil, provided it passes a proofroll.

The near-surface existing undocumented fill could become unstable with typical earthwork and construction traffic, especially after precipitation events. Effective drainage should be completed early in the construction sequence and maintained after construction to avoid potential issues. If possible, grading should be performed during the warmer and drier times of the year. If grading is performed during the winter months, an increased risk for possible undercutting and replacement of unstable subgrade will persist. Additional site preparation recommendations, including subgrade improvement and fill placement, are provided in the **Earthwork** section.

Traffic information is currently not available for us to generate an opinion of the minimum pavement component thickness. The **Pavements** section includes our

recommended parameters for subgrade support for surfacing design by others. Both flexible (asphalt cement concrete) and rigid (Portland cement concrete) pavement systems are discussed in this report. We can provide pavement section thickness design if traffic information is made available if so requested, as part of the final geotechnical engineering scope.

Support of pavements and floor slabs on or above existing fill materials is discussed in this report. However, even with the recommended construction procedures, an inherent risk remains for the owner that compressible fill or unsuitable material, within or buried by the fill, will not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by following the recommendations contained in this report. To take advantage of the cost benefit of not removing the entire amount of undocumented fill, the owner must be willing to accept the risk of increased differential performance which can result in increased cracking and abrupt differential settlement. Should this risk be acceptable, pavements can be supported on or above the existing fill.

The preliminary recommendations contained in this report are based upon the results of field and laboratory testing (presented in the **Exploration Results**), engineering analyses, and our current understanding of the proposed project. The **General Comments** section provides an understanding of the report limitations.

Earthwork

Earthwork is anticipated to include, clearing and grubbing, excavations, and engineered fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations, floor slabs, and pavements.

Site Preparation

Prior to placing new fill, existing vegetation, topsoil, and root mats should be removed. Complete stripping of the topsoil should be performed in the proposed building and parking/driveway areas. Any existing pavement areas should be completely removed and removed pavement materials be properly disposed of off-site.

Any existing utilities should be removed from the proposed building areas and relocated outside the building footprints. Any resulting trenches should be backfilled with structural fill as recommended in this report.

Any mature trees located within or near the finalized footprint of some of the proposed buildings will require removal at the onset of construction, which is anticipated in the

southwestern portion of the site, where existing brush and trees are present. Tree root systems can remove substantial moisture from surrounding soils. Where trees are removed, the full root ball and all associated dry and desiccated soils should be removed. The soil materials which contain less than 5 percent organics can be reused as engineered fill provided the material is moisture conditioned and properly compacted.

Where fill is placed on existing slopes steeper than 5H:1V, nearly level benches should be cut into the existing slopes prior to fill placement. The benches should have a minimum vertical face height of 1 foot and a maximum vertical face height of 3 feet and should be cut wide enough to accommodate the compaction equipment. This benching will help provide a positive bond between the new fill and the existing soils and reduce the potential of failure along the new fill/existing soil interface.

Subgrade Preparation

Before placing any new structural fill, we recommend that the areas of existing fill be prepared as recommended in the Existing Fill section. It is anticipated that existing fill soil (GeoModel Layers 1 and 2) may be exposed within the proposed building areas during construction, it is recommended that this soil be partially undercut to a minimum depth of 3 feet below the design floor slab subgrade elevation and replaced with structural fill. The partial undercut and structural fill placement beneath the building footprints should extend horizontally a minimum distance of 5 feet beyond the outside edge of the building. If firm native soils (GeoModel Layers 3 and 4) are encountered before reaching the partial undercut depth, the partial overexcavation can be terminated in these areas upon encountering firm native soil.

After subgrade preparation, partial undercut, and new utility installation, the subgrade should be proof rolled with an adequately loaded vehicle such as a fully loaded tandem-axle dump truck (minimum 20 tons). The proof rolling should be performed under the observation of the Geotechnical Engineer or representative. Areas excessively deflecting under the proof roll should be delineated and subsequently addressed by the Geotechnical Engineer. Elevated moisture contents were encountered in some of the test borings and some rutting and pumping of the cohesive soils at the base of the planned partial undercut should be anticipated. Such areas should either be removed or modified by treating/applying/mixing with lime or cement or using stone and geogrid. Excessively wet or dry material should either be removed, or moisture conditioned and recompacted.

All exposed areas which will receive new fill, once properly cleared and partially undercut where necessary, should be scarified to a minimum depth of 10 inches, moisture conditioned as necessary, and compacted per the compaction requirements in this report. Compacted structural fill soils should then be placed to the proposed design grade and the moisture content and compaction of subgrade soils should be maintained until foundation or pavement construction. Based upon the subsurface conditions determined from the geotechnical exploration, subgrade soils exposed during

construction are anticipated to be relatively workable; however, the workability of the subgrade may be affected by precipitation, repetitive construction traffic, or other factors. If unworkable conditions develop, workability may be improved by scarifying/discing and drying, if weather conditions permit. Alternatively, chemical drying could also be considered to dry soils if unworkable conditions develop during construction. Any mud and disturbed material should be removed before final pavement construction or granular base placement.

All new structural fill will need to be placed in maximum loose lifts of 8 inches. The fill will need to be compacted to at least 98% of maximum dry density per standard Proctor (ASTM D698). Cohesive fill should be compacted between +/-3% per ASTM D698, and granular fill should be compacted to between+/-2% per ASTM6 D698. Some moisture correction of the on-site soils should be anticipated.

New fill materials should have liquid limits of 45 or less and plastic limits of 23 or less. Any large inert items such as rocks with dimensions greater than 4 inches should be removed from the fill or mechanically broken down into smaller pieces. Deleterious items such as organics, wood, metal, or other items will need to be removed from the fill. Off-site fill sources should exclude shale and limestone bedrock and fat clay soils.

Existing Fill

As noted in **Geotechnical Characterization**, all but 1 boring encountered previously placed fill to depths ranging from about 2.5 to 28.5 feet. We have no records to indicate the degree of control of the existing fill, and consequently, the existing fill is considered unreliable for support of foundation loads. Support of floor slabs and pavements on or above existing fill soils is discussed in this report. However, even with the recommended construction procedures, inherent risk exists for the owner that compressible fill or unsuitable material, within or buried by the existing fill will, not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by following the recommendations contained in this report.

Based on the data from the field exploration and laboratory testing, it is our opinion that the existing fill (GeoModel Layers 1 and 2) is considered unreliable for support of foundation loads. The native soils (GeoModel Layers 3 and 4) and weathered bedrock (GeoModel Layer 5), in our opinion, are suitable for direct support of shallow foundation loads. It will be necessary at the foundation locations to completely undercut the existing fill soil (GeoModel Layers 1 and 2) until the more competent native, residual soils or weathered bedrock are exposed. Once the final building locations are known, we recommend that test pits and additional borings be performed before construction to confirm bearing elevations for the building footings.

In floor slab areas where existing fill is exposed at or within 3 feet of proposed subgrade elevation, it is recommended that this soil be partially undercut to a minimum depth of 3

feet below the design floor slab subgrade elevation and replaced with structural fill. The partial undercut and structural fill placement beneath the building footprints should extend horizontally a minimum distance of 5 feet beyond the outside edge of the building. If firm native soils (GeoModel Layers 3 and 4) are encountered before reaching the partial undercut depth, the partial overexcavation can be terminated in these areas upon encountering firm native soil.

If the owner elects to construct pavements on the existing undocumented fill (GeoModel Layers 1 and 2) to reduce initial construction costs in exchange for increased potential for longer-term pavement distress, the following protocol should be followed. After the planned subgrade elevation has been reached, the entire pavement area should be thoroughly proofrolled with heavy, rubber tire construction equipment, to aid in delineating any areas of soft or otherwise unsuitable soil. Areas of soft or otherwise unsuitable material should be undercut and replaced with either new structural fill or suitable, existing on-site materials. Any existing undocumented fill that was removed can be evaluated during construction for reuse as structural fill. As a minimum, some moisture correction of undercut existing fill soil should be anticipated.

Support of floor slabs and pavements on or above existing fill soils is discussed in this report. However, even with the recommended construction procedures, an inherent risk exists for the owner that compressible undocumented fill or unsuitable material, within or buried by the undocumented fill will, not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing undocumented fill but can be reduced by following the recommendations contained in this report.

Grading and Drainage

All grades must provide effective drainage away from the building during and after construction and should be maintained throughout the life of the structure. Water retained next to the building can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. The roof should have gutters/drains with downspouts that discharge onto splash blocks at a distance of at least 10 feet from the building.

Exposed ground should be sloped and maintained at a minimum 5% away from the building for at least 10 feet beyond the perimeter of the building. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After building construction and landscaping have been completed, final grades should be verified to document effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted, as necessary, as part of the structure’s maintenance program. Where paving or flatwork abuts the structure, a maintenance program should be established to effectively seal and maintain joints and prevent surface water infiltration.

Earthwork Construction Considerations

Upon completion of filling and grading, care should be taken to maintain the subgrade water content before the construction of grade-supported improvements such as floor slabs and pavements. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted before floor slab construction.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety or the contractor's activities; such responsibility shall neither be implied nor inferred.

Excavations or other activities resulting in ground disturbance have the potential to affect adjoining properties and structures. Our scope of services does not include review of available final grading information or consider potential temporary grading performed by the contractor for potential effects such as ground movement beyond the project limits. A preconstruction/ precondition survey should be conducted to document nearby property/infrastructure prior to any site development activity. Excavation or ground disturbance activities adjacent or near property lines should be monitored or instrumented for potential ground movements that could negatively affect adjoining property and/or structures.

Construction Observation and Testing

The earthwork efforts should be observed by the Geotechnical Engineer (or others under their direction). Observation should include documentation of adequate removal of surficial materials (vegetation, topsoil, and pavements), evaluation and remediation of existing fill materials, as well as proofrolling and mitigation of unsuitable areas delineated by the proofroll.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, as recommended by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content.

In areas of foundation excavations, the bearing subgrade should be evaluated by the Geotechnical Engineer. If unanticipated conditions are observed, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

Foundations

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following preliminary design parameters are applicable for foundations. We have included top of bedrock contour maps for first encountered bedrock and gray shale and limestone bedrock in the **Figures** section of the report to help estimate preliminary bearing depths of drilled shaft foundations

Design Parameters – Compressive Loads

Item	Description
Maximum Net Allowable Bearing Pressure [1]	3,000 psf – shallow foundations bearing on stiff or better residuum or native soil 25 ksf – deep foundation bearing at least 1 shaft diameter into brown or brown and gray bedrock 50 ksf – deep foundation bearing at least one shaft diameter into gray bedrock
Required Bearing Stratum [2]	GeoModel Layers 3 and 4 or undisturbed native soils or structural fill extending to undisturbed native soils…

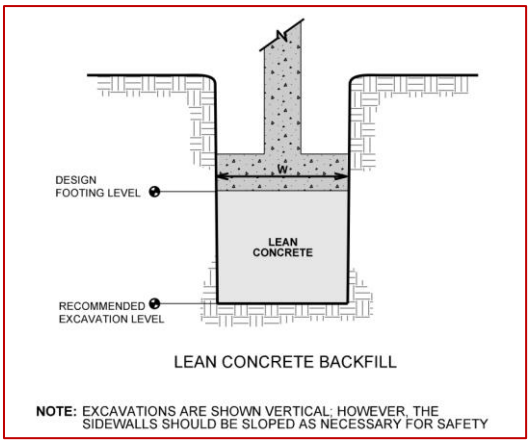
1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. Values assume that exterior grades are no steeper than 20% within 10 feet of structure.
2. Unsuitable or soft soils should be overexcavated and replaced per the recommendations presented in **Earthwork**.

For drilled shafts, the building columns could be supported on individual drilled shafts. Building walls would need to be supported on grade beams supported by regularly spaced drilled shafts. Lateral support of drilled shafts is beyond the scope of this preliminary report. L-Pile parameters for soil and bedrock would need to be provided in a final report.

Foundation Construction Considerations

As noted in **Earthwork**, the footing excavations should be evaluated under the observation of the Geotechnical Engineer. The base of all foundation excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

As indicated earlier, and existing fill would need to be overexcavated until firm native soil is exposed. The over excavation also includes any new fill that was placed over the existing fill. The footings cold then be constructed at the deepened level directly on the firm native soil of the undercut could be backfilled up to the design bearing elevation with lean concrete (f'c=1,500 psi minimum) and the footings bear on the lean concrete. If unsuitable bearing soils are observed at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the footings could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. The lean concrete replacement zone is illustrated on the sketch below.



For drilled shafts, encountered limestone floaters, granular fill zones or other debris in the existing fill will hamper drilled shaft excavation. Steel casing will need to be on site if caving or necking soils are required during excavation.

Floor Slabs

Design parameters for floor slabs assume the requirements for **Earthwork** have been followed. Specific attention should be given to positive drainage away from the structures and positive drainage of the aggregate base beneath the floor slab.

Existing unsuitable existing fill materials (GeoModel Layers 1 and 2) were observed at the site to depths of 2.5 to 28.5 feet below the existing grade. As previously described, any existing fill present beneath floor slabs should be partially removed such that a minimum of 3 feet of structural fill is present below the floor slab subgrade elevation.

Floor Slab Design Parameters

Item	Description
Floor Slab Support[1]	▪ Minimum 3 feet of compacted structural fill ▪ Minimum 4 inches of relatively free draining (less than 10% passing the U.S. No. 200 sieve) crushed aggregate, as compared to the cohesive subgrade soil, compacted to at least 98% of ASTM D 698 ▪ Subgrade compacted to recommendations in **Earthwork**
Estimated Modulus of Subgrade Reaction [2]	100 pounds per square inch per inch (psi/in) for point loads

1. Floor slabs should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.
2. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in **Earthwork**, and the floor slab support as noted in this table. It is provided for point loads. For large area loads the modulus of subgrade reaction would be lower.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, when the project includes humidity-controlled areas, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut contraction joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations, refer to the ACI Design Manual. Joints or cracks should be sealed with a waterproof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should

account for potential differential settlement through use of sufficient control joints, appropriate reinforcing, or other means.

Additional reinforcing steel in the floor slabs should be anticipated to stiffen the floor slabs, since some long-term settlement of floor slabs could occur due to the presence of undocumented/uncontrolled fill beneath the slab-on-grade floor slabs.

Floor Slab Construction Considerations

Finished subgrade, within and for at least 10 feet beyond the floor slab, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed, and structural fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

The Geotechnical Engineer should observe the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

Pavements

Pavement Subgrade Support Characteristics

Sufficient information is not available for us to provide an opinion of minimum pavement thickness for the project. For pavement design by others, we recommend that a preliminary subgrade California Bearing Ratio, CBR, of 3 be used for the asphaltic concrete pavement designs. We recommend that a modulus of subgrade reaction of 100 pci be used for the Portland cement concrete pavement designs. These values were empirically derived based upon our experience with the lean clay subgrade soils and our expectation of the quality of the subgrade as prescribed by the **Site Preparation** conditions as outlined in **Earthwork**.

Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section. Appropriate sub-

drainage or connection to a suitable daylight outlet should be provided to remove water from the granular subbase.

Pavement Maintenance

The pavement sections represent minimum recommended thicknesses and, as such, periodic upkeep should be anticipated. Preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Pavement care consists of both localized (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Additional engineering consultation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur, and repairs may be required.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2%.
- Subgrade and pavement surfaces should have a minimum 2% slope to promote proper surface drainage.
- Install pavement drainage systems surrounding areas anticipated for frequent wetting.
- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.
- Place compacted, low permeability backfill against the exterior side of curb and gutter.
- Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than on unbound granular base course materials.

General Comments

Our preliminary analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration (current and archive information). Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If

variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

The recommendations in this report are considered preliminary in nature and are not suitable for final design. Further subsurface study, laboratory testing, and geotechnical evaluation will be required once building locations have been selected and site grading plans have been developed.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for preliminary design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

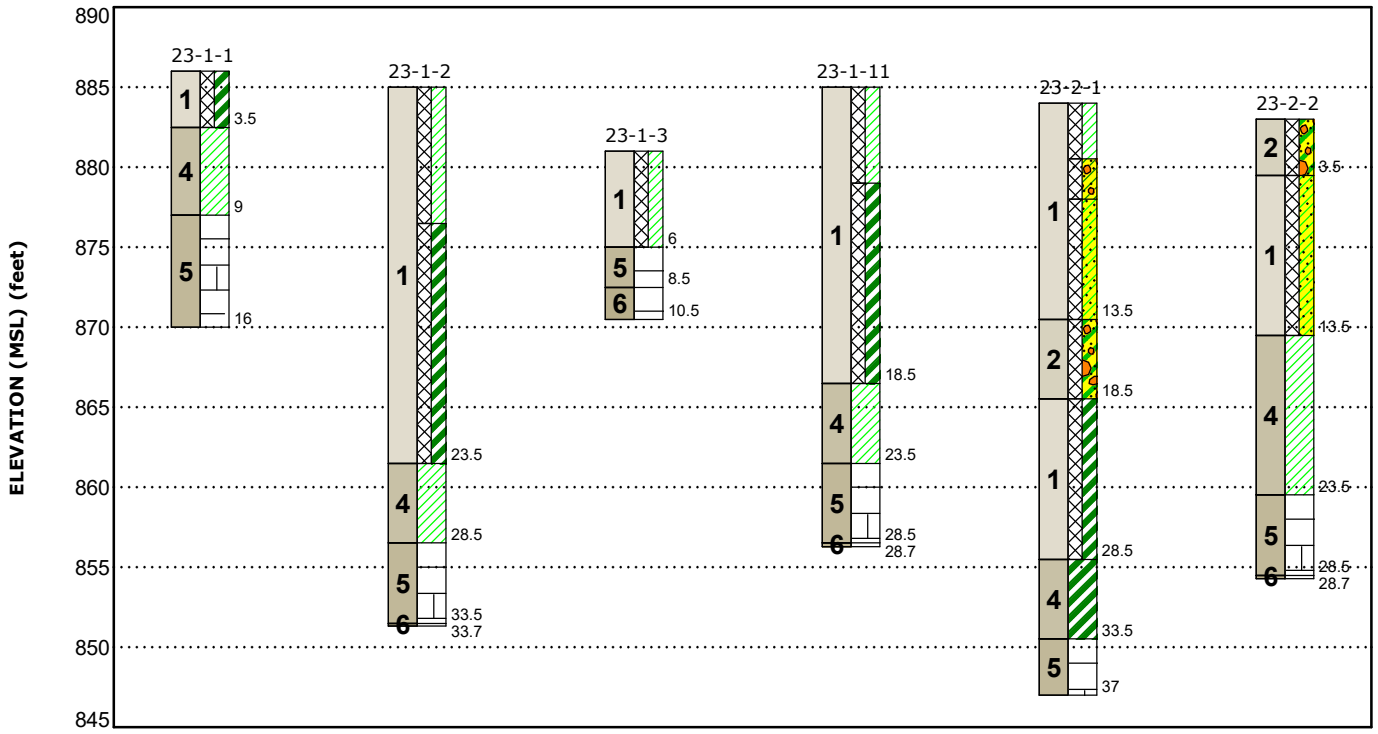
Figures

Contents:

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	**Existing Cohesive Fill**	Lean clay to fat clay, various rock, concrete and brick fragments, various sand and gravel, brown, dark brown, reddish brown and gray
2	**Existing Granular Fill**	Clayey sand with gravel, various coal, shale and brick fragments, light brown, brown and dark brown
3	**Native Cohesive**	Lean clay, various sand and gravel, brown to olive brown, hard
4	**Residuum**	Lean clay to fat clay, various relic bedding planes, limestone fragments to layers, and shale seams, brown, olive brown and gray, very stiff to hard
5	**Weathered Bedrock**	Shale, brown to brown and gray, very weak to weak, highly weathered to moderately weathered, with interbedded limestone seams
6	**Bedrock**	Shale, gray, very weak to weak, moderately weathered to slightly weathered, with interbedded limestone seams

Legend

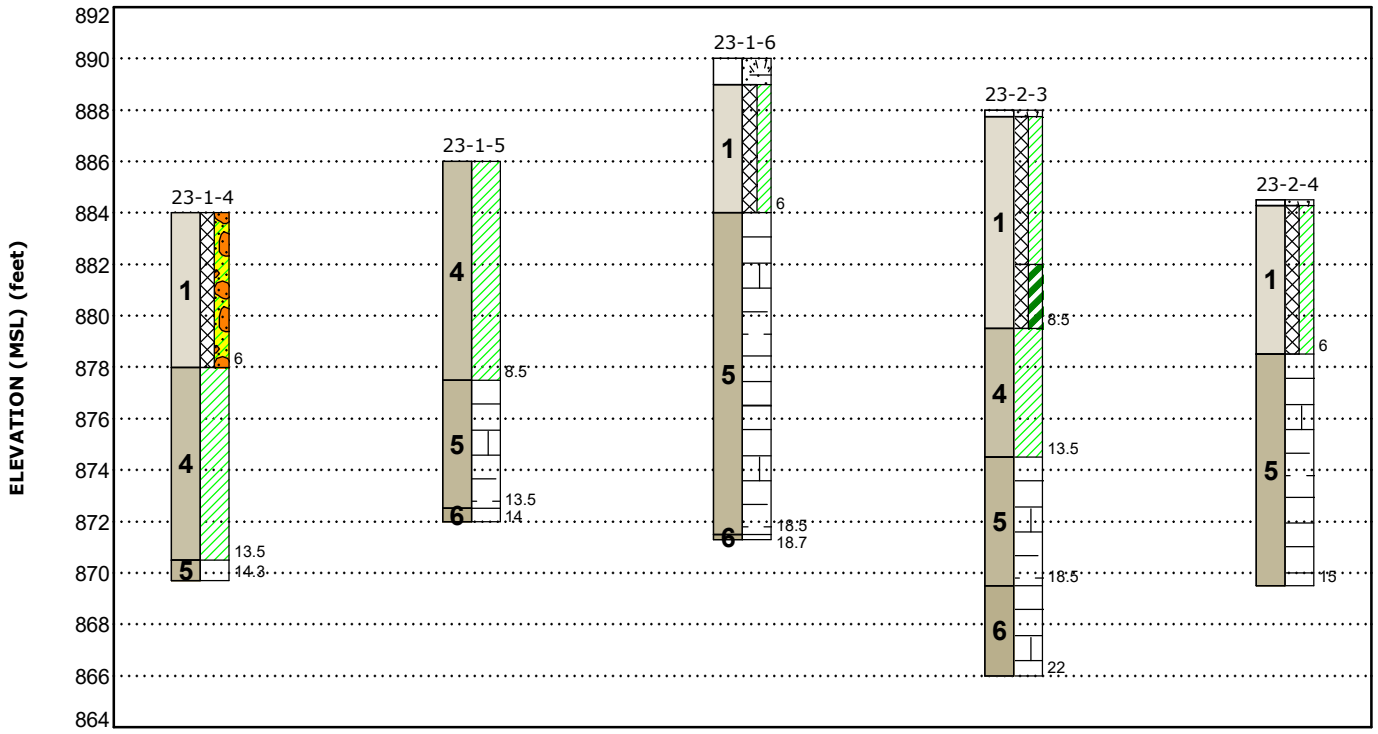
- Fat Clay
- Lean Clay
- Interbedded Limestone and Shale
- Sandy Lean Clay with Gravel
- Lean Clay with Sand
- Clayey Sand with Gravel

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

GeoModel



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Model Layer	Layer Name	General Description
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5	**Weathered Bedrock**	Shale, brown to brown and gray, very weak to weak, highly weathered to moderately weathered, with interbedded limestone seams
6	**Bedrock**	Shale, gray, very weak to weak, moderately weathered to slightly weathered, with interbedded limestone seams

Legend

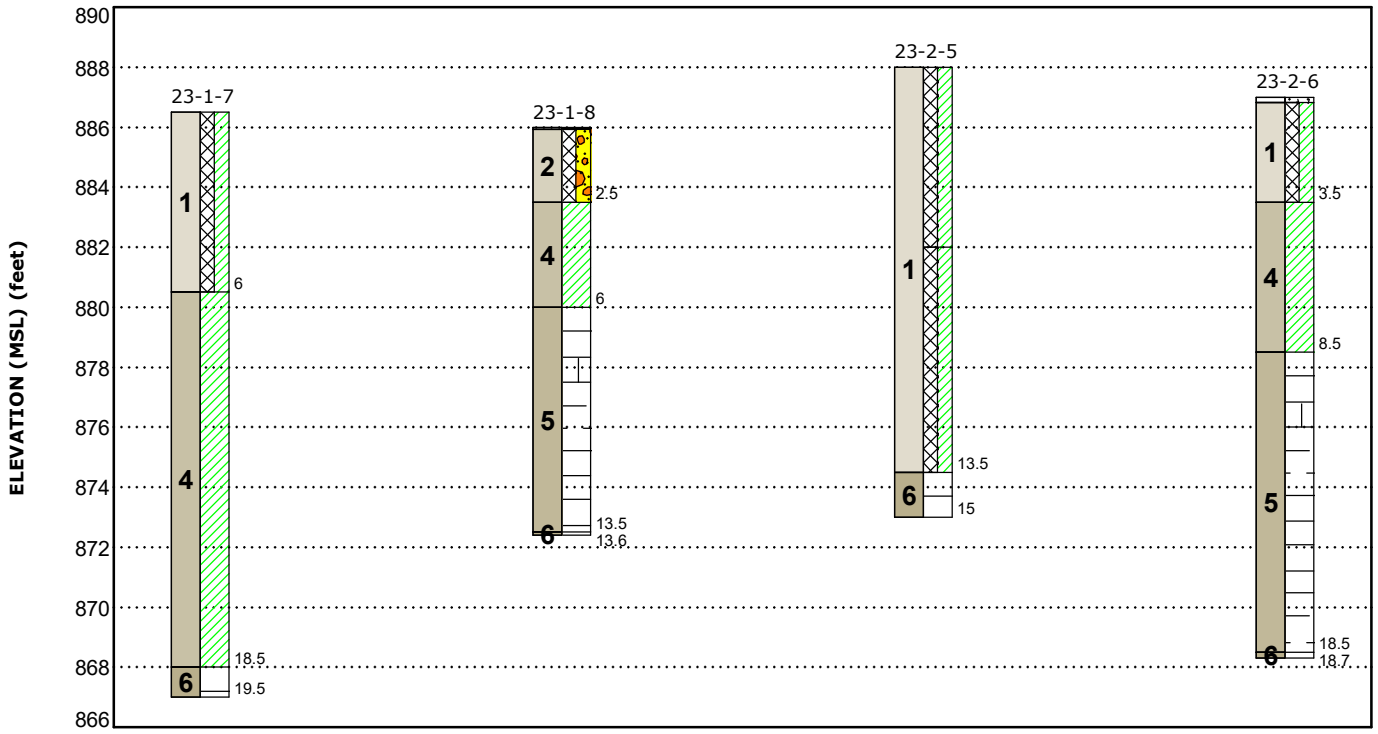
- Gravelly Lean Clay with Sand
- Interbedded Limestone and Shale
- Fat Clay
- Lean Clay
- Topsoil

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

GeoModel



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Model Layer	Layer Name	General Description
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6	**Bedrock**	Shale, gray, very weak to weak, moderately weathered to slightly weathered, with interbedded limestone seams

Legend

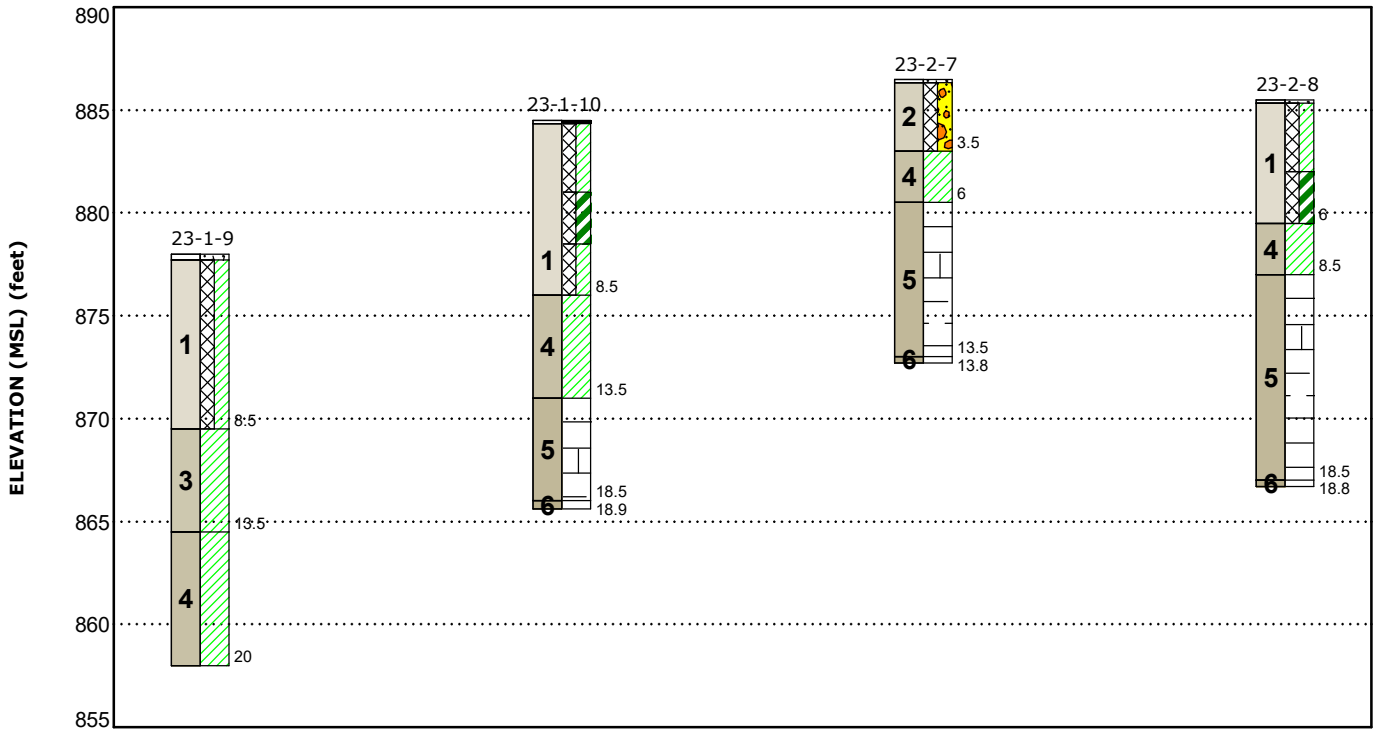
- Lean Clay
- Asphalt
- Topsoil
- Interbedded Limestone and Shale
- Poorly-graded Sand with Gravel

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

611 Lunken Park Dr
Cincinnati, OH

GeoModel



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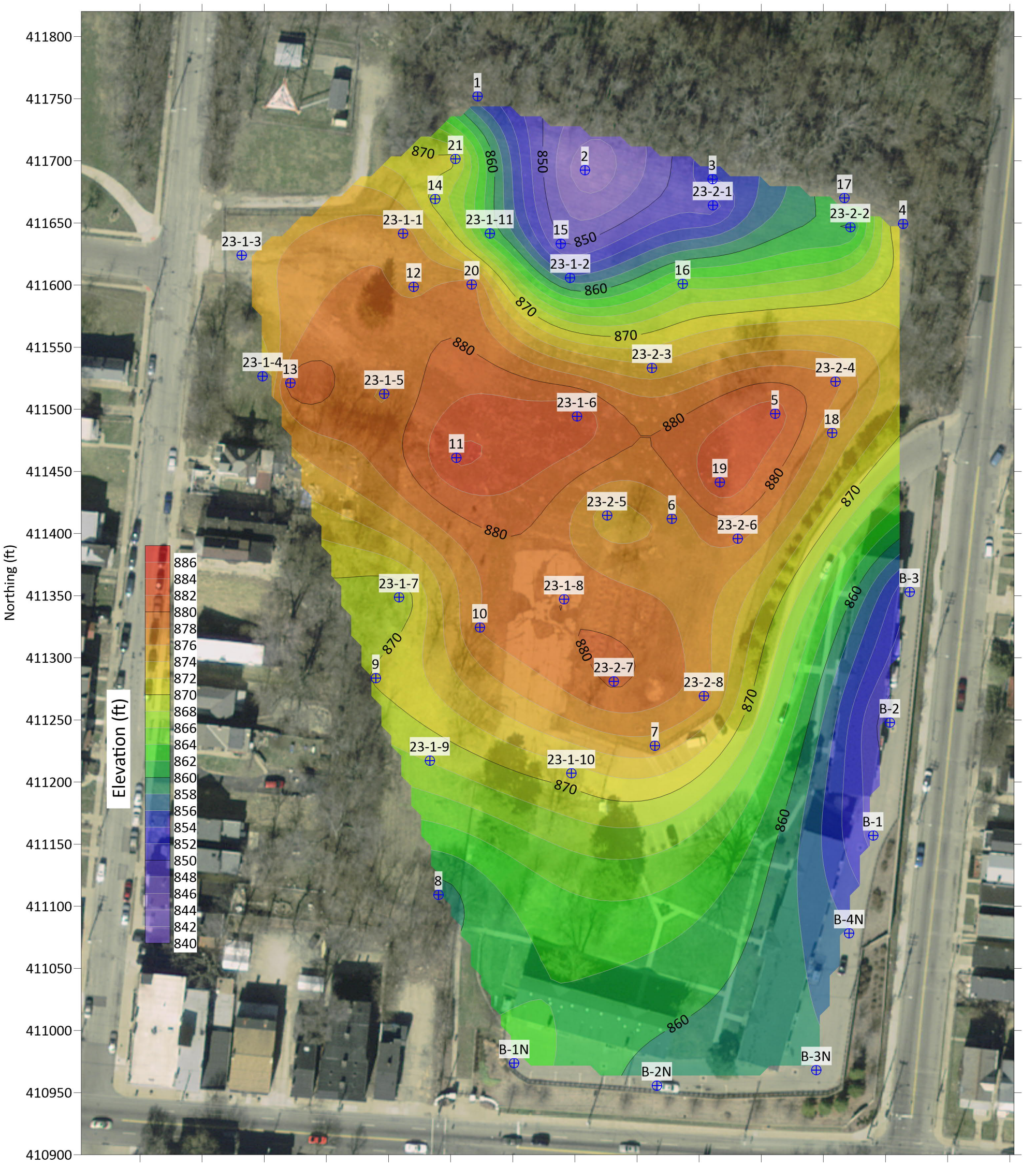
6	**Bedrock**	Shale, gray, very weak to weak, moderately weathered to slightly weathered, with interbedded limestone seams

Legend

- Topsoil
- Asphalt
- Interbedded Limestone and Shale
- Lean Clay
- Fat Clay
- Poorly-graded Sand with Gravel

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.



Estimated elevation contours represent the top of the first encountered bedrock consisting of brown weathered shale and limestone or gray shale and limestone bedrock. Contours are based on elevations at the current test borings and archive test borings, some variation should be anticipated during construction. Actual Elevations need to be confirmed during construction.

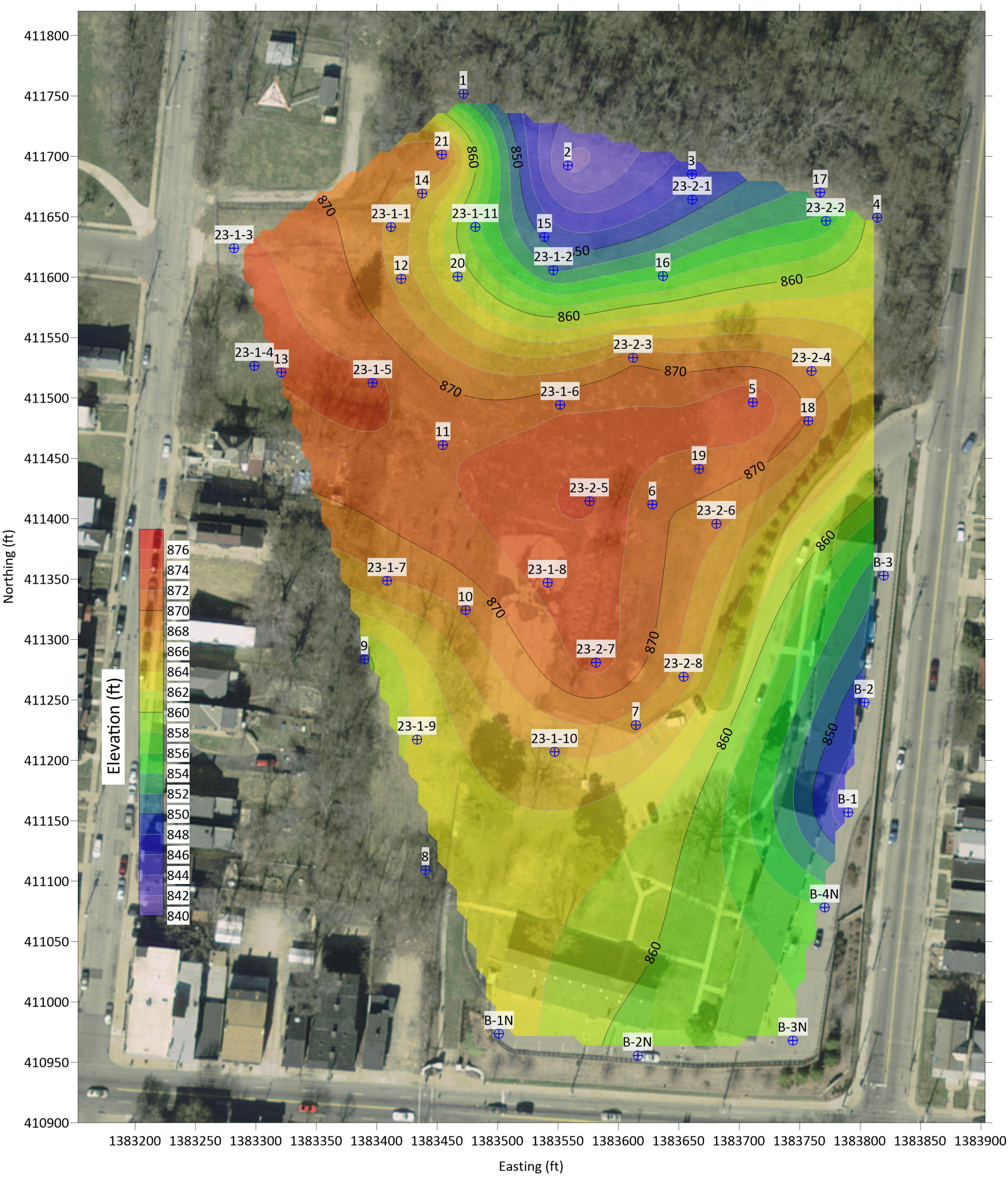
Project Manager:	JDD
Drawn by:	CHB
Checked by:	KJS
Approved by:	JDD

Project No.	N1195350
Scale:	As Shown
File Name:	GPX
Date:	9/26/2023

Terracon
Explore with us
611 Lunken Park Drive
Cincinnati, Ohio 45226

Top of First Encountered Bedrock Contour Map

Santa Maria Considine
Ridgeway and Harvey Avenues
Cincinnati, OH



N

Estimated elevation contours represent the top of gray shale and limestone bedrock. Contours are based on elevations at the current test borings and archive test borings, some variation should be anticipated during construction. Actual Elevations need to be confirmed during construction.

Project Manager: JDD	Project No. N1195350	Terracon Explore with us 611 Lunken Park Drive Cincinnati, Ohio 45226	Top of Gray Bedrock Contour Map Santa Maria Considine Ridgeway and Harvey Avenues Cincinnati, OH
Drawn by: CHB	Scale: As Shown		
Checked by: KJS	File Name: GPX		
Approved by: JDD	Date: 9/26/2023		

Attachments

Exploration and Testing Procedures

Field Exploration

Number of Borings	Approximate Boring Depth (feet)	Location
19	10 to 37	Anticipated development areas

Boring Layout and Elevations: Terracon personnel provided the boring layout using handheld GPS equipment (estimated horizontal accuracy of about ±2 feet) and referencing existing site features. Approximate ground surface elevations were obtained by interpolation from the Leica Zeno GPS Unit. If elevations and a more precise boring layout are desired, we recommend borings be surveyed.

Subsurface Exploration Procedures: We advanced the borings with a track-mounted, rotary drill rig using hollow-stem continuous flight augers. Four samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the thin-walled tube sampling procedure, a thin-walled, seamless steel tube with a sharp cutting edge was pushed hydraulically into the soil to obtain a relatively undisturbed sample. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels during drilling and sampling. For safety purposes, all borings were backfilled with auger cuttings after their completion.

We also observed the boreholes while drilling and at the completion of drilling for the presence of groundwater. Next day water levels were observed in some test borings. Groundwater was not observed at these times in the boreholes.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials observed during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following types of tests:

- Moisture Content
- Organic Content
- Unconfined Compression
- Atterberg Limits

The laboratory testing program included an examination of soil samples by an engineer. Based on the results of our field and laboratory programs, we described and classified the soil samples in accordance with the Unified Soil Classification System.

Rock classification was conducted using locally accepted practices for engineering purposes. Boring log rock classification was determined using the Description of Rock Properties.

Site Location and Exploration Plans

Contents:

Note: All attachments are one page unless noted above.

Site Location

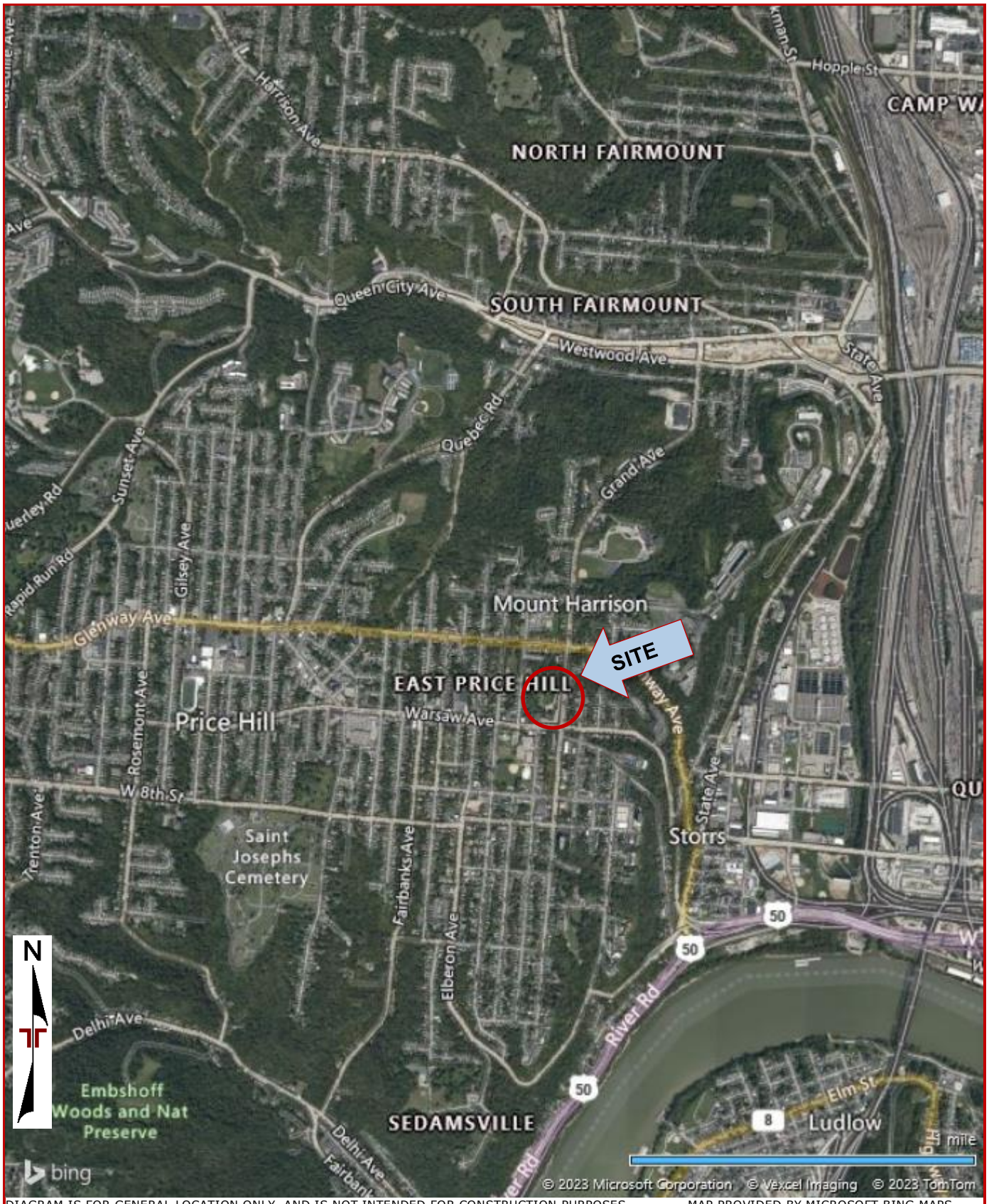


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan

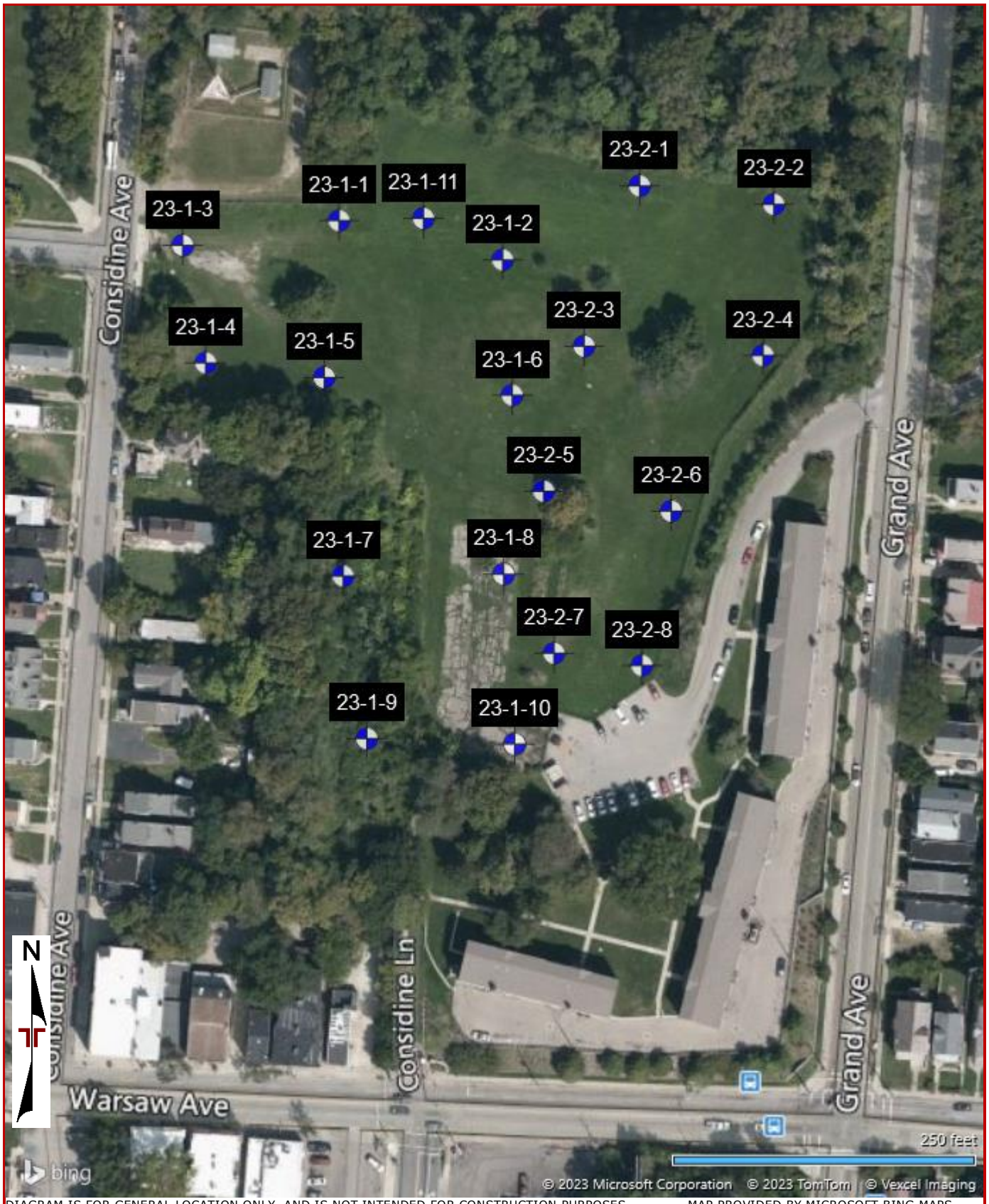


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES MAP PROVIDED BY MICROSOFT BING MAPS

Archive Exploration Plan

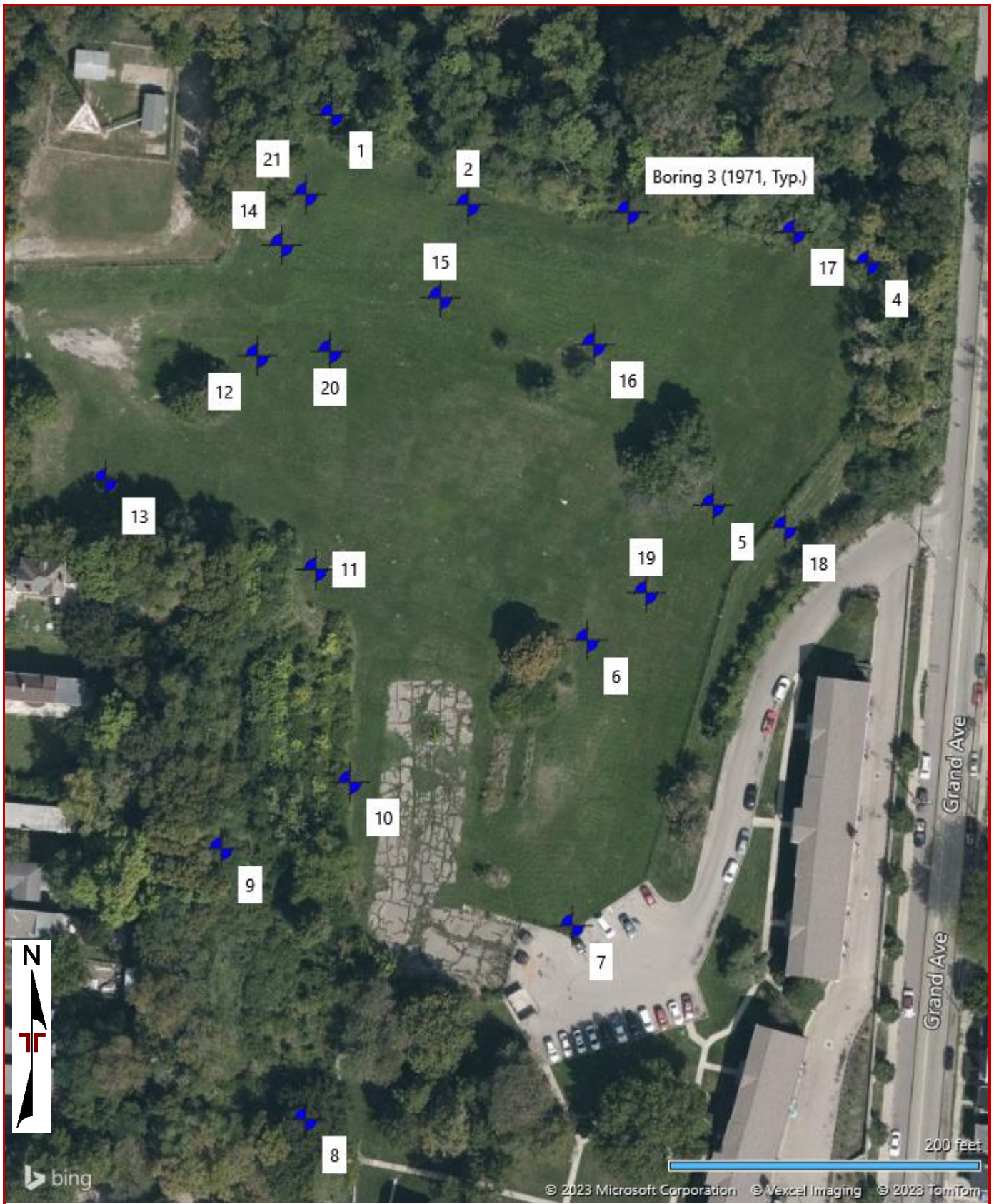


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES MAP PROVIDED BY MICROSOFT BING MAPS

Exploration and Laboratory Results

Contents:

Note: All attachments are one page unless noted above.

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-1-1

Location: See Exploration Plan

Latitude: 39.111869° Longitude: -84.562210°

Model Layer	Graphic Log	Depth (Ft.) / Elevation: 886 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
1		**FILL - FAT CLAY**, with oxide concretions and trace gravel, reddish brown									
					X	100	12-4-4 N=8			26.1	54-24-30
		3.5 / 882.5									
4		**LEAN CLAY (CL)**, with relic bedding planes, trace sand, and limestone fragments or seams, brown to olive, hard, (RESIDUUM)			X	100	20-10-18 N=28	4.5 (HP)		12.1	
			5								
					X	100	20-50/5"	4.5 (HP)		11.8	
		9.0 / 877			X	100	36-50/5"	4.5 (HP)		10.7	
5		**SHALE**, with interbedded limestone seams, brown, moderately to highly weathered, very weak	10								
					X	100	23-35-50/3"			13.8	
		16.0 / 870	15								
		Auger Refusal at 16 Feet									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling
No water observed after 24 hrs

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-04-2023

Boring Completed
09-04-2023

Notes

Elevation Reference: Elevations were interpolated from a topographic site plan. Coordinates measured using Zeno 20 GPS Unit.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler

Abandonment Method
Boring backfilled with Auger Cuttings

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-1-2

Location: See Exploration Plan

Latitude: 39.111780° Longitude: -84.561733°

Depth (Ft.) Elevation: 885 (Ft.) +/-

Model Layer	Graphic Log		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
		FILL - LEAN CLAY, trace sand, brick, root hairs, and coal fragments, dark brown and brown									
						22	9-7-5 N=12	4.5 (HP)		16.0	42-18-24
						39	3-2-1 N=3	4.5 (HP)		18.9	
			5			100	3-5-7 N=12	4.5 (HP)		18.5	
		8.5 876.5									
1		**FILL - FAT CLAY**, trace coal fragments, brown with gray				100	2-1-2 N=3	2.75 (HP)		31.8	
			10			100	2-3-4 N=7	1.5 (HP)		29.9	
			15								
						100	2-3-7 N=10	2.25 (HP)		29.3	
			20								
4		23.5 861.5 **LEAN CLAY (CL)**, with relic bedding planes, olive brown with gray, very stiff, (RESIDUUM)				100	6-12-11 N=23	4.5 (HP)		18.4	
			25								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-08-2023

Boring Completed
09-08-2023

Notes

Elevation Reference: Elevations were interpolated from a topographic site plan. Coordinates measured using Zeno 20 GPS Unit.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler

Abandonment Method
Boring backfilled with Auger Cuttings

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-1-2

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 39.111780° Longitude: -84.561733° Depth (Ft.) / Elevation: 885 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
4		**LEAN CLAY (CL)**, with relic bedding planes, olive brown with gray, very stiff, (RESIDUUM) *(continued)*									
		28.5 / 856.5									
5		**SHALE**, with interbedded limestone seams, brown, highly weathered, very weak	30			60	50			18.2	
		33.5 / 851.5									
6		33.7 / 851.3 **SHALE**, with interbedded limestone seams, gray, moderately weathered, weak ***Boring Terminated at 33.7 Feet***				100	50/2"			14.6	

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-08-2023

Boring Completed
09-08-2023

Notes

Elevation Reference: Elevations were interpolated from a topographic site plan. Coordinates measured using Zeno 20 GPS Unit.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler

Abandonment Method
Boring backfilled with Auger Cuttings

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-1-3

Location: See Exploration Plan

Latitude: 39.111813° Longitude: -84.562666°

Depth (Ft.) Elevation: 881 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
1		**FILL - LEAN CLAY**, trace sand, limestone fragments, and brown shale fragments, brown to olive brown			100	25-20-15 N=35			9.4	
		-limestone floater or cobble at 4.5 ft.			0	50				
		6.0 875								
5		**SHALE**, with interbedded limestone seams, brown, highly weathered, very weak			100	48-50/2"	4.5 (HP)		8.4	
		8.5 872.5								
6		**SHALE**, with interbedded limestone seams, gray, moderately weathered, weak			100	50/4"			10.3	
		10.5 870.5								
		Auger Refusal at 10.5 Feet								

5

10

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling
No water observed after 24 hrs

Drill Rig
932

Hammer Type
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Driller
A. Risner

Logged by
B. Mills

Boring Started
09-04-2023

Boring Completed
09-04-2023

Notes

Elevation Reference: Elevations were interpolated from a topographic site plan. Coordinates measured using Zeno 20 GPS Unit.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler

Abandonment Method
Boring backfilled with Auger Cuttings

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-1-4

Location: See Exploration Plan

Latitude: 39.111547° Longitude: -84.562599°

Depth (Ft.) Elevation: 884 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
1		**FILL - GRAVELLY LEAN CLAY WITH SAND**, with shale fragments, limestone fragments and trace oxide concretions, brown to olive brown								
					100	11-10-10 N=20	4.5 (HP)		10.1	
					100	12-10-38 N=48	4.5 (HP)		13.7	
		5								
		6.0 878								
4		**LEAN CLAY (CL)**, trace limestone layers, oxide concretions, trace sand, and relic bedding planes, olive brown, hard, (RESIDUUM)								
					100	23-37-50/3"	4.5 (HP)		2.4	
		trace shale seams at 8.5 - 13.5 ft.								
					100	50/4"	4.5 (HP)		7.9	
		10								
		13.5 870.5								
5		**SHALE**, with interbedded limestone seams, gray with brown, moderately weathered, very weak			100	40-50/3"			7.3	
		14.3 869.7								
		Boring Terminated at 14.3 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling
No water observed after 24 hrs

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-05-2023

Boring Completed
09-05-2023

Notes

Elevation Reference: Elevations were interpolated from a topographic site plan. Coordinates measured using Zeno 20 GPS Unit.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler

Abandonment Method
Boring backfilled with Auger Cuttings

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-1-5

Location: See Exploration Plan

Latitude: 39.111514° Longitude: -84.562253°

Model Layer	Graphic Log	Depth (Ft.) / Elevation: 886 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
4		**LEAN CLAY (CL)**, trace sand, limestone fragments, and relic bedding planes, olive brown, hard, (RESIDUUM)									
						100	24-14-24 N=38	4.5 (HP)		8.7	32-15-17
		-trace limestone seams below 4.5 ft.	5			100	27-27-50/5"	4.5 (HP)		15.2	
		-with sand at 6 ft.				100	30-50/5"	4.5 (HP)		5.3	
		8.5 877.5									
5		**SHALE**, with interbedded limestone seams, brown, highly weathered, very weak	10			100	38-50/5"			6.6	
		13.5 872.5									
6		14.0 **SHALE**, with interbedded limestone seams, gray, moderately weathered, weak 872				100	50/5"			8.1	
		Auger Refusal at 14 Feet									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling
No water observed after 24 hrs

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-06-2023

Boring Completed
09-06-2023

Notes

Elevation Reference: Elevations were interpolated from a topographic site plan. Coordinates measured using Zeno 20 GPS Unit.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler

Abandonment Method
Boring backfilled with Auger Cuttings

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-1-6

Location: See Exploration Plan

Latitude: 39.111474° Longitude: -84.561705°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 890 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
		0.0	**TOPSOIL (12")**									
		1.0	889									
1			**FILL - LEAN CLAY**, trace sand, gravel, root hairs, brick, and coal fragments, brown				100	12-13-18 N=31			6.1	
							100	25-10-46 N=56			16.2	
		6.0	884	5								
5			**SHALE**, with interbedded limestone seams, brown, highly weathered, extremely weak				100	40-30-25 N=55			11.0	
							100	36-32-32 N=64			9.0	
		13.5	876.5	10								
			SHALE, with interbedded limestone seams, brown, highly weathered, very weak				100	50/5"			10.2	
		18.5	871.5	15								
6		18.7	**SHALE**, with interbedded limestone seams, gray, moderately weathered, weak				100	50/2"			4.3	
			Boring Terminated at 18.7 Feet									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling
No water observed after 24 hrs

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-06-2023

Boring Completed
09-06-2023

Notes

Elevation Reference: Elevations were interpolated from a topographic site plan. Coordinates measured using Zeno 20 GPS Unit.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler

Abandonment Method
Boring backfilled with Auger Cuttings

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-1-7

Location: See Exploration Plan

Latitude: 39.111065° Longitude: -84.562198°

Depth (Ft.) Elevation: 886.5 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
1		**FILL - LEAN CLAY**, with shale and limestone fragments, slag, and root hairs, brown to reddish brown								
					6	9-10-10 N=20			19.5	
					22	9-7-7 N=14	4.5 (HP)		14.5	
		6.0 880.5								
4		**LEAN CLAY (CL)**, with limestone and shale seams, brown, hard, (RESIDUUM)								
					56	6-11-25 N=36			19.4	
					100	29-38-33 N=71	4.5 (HP)		12.6	
					100	28-23-18 N=41			12.6	
		18.5 868								
6		**SHALE**, with interbedded limestone seams, gray, moderately weathered, weak			100	20-50			11.2	
		19.5 867								
		Boring Terminated at 19.5 Feet								

5
10
15

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-08-2023

Boring Completed
09-08-2023

Notes

Elevation Reference: Elevations were interpolated from a topographic site plan. Coordinates measured using Zeno 20 GPS Unit.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler

Abandonment Method
Boring backfilled with Auger Cuttings

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-1-8

Location: See Exploration Plan

Latitude: 39.111069° Longitude: -84.561730°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 886 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
2		0.1	**ASPHALT (1")** 885.92									
			FILL - SAND WITH GRAVEL, trace root hairs, brown to light brown				0	4-3-2 N=5				
		2.5	883.5									
4			**LEAN CLAY (CL)**, trace sand, limestone fragments, and relic bedding planes, brown to olive brown, hard, (RESIDUUM)				100	9-10-12 N=22	4.5 (HP)		11.7	
		6.0	880	5								
5			**SHALE**, with interbedded limestone seams, brown, highly weathered, very weak				100	20-50/5"	4.5 (HP)		11.4	
							82	34-50/5"			9.8	
				10								
6		13.5	872.5									
		13.6	**SHALE**, with interbedded limestone seams, gray, moderately weathered, weak 872.4				11	50/1"			7.6	
			Boring Terminated at 13.6 Feet									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling
No water observed after 24 hrs

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-06-2023

Boring Completed
09-06-2023

Notes

Elevation Reference: Elevations were interpolated from a topographic site plan. Coordinates measured using Zeno 20 GPS Unit.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler

Abandonment Method
Boring backfilled with Auger Cuttings

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-1-9

Location: See Exploration Plan

Latitude: 39.1107° Longitude: -84.5621°

Depth (Ft.) Elevation: 878 (Ft.) +/-

Model Layer	Depth (Ft.)	Material Description	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
	0.3 (877.71)	**TOPSOIL (3-1/2")**								
1		**FILL - LEAN CLAY**, trace sand, gravel, limestone fragments, brick fragments, and root hairs, brown with gray			44	10-11-12 N=23			10.0	32-18-14
					28	9-9-12 N=21			13.1	
					22	7-7-9 N=16			10.0	
3	8.5 (869.5)	**LEAN CLAY (CL)**, trace sand, brown to dark brown, very stiff -Shelby tube sample from 8 to 10 ft. from offset boring was crushed and there was no recovery			56	10-6-7 N=13	4.5 (HP)		22.5	
4	13.5 (864.5)	**LEAN CLAY (CL)**, trace limestone fragments and relic bedding planes, olive brown and gray, hard, (RESIDUUM)			33	6-11-12 N=23	4.5 (HP)		19.6	
					89	12-12-17 N=29	4.5 (HP)		19.1	
	20.0 (858)	***Boring Terminated at 20 Feet***								

Depth (Ft.): 5, 10, 15, 20

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling
Cave-in at 15.5'

Notes
Elevation Reference: Elevations were interpolated from a topographic site plan. Coordinates interpolated by measuring 50 ft. east of staked location.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler
3-Inch Thin-Walled Tube

Abandonment Method
Boring backfilled with Auger Cuttings
Surface capped with concrete

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-08-2023

Boring Completed
09-08-2023

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-1-10

Location: See Exploration Plan

Latitude: 39.110685° Longitude: -84.561698°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 884.5 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
		0.2	**ASPHALT (2")** 884.33									
		3.5	**FILL - LEAN CLAY**, trace gravel and coal fragments, brown and black, with bluish gray 881				100	4-4-3 N=7			16.4	
		6.0	**FILL - FAT CLAY**, trace sand and gravel, brown to dark brown 878.5	5			100	4-8-11 N=19	4.5 (HP)		23.7	
1		8.5	**FILL - LEAN CLAY**, trace gravel and coal fragments, brown and black, with bluish gray 876				67	SHELBY TUBE		1.45	20.4	39-16-23
4		13.5	**LEAN CLAY (CL)**, with relic bedding planes and trace limestone fragments, brown to olive brown, hard, (RESIDUUM) 871	10			100	21-41-50 N=91	4.5 (HP)		9.1	
5		18.5	**SHALE**, with interbedded limestone seams, brown, highly weathered, very weak 866	15			100	15-31-50/4"	4.5 (HP)		16.0	
6		18.9	**SHALE**, with interbedded limestone seams, gray, moderately weathered, weak 865.6				100	50/5"			7.9	
			Boring Terminated at 18.9 Feet									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling
No water observed after 24 hrs

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-06-2023

Boring Completed
09-06-2023

Notes

Elevation Reference: Elevations were interpolated from a topographic site plan. Coordinates measured using Zeno 20 GPS Unit.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler
3-Inch Thin-Walled Tube

Abandonment Method
Boring backfilled with Auger Cuttings
Surface capped with concrete

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-1-11

Location: See Exploration Plan

Latitude: 39.111874° Longitude: -84.561964°

Depth (Ft.) Elevation: 885 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
		FILL - LEAN CLAY, trace sand, gravel, and limestone fragments, brown and dark gray								
					33	13-11-12 N=23	4.5 (HP)		16.2	
		-with sand and coal fragments at 3.5 ft.								
					100	6-6-5 N=11	4.5 (HP)		19.3	
		6.0 879								
		FILL - FAT CLAY, trace sand, limestone fragments, and shale seams, brown and gray								
1					100	4-2-3 N=5	2.25 (HP)		21.5	
					100	3-3-5 N=8	3.0 (HP)		22.7	
					100	4-7-7 N=14			21.0	
		18.5 866.5								
4		**LEAN CLAY (CL)**, relic bedding planes, olive brown, hard, (RESIDUUM)			100	7-12-15 N=27	4.5 (HP)		17.1	
		23.5 861.5								
5		**SHALE**, with interbedded limestone seams, brown and gray, highly weathered, extremely weak			100	9-23-50 N=73			14.4	

5 10 15 20 25

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-08-2023

Boring Completed
09-08-2023

Notes
Elevation Reference: Elevations were interpolated from a topographic site plan.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler
3-Inch Thin-Walled Tube

Abandonment Method
Boring backfilled with Auger Cuttings
Surface capped with concrete

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-1-11

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 39.111874° Longitude: -84.561964° Depth (Ft.) Elevation: 885 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
5		**SHALE**, with interbedded limestone seams, brown and gray, highly weathered, extremely weak *(continued)*									
		28.5 856.5									
6		28.7 856.3 **SHALE**, with interbedded limestone seams, gray, moderately weathered, weak ***Boring Terminated at 28.7 Feet***				50	50/2"			0.3	

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-08-2023

Boring Completed
09-08-2023

Notes
Elevation Reference: Elevations were interpolated from a topographic site plan.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler
3-Inch Thin-Walled Tube

Abandonment Method
Boring backfilled with Auger Cuttings
Surface capped with concrete

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-2-1

Location: See Exploration Plan

Latitude: 39.111947° Longitude: -84.561334°

Depth (Ft.) Elevation: 884 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
		FILL - LEAN CLAY, with oxide concretions and root hairs, brown								
		3.5 880.5			100	7-7-6 N=13	4.5 (HP)		14.4	
		FILL - SANDY LEAN CLAY WITH GRAVEL, trace calcareous nodules, brown			39	6-2-4 N=6	4.5 (HP)		16.6	
		6.0 878								
1		**FILL - LEAN CLAY WITH SAND**, with coal fragments, trace limestone fragments, and oxide concretions, brown to dark brown			100	5-4-6 N=10	4.5 (HP)		18.1	
					100	5-4-6 N=10	4.5 (HP)		16.2	
		13.5 870.5								
2		**FILL - CLAYEY SAND WITH GRAVEL**, with coal fragments, trace shale and brick fragments, dark brown to black			100	2-2-2 N=4			31.2	
		18.5 865.5								
1		**FILL - FAT CLAY**, with oxide concretions, silt lenses, and trace limestone fragments, brown with dark brown			100	3-3-6 N=9	2.0 (HP)		32.8	
					100	3-6-9 N=15	2.5 (HP)		25.7	

5 10 15 20 25

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling

Drill Rig
932

Hammer Type
Automatic

Driller
A. Moore

Logged by
B. Mills

Boring Started
09-13-2023

Boring Completed
09-13-2023

Notes
Elevation Reference: Elevations were interpolated from a topographic site plan.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler
3-Inch Thin-Walled Tube

Abandonment Method
Boring backfilled with Auger Cuttings
Surface capped with concrete

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-2-1

Location: See Exploration Plan

Latitude: 39.111947° Longitude: -84.561334°

Depth (Ft.) Elevation: 884 (Ft.) +/-

Model Layer	Graphic Log		Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
1		**FILL - FAT CLAY**, with oxide concretions, silt lenses, and trace limestone fragments, brown with dark brown *(continued)*									
		28.5 855.5									
4		**FAT CLAY (CH)**, with sand lenses and relic bedding planes, olive brown to brown, stiff to very stiff, (RESIDUUM)	30			100	11-10-12 N=22	1.75 (HP)		16.6	51-21-30
		33.5 850.5									
5		**SHALE**, with interbedded limestone seams, brown, highly weathered, very weak	35			100	29-36-50 N=86			15.1	
		37.0 847									
		Auger Refusal at 37 Feet									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling

Drill Rig
932

Hammer Type
Automatic

Driller
A. Moore

Logged by
B. Mills

Boring Started
09-13-2023

Boring Completed
09-13-2023

Notes
Elevation Reference: Elevations were interpolated from a topographic site plan.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler
3-Inch Thin-Walled Tube

Abandonment Method
Boring backfilled with Auger Cuttings
Surface capped with concrete

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-2-2

Location: See Exploration Plan

Latitude: 39.111906° Longitude: -84.560942°

Depth (Ft.) Elevation: 883 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
2		**FILL - CLAYEY SAND WITH GRAVEL**, with concrete fragments, trace root hairs and limestone fragments, brown								
					67	14-33-18 N=51			7.1	
		3.5 879.5								
1		**FILL - LEAN CLAY WITH SAND**, with limestone fragments, coal fragments, and trace oxide concretions, brown								
					100	11-7-6 N=13	4.5 (HP)		17.1	41-18-23
		5								
					100	7-9-11 N=20			12.9	
					100	8-9-9 N=18	4.5 (HP)		13.4	
		10								
4		**LEAN CLAY (CL)**, trace sand, limestone fragments, and relic bedding planes, olive brown with gray, hard, (RESIDUUM)								
					100	10-29-11 N=40	4.5 (HP)		16.0	
		15								
		-with sand pockets at 18.5 - 23.5 ft.								
					100	16-19-16 N=35	4.5 (HP)		18.4	
		20								
5		23.5 859.5								
		SHALE, gray with brown, highly weathered, extremely weak								
					100	12-14-18 N=32	4.5 (HP)		18.3	
		25								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling

Drill Rig
932

Hammer Type
Automatic

Driller
A. Moore

Logged by
B. Mills

Boring Started
09-13-2023

Boring Completed
09-13-2023

Notes
Elevation Reference: Elevations were interpolated from a topographic site plan.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler
3-Inch Thin-Walled Tube

Abandonment Method
Boring backfilled with Auger Cuttings
Surface capped with concrete

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-2-2

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 39.111906° Longitude: -84.560942° Depth (Ft.) Elevation: 883 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
5		**SHALE**, gray with brown, highly weathered, extremely weak *(continued)*									
		28.5 854.5									
6		28.7 **SHALE**, gray, moderately weathered, weak 854.3 ***Boring Terminated at 28.7 Feet***				100	50/2"			9.1	

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling

Drill Rig
932

Hammer Type
Automatic

Driller
A. Moore

Logged by
B. Mills

Boring Started
09-13-2023

Boring Completed
09-13-2023

Notes
Elevation Reference: Elevations were interpolated from a topographic site plan.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler
3-Inch Thin-Walled Tube

Abandonment Method
Boring backfilled with Auger Cuttings
Surface capped with concrete

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-2-3

Location: See Exploration Plan

Latitude: 39.111585° Longitude: -84.561495°

Model Layer	Depth (Ft.)	Elevation: 888 (Ft.) +/-	Recovery (%)	Field Test Results	HP (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
	0.3	**TOPSOIL (3")** 887.75					
1	6.0	**FILL - LEAN CLAY**, trace gravel, limestone fragments, and brick fragments, brown to reddish brown	50	8-16-30 N=46		7.3	27-17-10
1	6.0	-brown to dark brown from 3.5 - 6.0 ft.	11	10-8-5 N=13		11.1	
1	8.5	**FILL - FAT CLAY**, trace sand and coal fragments, brown, stiff 879.5	44	8-4-5 N=9	1.75 (HP)	33.8	
4	13.5	**LEAN CLAY (CL)**, trace limestone fragments and relic bedding planes, brown to olive brown, hard, (RESIDUUM) 874.5	33	11-9-32 N=41		10.4	
5	18.5	**SHALE**, with interbedded limestone seams, brown, highly weathered, very weak 869.5	75	43-50		10.2	
6	22.0	**SHALE**, with interbedded limestone seams, gray, moderately weathered, weak 866	67	50/3"		5.0	
		Auger Refusal at 22 Feet					

Depth (Ft.): 5, 10, 15, 20

Water Level Observations: Cave-in at 18.0'

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling
No water observed after 24 hrs
Cave-in at 18.0'

Notes
Elevation Reference: Elevations were interpolated from a topographic site plan.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler
3-Inch Thin-Walled Tube

Abandonment Method
Boring backfilled with Auger Cuttings
Surface capped with concrete

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-07-2023

Boring Completed
09-07-2023

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-2-4

Location: See Exploration Plan

Latitude: 39.111564° Longitude: -84.560974°

Depth (Ft.) Elevation: 884.5 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
		0.2 **TOPSOIL (2-1/2")** 884.29								
1		**FILL - LEAN CLAY**, trace gravel, limestone fragments, brick fragments, and root hairs, brown			44	34-15-12 N=27	4.5 (HP)		10.5	
					28	18-8-9 N=17			8.5	
		5								
5		6.0 878.5 **SHALE**, with interbedded limestone seams, brown and gray, moderately to highly weathered, very weak			100	26-35-50/4"			11.3	
					59	40-42-50/5"			10.3	
		10								
			Cave-in at 12.0'							
					90	34-50/4"			9.4	
		15.0 869.5								
		15 ***Auger Refusal at 15 Feet***								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling
No water observed after 24 hrs
Cave-in at 12.0'

Notes
Elevation Reference: Elevations were interpolated from a topographic site plan.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler
3-Inch Thin-Walled Tube

Abandonment Method
Boring backfilled with Auger Cuttings
Surface capped with concrete

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-07-2023

Boring Completed
09-07-2023

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-2-5

Location: See Exploration Plan

Latitude: 39.111257° Longitude: -84.561613°

Depth (Ft.) Elevation: 888 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
1		**FILL - LEAN CLAY**, trace sand, gravel, limestone fragments, root hairs, and brick fragments, brown			100	8-8-6 N=14			8.9	30-18-12
					22	8-7-6 N=13			9.4	
		6.0 882								
1		**FILL - LEAN CLAY**, with coal and concrete fragments, trace sand and gravel, brown and black			100	7-7-5 N=12			12.5	
					100	8-8-8 N=16			6.4	
		13.5 874.5								
6		**SHALE**, with interbbeded limestone seams, gray, moderately weathered, weak			100	50/2"			6.3	
		15.0 873								
		Auger Refusal at 15 Feet								

5
10
15

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling
No water observed after 24 hrs

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-06-2023

Boring Completed
09-06-2023

Notes
Elevation Reference: Elevations were interpolated from a topographic site plan.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler
3-Inch Thin-Walled Tube

Abandonment Method
Boring backfilled with Auger Cuttings
Surface capped with concrete

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-2-6

Location: See Exploration Plan

Latitude: 39.111212° Longitude: -84.561241°

Model Layer	Depth (Ft.)	Elevation: 887 (Ft.) +/-	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
1	0.2	**TOPSOIL (2")** 886.83						
		FILL - LEAN CLAY, trace sand, gravel, and limestone fragments, brown and gray						
				44	13-7-7 N=14	4.5 (HP)	15.1	
	3.5	883.5						
4		**LEAN CLAY (CL)**, with limestone fragments, brown to olive brown, hard, (RESIDUUM)		50	8-17-36 N=53		10.1	31-15-16
		- trace shale seams from 6.0 - 8.5 ft.		56	26-37-31 N=68		12.1	
	8.5	878.5						
5		**SHALE**, with interbedded limestone seams, brown, highly weathered, very weak		25	50/4"		5.6	
				100	50/4"		9.7	
	18.5	868.5						
6	18.7	**SHALE**, with interbedded limestone seams, gray, moderately weathered, weak 868.3		50	50/2"		5.1	
		Boring Terminated at 18.7 Feet						

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling
No water observed after 24 hrs
Cave-in at 14.0'

Notes
Elevation Reference: Elevations were interpolated from a topographic site plan.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler
3-Inch Thin-Walled Tube

Abandonment Method
Boring backfilled with Auger Cuttings
Surface capped with concrete

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-07-2023

Boring Completed
09-07-2023

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-2-7

Location: See Exploration Plan

Latitude: 39.110890° Longitude: -84.561583°

Model Layer	Depth (Ft.)	Elevation: 886.5 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
2	0.2	**TOPSOIL (2")** 886.33									
		FILL - SAND WITH GRAVEL, trace limestone and root hairs, gray				100	50/5"			8.3	
	3.5	883									
4		**LEAN CLAY (CL)**, trace sand, relic bedding planes, and limestone fragments, brown and olive brown, hard, (RESIDUUM)	5			56	5-11-24 N=35			9.0	
	6.0	880.5									
5		**SHALE**, with interbedded limestone seams, brown, highly weathered, very weak				73	15-50/5"			9.6	
						100	32-46-50/4"			9.9	
			10	▨							
	13.5	873									
6	13.8	**SHALE**, with interbedded limestone seams, gray, moderately weathered, weak 872.7				100	50/4"			6.8	
		Boring Terminated at 13.8 Feet									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations

No water observed during drilling
No water observed after drilling
No water observed after 24 hrs
▨ Cave-in at 11.0'

Notes

Elevation Reference: Elevations were interpolated from a topographic site plan.

Advancement Method

3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler
3-Inch Thin-Walled Tube

Abandonment Method

Boring backfilled with Auger Cuttings
Surface capped with concrete

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-07-2023

Boring Completed
09-07-2023

Santa Maria Considine
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Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Boring Log No. 23-2-8

Location: See Exploration Plan

Latitude: 39.110863° Longitude: -84.561327°

Model Layer	Depth (Ft.)	Elevation: 885.5 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Recovery (%)	Field Test Results	HP (tsf)	Unconfined Compressive Strength (tsf)	Water Content (%)	Atterberg Limits LL-PL-PI
	0.2	**TOPSOIL (2")** 885.33									
1		**FILL - LEAN CLAY**, trace sand, gravel, limestone fragments, and brick fragments, dark brown with reddish brown				39	17-11-7 N=18			16.1	
	3.5	882									
		FILL - FAT CLAY, trace sand, limestone and brick fragments, dark brown	5			79	SHELBY TUBE		2.52	27.7	63-27-36
	6.0	879.5									
4		**LEAN CLAY (CL)**, with limestone fragments, trace relic bedding planes, olive brown, very stiff, (RESIDUUM)				44	8-10-10 N=20	4.5 (HP)		14.6	
	8.5	877									
5		**SHALE**, with interbedded limestone seams, brown, highly weathered, very weak	10			91	24-50/5"	4.5 (HP)		12.5	
						60	50/5"	4.5 (HP)		7.4	
			15								
	18.5	867									
6	18.8	**SHALE**, with interbedded limestone seams, gray, moderately weathered, weak 866.7				100	50/3"			7.2	
		Boring Terminated at 18.8 Feet									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
No water observed during drilling
No water observed after drilling
No water observed after 24 hrs
Cave-in at 15.0'

Notes
Elevation Reference: Elevations were interpolated from a topographic site plan.

Advancement Method
3.25-inch Continuous-Flight Hollow-Stem Auger
2-inch Split-Barrel Sampler
3-Inch Thin-Walled Tube

Abandonment Method
Boring backfilled with Auger Cuttings
Surface capped with concrete

Drill Rig
932

Hammer Type
Automatic

Driller
A. Risner

Logged by
B. Mills

Boring Started
09-07-2023

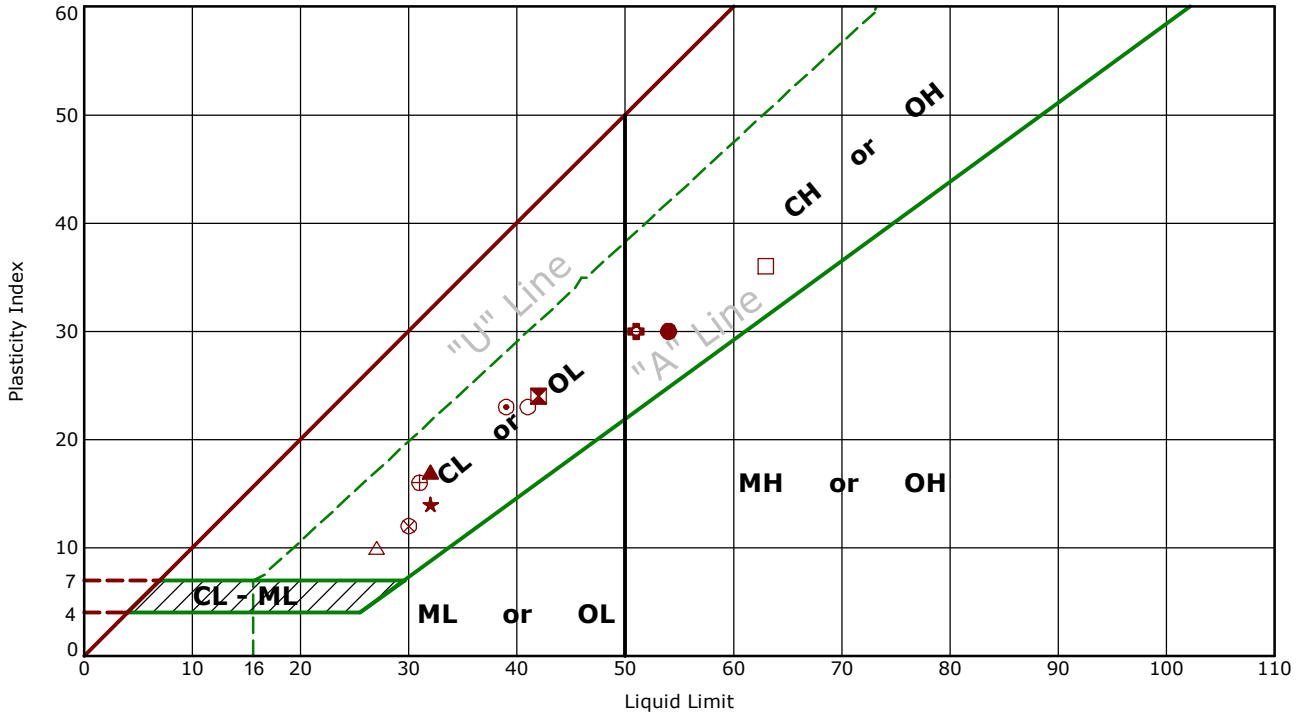
Boring Completed
09-07-2023

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Atterberg Limit Results

ASTM D4318



	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	23-1-1	1 - 2.5	54	24	30			
⊠	23-1-2	1 - 2.5	42	18	24			
▲	23-1-5	1 - 2.5	32	15	17			
★	23-1-9	1 - 2.5	32	18	14			
⊙	23-1-10	6 - 8	39	16	23			
✿	23-2-1	28.5 - 30	51	21	30			
○	23-2-2	3.5 - 5	41	18	23			
△	23-2-3	1 - 2.5	27	17	10			
⊗	23-2-5	1 - 2.5	30	18	12			
⊕	23-2-6	3.5 - 5	31	15	16			
□	23-2-8	3.5 - 5.5	63	27	36			

Santa Maria Considine
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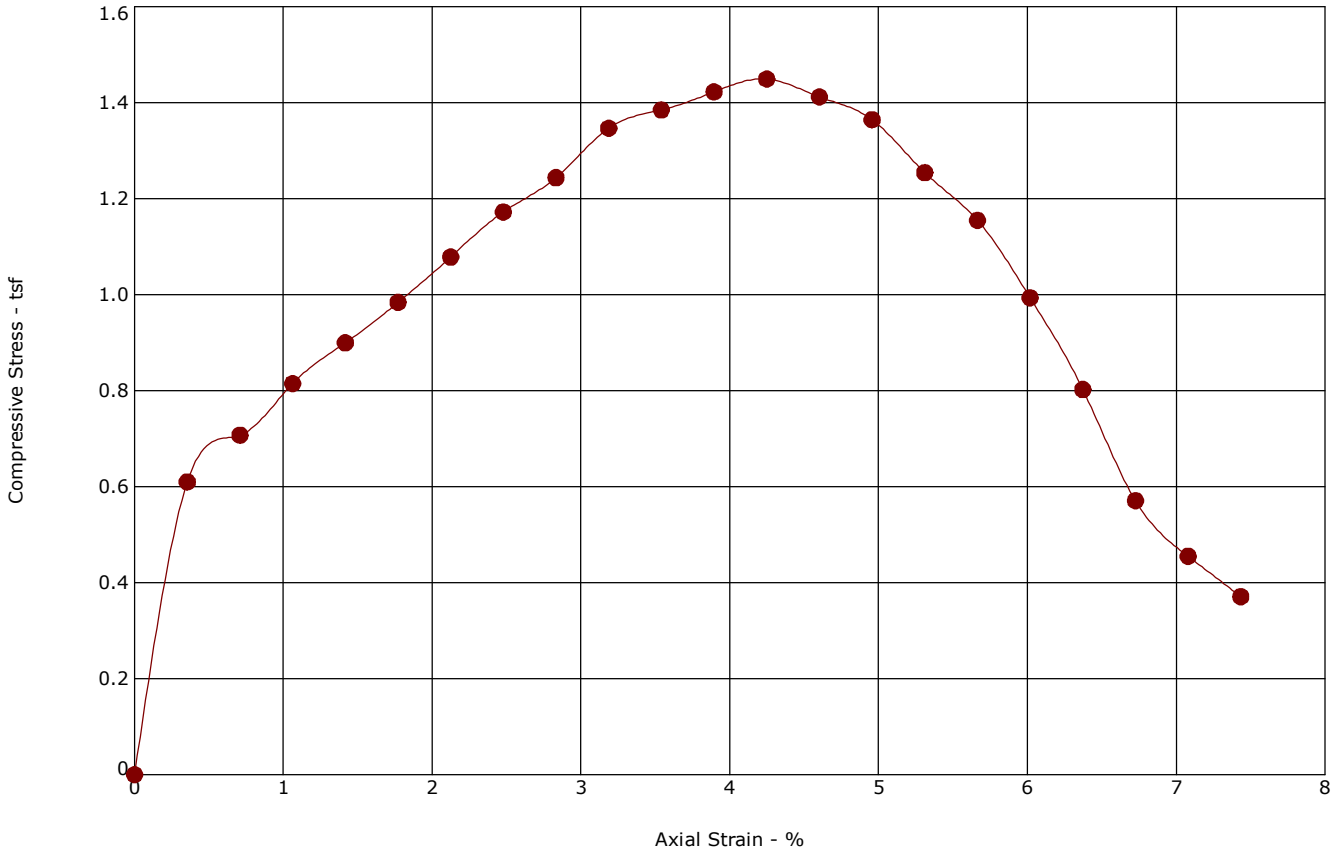
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

Unconfined Compression Test
ASTM D2166



Boring ID	Depth (Ft)	Sample type	LL	PL	PI	Fines (%)	Description
23-1-10	6 - 8	Shelby Tube	39	16	23		Lean Clay

Specimen Failure Mode

Specimen Test Data

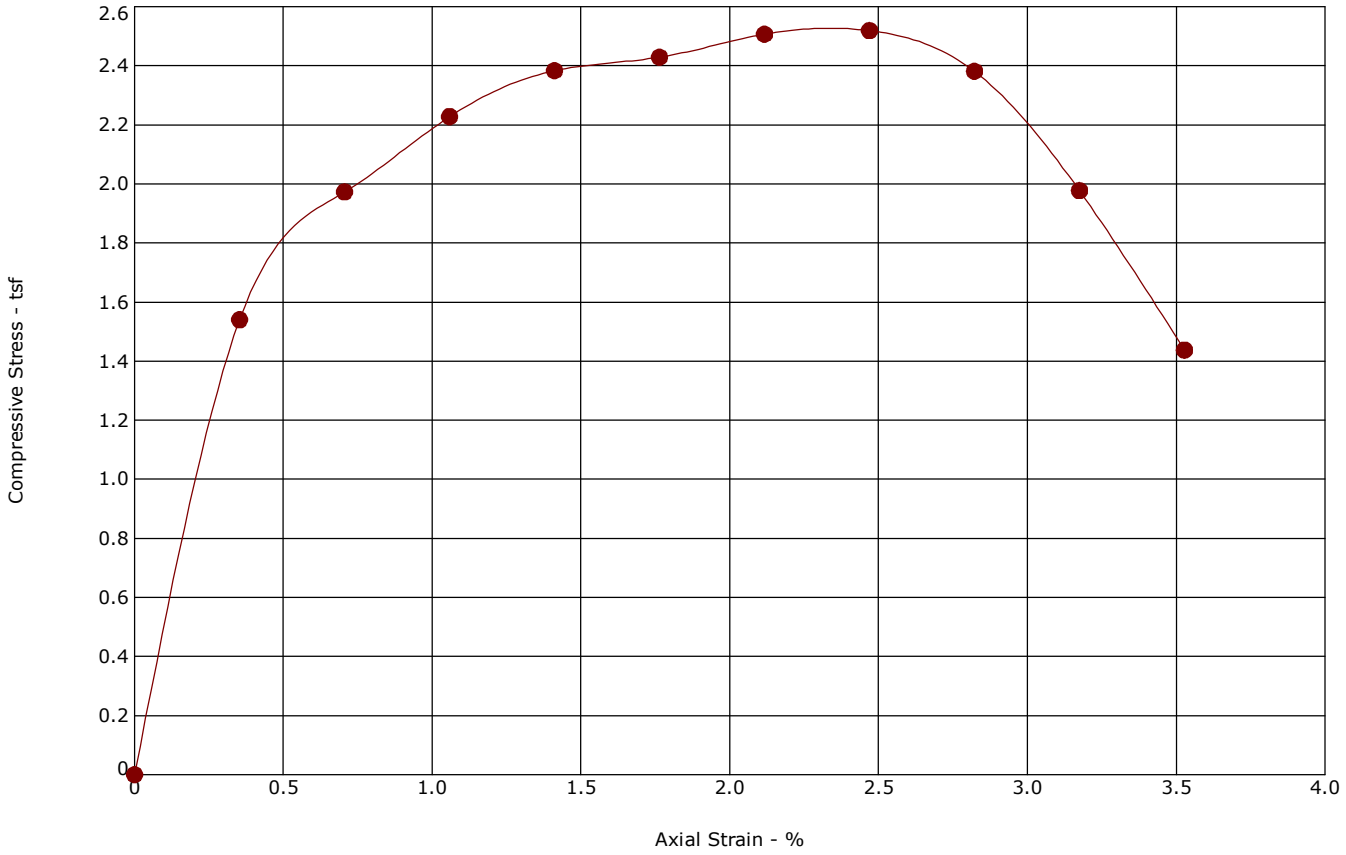
Moisture Content (%):	20.4
Dry Density (pcf):	104
Diameter (in.):	2.87
Height (in.):	5.65
Height / Diameter Ratio:	1.97
Calculated Saturation (%):	89.03
Calculated Void Ratio:	0.62
Assumed Specific Gravity:	2.7
Failure Strain (%):	4.25
Unconfined Compressive Strength (tsf):	1.45
Undrained Shear Strength (tsf):	0.72
Strain Rate (in/min):	0.0565
Remarks:	

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

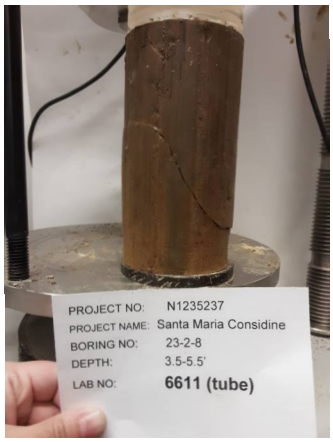
Unconfined Compression Test

ASTM D2166



Boring ID	Depth (Ft)	Sample type	LL	PL	PI	Fines (%)	Description
23-2-8	3.5 - 5.5	Shelby Tube	63	27	36		Fat Clay

Specimen Failure Mode



Specimen Test Data

Moisture Content (%):	27.7
Dry Density (pcf):	94
Diameter (in.):	2.88
Height (in.):	5.67
Height / Diameter Ratio:	1.97
Calculated Saturation (%):	91.53
Calculated Void Ratio:	0.83
Assumed Specific Gravity:	2.75
Failure Strain (%):	2.47
Unconfined Compressive Strength (tsf):	2.52
Undrained Shear Strength (tsf):	1.26
Strain Rate (in/min):	0.0567
Remarks:	

Form No. 504—10-58

THE H. C. NUTTING COMPANY
TESTING ENGINEERS AND SOIL CONSULTANTS • SINCE 1921
4120 AIRPORT ROAD • CINCINNATI, OHIO 45226 • TEL. 513-321-5816

TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt.Complex,Grand & Warsaw Aves.Cinti., Ohio HOLE No. 1

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 28 DATE STARTED 3-15-71

ELEVATION REFERENCE Sewer M.H. Lid elev. 864.1 opposite 1030 Considine DATE COMPLETED 3-15-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. ____ FALL ____

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE Seepage 26.0' UPON COMPLETION None

DEPTH TO WATER 6 DAYS AFTER COMPLETION 30.0' WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
884.8'	0'						
		2.5' Topsoil, clay and rock fragments (fill) moist - very loose	1	0-1.5	SS	1-1-1	4"
882.3'	2.5'		2	2.5-4	SS	16-16-2	3"
		2.5' Rock fragments and clay (fill) moist - medium dense					
879.8'	5.0'		3	5-6.5	SS	1-2-1	2"
		15.0' Brick fragments, rock fragmenrs, cinders and clay (fill) moist - very loose to loose	4	7.5-9	SS	1-1-1	No Rec
			5	10-11.5	SS	2-2-5	8"
			6	12.5-14	SS	6-5-2	4"
			7	15-16.5	SS	3-5	6"
			8	16-16.5	SS	10	5"
			9	17.5-19	SS	7-9-10	6"
864.8'	20.0'		10	20-21.5	SS	8-9-11	12"
		10.0' Brown silty clay with limestone fragments (floaters possible) moist - very stiff	11	25-26.5	SS	10-20-17	9"
854.8'	30.0'		12	30-30.5	SS	70	4"

REMARKS:

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.
By

Form 504A—10-56

PROJECT Prop. Apt. Complex, Grand & Warsaw Aves.Cinti., Ohio HOLE No. 1

ELEVATION 854.8'	DEPTH 30.0'	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recover
		2.5' Layered brown and gray weathered shale and limestone					
852.3'	32.5'	0.5' Gray shale and limestone layers	13	32.5-33	SS	200	6"
851.8'	33.0'	Refusal at 33.0'					
		BORING COMPLETED					

Form No. 504—10-58

THE H. C. NUTTING COMPANY

TESTING ENGINEERS AND SOIL CONSULTANTS • SINCE 1921

4120 AIRPORT ROAD • CINCINNATI, OHIO 45226 • TEL. 513-321-5816

TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt.Complex,Grand & Warsaw Aves. Cinti., Ohio HOLE No. 2

LOCATION As shown on plan

DRILLER E. Fornash DRILL No. 17 DATE STARTED 3-14-71

ELEVATION REFERENCE Sewer M.H.Lid elev.864.1 opposite 1030 Consodine DATE COMPLETED 3-14-71

CASING: DIAMETER 3.5"I.D. Hollow Stem Auger HAMMER WT. ____ FALL ____

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon & NXM Core/Barrel HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION 25.0'

DEPTH TO WATER 2 hrs. AFTER COMPLETION 25.0' WATER USED IN DRILLING From 43.0'

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
884.3'	0'						
		12.5' Brown and gray silty clay with cinders and brick fragments, (fill) moist - medium stiff	1	0-1.5	SS	3-10-9	10"
			2	2.5-4	SS	4-10-11	14"
			3	5-6.5	SS	5-6-6	13"
			4	7.5-9	SS	3-3-4	12"
			5	10-11.5	SS	4-5-4	9"
871.8'	12.5'		6	12.5-14	SS	5-5-6	10"
		12.5' Cinders, clay, brick fragments, and concrete (fill) moist - medium dense to loose	7	15-16.5	SS	6-7-10	12"
			8	17.5-19	SS	2-3-8	10"
			9	20-21.5	SS	4-5-3	12"
859.3'	25.0'		10	25-26.5	SS	5-6-9	16"
		5.0' Brown and gray silty clay, and weathered shale (fill) moist - stiff	11	30-31.5	SS	3-4-7	16"
854.3'	30.0'		11	30-31.5	SS	3-4-7	16"
		5.0' Brown and gray silty clay, moist - stiff					
849.3'	35.0'		12	35-36.5	SS	18-29-27	14"
		5.0' Brown silty clay with limestone fragments, (floaters possible) moist - stiff					
844.3'	40.0'		13	40-41.5	SS	23-25-32	15"

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.
By

PROJECT Prop.Apt.Complex,Grand & Warsaw Aves. Cinti., Ohio HOLE No. 2

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.
844.3'	40.0'					
		3.0' Brown and gray weathered shale with limestone fragments and layers, moist - very stiff				
841.3'	43.0'			43-48	NXM	52%
		5.0' Gray shale with gray limestone, approx. 80% shale, 20% limestone. Shale silty, calcareous, jointed, tough, some probable soft to medium tough. Limestone occurs in 1¼" to 4 3/4" layers, is crystalline, trace shaly, fossiliferous, occasionally jointed with iron oxide staining, hard.				
836.3'	48.0'					
		BORING COMPLETED				

Form No. 504—10-58

THE H. C. NUTTING COMPANY

TESTING ENGINEERS AND SOIL CONSULTANTS • SINCE 1921

4120 AIRPORT ROAD • CINCINNATI, OHIO 45226 • TEL. 513-321-5816

4-8-71 - kg

TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt.Complex Grand & Warsaw Aves.,Cinti., Ohio HOLE No. 3

LOCATION As shown on plan

DRILLER B. R. Ball DRILL No. 27 DATE STARTED 3-14-71

ELEVATION REFERENCE _____ DATE COMPLETED 3-14-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. _____ FALL _____

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION None

DEPTH TO WATER _____ DAYS AFTER COMPLETION Backfilled WATER USED IN DRILLING No

ELEVATION	DEPTH		DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
884.4'	0'							
		5.0'	Brown silty clay with brick and rock fragments, (fill) moist - medium stiff	1	0-1.5	SS	3-4-5	5"
				2	2.5-4	SS	6-7-5	0"
879.4'	5.0'			3	5-6.5	SS	8-6-4	15"
		7.5'	Brick, wood and clay (fill) moist - medium dense	4	7.5-9	SS	4-4-6	10"
				5	10-11.5	SS	3-4-8	3"
871.9'	12.5'			6	12.5-14	SS	2-2-2	16"
		5.0'	Brown and gray silty clay with brick fragments, (fill) moist - medium stiff	7	15-16.5	SS	2-1-4	4"
866.9'	17.5'			8	17.5-19	SS	4-4-5	13"
		7.5'	Brown silty clay (fill) moist - stiff	9	20-21.5	SS	3-4-4	10"
859.4'	25.0'			10	25-26.5	SS	1-2-2	11"
		5.0'	Brown silty clay with topsoil (fill) moist - medium stiff					
854.4'	30.0'			11	30-31.5	SS	14-18-17	15"

REMARKS:

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.

By _____

PROJECT Prop.Apt.Complex Grand & Warsaw Aves.Cinti., Ohio HOLE No. 3

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recove
854.4'	30.0'						
		10.0' Layered brown and gray weathered shale with thin limestone layers	12	35-36	SS	29-58	10"
844.4'	40.0'		13	40-40.5	SS	78	3"
		0.5' Layered gray shale and brown weathered shale					
843.9'	40.5'						
		Refusal at 40.5'					
		BORING COMPLETED					

Form No. 504—10-58

THE H. C. NUTTING COMPANY

TESTING ENGINEERS AND SOIL CONSULTANTS • SINCE 1921

4120 AIRPORT ROAD • CINCINNATI, OHIO 45226 • TEL. 513-321-5816

4-8-71 - kg

TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop. Apt. Complex Grand & Warsaw Aves.,Cinti.,Ohio HOLE No. 4

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 28 DATE STARTED 3-16-71

ELEVATION REFERENCE Sewer M.H.Lid Elev. 864.1 opposite 1030 Consodine DATE COMPLETED 3-16-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. FALL

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION None

DEPTH TO WATER 5 DAYS AFTER COMPLETION None WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
883.0'	0'						
		6.5' Brown and gray silty clay (fill) moist - medium stiff	1	0-1.5	SS	1-2-1	14"
			2	2.5-4	SS	2-2-2	12"
			3	5-6.5	SS	2-3-2	8"
876.5'	6.5'						
		3.5' Mottled brown clay, moist - very stiff	4	7.5-9	SS	5-7-9	12"
873.0'	10.0'		5	10-11.5	SS	11-14-14	10"
		5.0' Brown weathered shale with limestone fragments, (floaters possible) dry - hard	6	12.5-14	SS	20-20-19	12"
868.0'	15.0'		7	15-16.5	SS	10-14-14	16"
		6.5' Layered gray and brown weathered shale with thin limestone layers, moist to dry - very stiff to hard	8	17.5-18.5	SS	21-27	10"
			9	20-21.5	SS	20-54-73	14"
861.5'	21.5'						
		1.5' Layered gray shale with limestone layers (some brown stains)	10	22.5-23	SS	25-125	4"
860.0'	23.0'						
		Refusal at 23.0'					

REMARKS: BORING COMPLETED

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.
By

Form No. 504—10-58

THE H. C. NUTTING COMPANY
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4-8-71 - kg

TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt.Complex,Grand & Warsaw Aves.Cinti., Ohio HOLE No. 5

LOCATION As shown on plan

DRILLER B. R. Ball DRILL No. 27 DATE STARTED 3-14-71

ELEVATION REFERENCE Sewer M.H. Lid Elev. 864.1 Opposite 1030 Consodine DATE COMPLETED 3-14-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. ____ FALL ____

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION None

DEPTH TO WATER ____ DAYS AFTER COMPLETION Backfilled WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
887.7'	0'						
		2.5' Topsoil with clay and rock fragments (fill) moist - loose	1	0-1.5	SS	1-2-3	8"
885.2'	2.5'		2	2.5-4	Auger		
		2.0' Limestone floaters					
883.2'	4.5'						
		9.5' Layered brown weathered shale with thin limestone layers	3	5-6.5	SS	19-31-47	16"
			4	7.5-9	SS	21-34-40	15"
			5	10-11	SS	20-31-50	No Pene. 10"
			6	12.5-13	SS	75	3"
873.7'	14.0'		7	14-14.3	SS	68	2"
		0.3' Layered gray shale					
873.4'	14.3'						
		Refusal at 14.3'					
		BORING COMPLETED					

REMARKS:

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.
By

Form No. 504—10-58

THE H. C. NUTTING COMPANY
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TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt.Complex,Grand & Warsaw Aves.,Cinti., Ohio HOLE No. 6

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 28 DATE STARTED 3-17-71

ELEVATION REFERENCE Sewer M.H. Lid Elev. 864.1' Opposite 1030 Consodine DATE COMPLETED 3-17-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. ____ FALL ____

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION None

DEPTH TO WATER 4 DAYS AFTER COMPLETION None WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
887.8'	0'						
		4.0' Brown and gray silty clay with cinders and rock fragments (fill) moist - medium stiff	1	0-1.2	SS	3-4-5	16"
			2	2.5-4	SS	3-9-5	16"
883.8'	4.0'						
		7.5' Cinders, sand, gravel, clay and brick fragments, (fill) moist - medium dense to loose	3	5-6.5	SS	5-9-13	5"
			4	7.5-9	SS	9-5-10	6"
			5	10-11.5	SS	9-5-3	9"
876.3'	11.5'						
		6.0' Layered brown and gray weathered shale with thin limestone layers	6	12.5-14	SS	20-21-17	10"
				15	SS	150 No Pene.	
870.3'	17.5'		7	17.5-	SS	40	3"
		4.5' Layered gray shale with thin limestone layers	8	20.5-22	SS	60-39-53	12"
865.8'	22.0'						
		Refusal at 22.0'					
		BORING COMPLETED					

REMARKS:

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.
By [signature]

Form No. 504—10-58

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TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop. Apt.Complex,Grand & Warsaw Aves.Cinti., Ohio HOLE No. 7

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 28 DATE STARTED 3-17-71

ELEVATION REFERENCE Sewer M.H.Lid Elev. 864.1 Opposite 1030 Consodine DATE COMPLETED 3-17-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. ____ FALL ____

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION None

DEPTH TO WATER 4 DAYS AFTER COMPLETION 10.0' WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
885.1'	0'						
		1.5' Topsoil and brown silty clay (fill) moist - soft	1	0-1.5	SS	1-3-3	16"
883.6'	1.5'						
		3.5' Mottled brown and gray silty clay, moist - stiff	2	2.5-4	SS	6-7-6	16"
880.1'	5.0'		3	5-6.5	SS	5-6-8	16"
		5.0' Brown silty clay with limestone floaters and fragments, moist - stiff	4	7.5-9	SS	12-12-14	16"
875.1'	10.0'		5	10-11.5	SS	20-40	10"
		5.0' Layered brown weathered shale and limestone	6	12.5-13.5	SS	63-125	10"
870.1'	15.0'			15-	SS	165 No Pene.	
		Refusal at 15.0'					
		BORING COMPLETED					

REMARKS:

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.
By

Form No. 504—10-58

THE H. C. NUTTING COMPANY

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TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt.Complex,Grand & Warsaw Aves.Cinti.,Ohio HOLE No. 8

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 28 DATE STARTED 3-17-71

ELEVATION REFERENCE Sewer M.H.Lid Elev. 864.1 Opposite 1030 Consodine DATE COMPLETED 3-17-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. ____ FALL ____

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION None

DEPTH TO WATER 4 DAYS AFTER COMPLETION None WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
868.8'	0'						
		2.5' Brown silty clay, moist - soft	1	0-1.5	SS	1-1-1	16"
866.3'	2.5'		2	2.5-4	SS	3-5-9	16"
		7.5' Brown silty clay with limestone fragments and floaters, moist - stiff to very stiff	3	5-6.5	SS	10-12-14	18"
			4	7.5-9	SS	15-15-19	18"
858.8'	10.0'		5	10-11.5	SS	20-20-28	9"
		7.0' Layered brown weathered shale and limestone	6	12.5-14	SS	40-15-17	12"
			7	15-16.5	SS	23-25-24	16"
851.8'	17.0'		8	17-17.5	SS	100	
		0.5' Layered gray shale and brown weathered shale with limestone layers					
851.3'	17.5'						
		Refusal at 17.5'					
		BORING COMPLETED					

REMARKS:

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,

THE H. C. NUTTING CO.

By J. J. Flaig

Form No. 504—10-58

THE H. C. NUTTING COMPANY

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TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt. Complex, Grand & Warsaw Aves. Cinti., Ohio HOLE No. 9

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 28 DATE STARTED 3-19-71

ELEVATION REFERENCE Sewer M.H. Lid Elev. 864.1 Opposite 1030 Consodine DATE COMPLETED 3-19-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. ____ FALL ____

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE Seepage at 17.0' UPON COMPLETION None

DEPTH TO WATER 2 DAYS AFTER COMPLETION 15.0' WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
880.3'	0'						
		5.0' Brown and gray silty clay with cinders and rock fragments, (fill) moist - medium stiff to stiff	1	0-1.5	SS	2-2-3	16"
			2	2-4	SS	4-5-4	16"
875.3'	5.0'		3	5-6.5	SS	4-4-5	18"
		1.5' Brown silty clay with limestone fragments, moist - stiff					
873.8'	6.5'						
		3.5' Brown and gray clay with limestone fragments and floaters, moist - very stiff	4	7.5-9	SS	9-12-14	16"
870.3'	10.0'		5	10-11.5	SS	17-30-41	10"
		7.5' Layered brown and gray weathered shale and limestone	6	12.5-14	SS	20-21-42	9"
			7	15-16.5	SS	25-40-25	12"
862.8'	17.5'		8	17.5-19	SS	19-20-25	16"
		3.5' Layered gray and brown weathered shale and limestone	9	20-21	SS	13-18	12"
859.3'	21.0'		10	21-21.5	SS	60	6"
		0.5' Layered gray shale					
858.8'	21.5'	Refusal at 21.5'					

REMARKS: BORING COMPLETED

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.
By

Form No. 504—10-58

THE H. C. NUTTING COMPANY

TESTING ENGINEERS AND SOIL CONSULTANTS • SINCE 1921

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TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt. Complex, Grand & Warsaw Aves.Cinti., Ohio HOLE No. 10

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 28 DATE STARTED 3-15-71

ELEVATION REFERENCE Sewer M.H. Lid Elev. 864.1 Opposite 1030 Consodine DATE COMPLETED 3-15-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. ____ FALL ____

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION None

DEPTH TO WATER 6 DAYS AFTER COMPLETION 12.0' WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
888.3'	0'						
		4.5' Brown silty clay with cinders and brick fragments (fill) moist - medium stiff	1	0-1.5	SS	1-3-4	16"
			2	2.5-4	SS	6-5-4	16"
883.8'	4.5'						
		3.0' Mottled brown and gray silty clay, moist - stiff	3	5-6.5	SS	4-5-7	14"
880.8'	7.5'		4	7.5-9	SS	10-10-12	9"
		2.5' Mottled brown and gray clay, moist - very stiff					
878.3'	10.0'		5	10-11.5	SS	15-15-15	9"
		5.0' Brown weathered shale with limestone fragments and floaters, moist to dry - very stiff to hard	6	12.5-13	SS	60	6"
873.3'	15.0'		7	15-16.5	SS	10-15-14	10"
		5.0' Layered brown and gray weathered shale with thin limestone layers	8	17.5-18.5	SS	17-67	10"
868.3'	20.0'		9	20-21	SS	30-58	10"
		2.5' Layered gray shale with thin limestone layers		22.5	SS	125 No Pene.	
865.8'	22.5'						
		Refusal at 22.5'					

REMARKS: BORING COMPLETED

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,

THE H. C. NUTTING CO.

By _____

Form No. 504—10-58

THE H. C. NUTTING COMPANY

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TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt.Complex, Grand & Warsaw Aves.Cinti., Ohio HOLE No. 11

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 28 DATE STARTED 3-18-71

ELEVATION REFERENCE Sewer M.H. Lid Elev. 864.1 Opposite 1030 Consodine DATE COMPLETED 3-18-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. ____ FALL ____

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION None

DEPTH TO WATER 3 DAYS AFTER COMPLETION 12.5' WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
889.6'	0'						
		5.0' Brown silty clay with rock and brick fragments, (fill) moist - medium stiff	1	0-1.5	SS	2-2-4	12"
			2	2.5-4	SS	2-1-7	6"
884.6'	5.0'		3	5-6.5	SS	22-20-21	16"
		10.0' Layered brown weathered shale and limestone	4	7.5-9	SS	25-25-24	14"
			5	10-11.5	SS	53-27-40	6"
			6	12.5-13.5	SS	60-65	6"
874.6'	15.0'			15	SS	150 No pene.	
		Refusal at 15.0'					
		BORING COMPLETED					

REMARKS:

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,

THE H. C. NUTTING CO.

By _____

Form No. 504—10-58

THE H. C. NUTTING COMPANY
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TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt. Complex,Grand & Warsaw Aves. Cinti., Ohio HOLE No. 12

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 28 DATE STARTED 3-16-71

ELEVATION REFERENCE Sewer M.H. Lid Elev. 864.1 Opposite 1030 Consodine DATE COMPLETED 3-16-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. ____ FALL ____

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION None

DEPTH TO WATER 5 DAYS AFTER COMPLETION None WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
887.2'	0'						
		2.5' Topsoil and brown silty clay (fill) moist - medium stiff	1	0-1.5	SS	2-3-4	16"
884.7'	2.5'		2	2.5-4	SS	4-6-6	16"
		2.5' Brown silty clay with fine gravel (probable fill) moist - medium stiff					
882.2'	5.0'		3	5-6.5	SS	20-20-21	6"
		5.0' Brown weathered shale with limestone fragments and floaters, moist - very stiff	4	7.5-8	SS	50 No Pene.	from 8 6"
877.2'	10.0'		5	10-10.5	SS	70 No Pene.	from 10.5 5"
		5.0' Layered brown weathered shale and limestone	6	12.5-13	SS	63 No Pene.	from 13 4"
872.2'	15.0'			15	SS	No Pene.	
		Refusal at 15.0'					
		BORING COMPLETED					

REMARKS:

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.
By

Form No. 504—10-58

THE H. C. NUTTING COMPANY
TESTING ENGINEERS AND SOIL CONSULTANTS • SINCE 1921
4120 AIRPORT ROAD • CINCINNATI, OHIO 45226 • TEL. 513-321-5816

4-8-71 - kg

TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt.Complex,Grand & Warsaw Aves. Cinti., Ohio HOLE No. 13

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 28 DATE STARTED 3-16-71

ELEVATION REFERENCE Sewer M.H. Lid Elev.864.1 Opposite 1030 Consodine DATE COMPLETED 3-16-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. FALL

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION None

DEPTH TO WATER DAYS AFTER COMPLETION Backfilled upon completion WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
887.1'	0'						
		2.5' Cinders and rock fragments (fill) moist - medium dense	1	0-1.5	SS	10-12-11	16"
884.6'	2.5'		2	2.5-4	SS	7-8-9	18"
		2.5' Mottled brown silty clay, moist - very stiff					
882.1'	5.0'		3	5-6	SS	27-60	10"
		10.0' Layered brown and gray weathered shale and limestone	4	7.5-8.5	SS	30-70	12"
			5	10-10.5	SS	125	3"
				12.5	SS	125 No Pene.	
872.1'	15.0'		7	15-15.5	SS	200	4"
		0.5' Layered gray shale and limestone					
871.6'	15.5'						
		Refusal at 15.5'					
		BORING COMPLETED					

REMARKS:

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.
By

Form No. 504—10-58

THE H. C. NUTTING COMPANY
TESTING ENGINEERS AND SOIL CONSULTANTS • SINCE 1921
4120 AIRPORT ROAD • CINCINNATI, OHIO 45226 • TEL. 513-321-5816

4-8-71 - kg

TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt.Complex,Grand & Warsaw Ave. Cinti., Ohio HOLE No. 14

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 28 DATE STARTED 3-15-71

ELEVATION REFERENCE Sewer M.H. Lid Elev. 864.1 Opposite 1030 Considine DATE COMPLETED 3-15-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. ____ FALL ____

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION None

DEPTH TO WATER 1 DAYS AFTER COMPLETION 15.0' WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
886.3'	0'						
		12.5' Brown silty clay with cinders, gravel, rock fragments and coal (fill) moist - medium stiff to stiff	1	0-1.5	SS	2-4-4	6"
			2	2.5-4	SS	4-4-5	5"
			3	5-6.5	SS	3-4-4	18"
			4	7.5-9	SS	5-7-7	18"
			5	10-11.5	SS	4-7-8	9"
873.8'	12.5'		6	12.5-14	SS	5-7-8	12"
		2.5' Brown and gray silty clay, moist - stiff					
871.3'	15.0'		7	15-16.5	SS	8-20-9	10"
		2.5' Brown and gray silty clay with thin limestone layers, moist - very stiff					
868.8'	17.5'		8	17.5-19	SS	8-8-10	16"
		2.5' Brown and gray weathered shale with thin limestone layers, moist - very stiff					
866.3'	20.0'		9	20-21.5	SS	14-25-110	16"
		1.5' Layered gray shale and limestone					
864.8'	21.5'						
		Refusal at 21.5'					

REMARKS: BORING COMPLETED

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.
By

Form No. 504—10-58

THE H. C. NUTTING COMPANY

TESTING ENGINEERS AND SOIL CONSULTANTS • SINCE 1921

4120 AIRPORT ROAD • CINCINNATI, OHIO 45226 • TEL. 513-321-5816

4-8-71 - kg

TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt.Complex,Grand & Warsaw Aves. Cinti., Ohio HOLE No. 15

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 18 DATE STARTED 3-20-71

ELEVATION REFERENCE Sewer M.H. Lid Elev. 864.1 Opposite 1030 Considine DATE COMPLETED 3-20-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. ____ FALL ____

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION None

DEPTH TO WATER 1 DAYS AFTER COMPLETION 15.0' WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
884.7'	0'						
		2.5' Brown silty clay with cinders and rock fragments (fill) moist - stiff	1	0-1.5	SS	6-7-9	16"
882.2'	2.5'		2	2.5-4	SS	16-5-4	8"
		2.5' Cinders (fill) moist - loose					
879.7'	5.0'		3	5-6.5	SS	2-3-4	16"
		17.5' Brown silty clay with cinders and brick fragments (fill) moist - medium stiff	4	7.5-9	SS	4-4-5	16"
			5	10-11.5	SS	2-4-4	8"
			6	12.5-14	SS	2-3-4	12"
			7	15-16.5	SS	3-4-4	10"
			8	17.5-19	SS	4-4-6	8"
			9	20-21.5	SS	3-4-4	16"
862.2'	22.5'		10	22.5-24	SS	9-8-9	12"
		7.5' Brown and gray silty clay with limestone fragments and floaters, moist - very stiff	11	25-26.5	SS	10-20-9	No Rec
			12	26.5-28	SS	9-10-10	12"
854.7'	30.0'		13	30-31.5	SS	4-7-6	12"
		5.0' Brown silty clay, moist - stiff					
849.7'	35.0'			35	SS	100 No Rene.	
		2.5' Layered gray shale and limestone		36	SS	100 No Rene.	
				37.5	SS	100 No Rene.	
847.2'	37.5'	Refusal at 37.5'					

BORING COMPLETED

Augered from 3.5' with SS in hole to obtain gray shale and limestone sample

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.

By _____

THE H. C. NUTTING COMPANY
TESTING ENGINEERS AND SOIL CONSULTANTS • SINCE 1921
4120 AIRPORT ROAD • CINCINNATI, OHIO 45226 • TEL. 513-321-5816

4-8-71 - kg

TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt.Complex,Grand & Warsaw Aves. Cinti., Ohio HOLE No. 16

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 28 DATE STARTED 3-30-71

ELEVATION REFERENCE Sewer M.H. Lid Elev. 864.1 Opposite 1030 Considine DATE COMPLETED 3-20-71

CASING: DIAMETER 2.25"I.D.Hollow Stem Auger HAMMER WT. FALL

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION None

DEPTH TO WATER 1 DAYS AFTER COMPLETION 25.0' WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
885.4'	0'						
		2.5' Brown silty clay (fill) moist - medium stiff	1	0-1.5	SS	3-6-20	16"
882.9'	2.5'		2	2.5-4	SS	9-11-5	16"
		2.5' Cinders and rock fragments (fill) moist - medium dense					
880.4'	5.0'		3	5-6.5	SS	8-8-8	9"
		12.5' Brown silty clay with rock fragments (fill) moist - stiff to medium stiff	4	7.5-9	SS	5-4-3	12"
			5	10-11.5	SS	3-3-4	12"
			6	12.5-14	SS	4-4-3	12"
			7	15-16.5	SS	3-4-5	16"
867.9'	17.5'		8	17.5-19	SS	7-8-8	16"
		2.5' Brown and gray clay with limestone fragments and floaters, moist - very stiff					
865.4'	20.0'		9	20-21.5	SS	8-9-14	14"
		10.0' Layered brown weathered shale and limestone	10	25-26.5	SS	15-16-21	5"
855.4'	30.0'			30	SS	125 No Pene.	
		1.5' Layered gray shale and limestone		31.5	SS	125 No Pene.	
853.9'	31.5'						
		Refusal at 31.5'		Penetrate augers from 30 to 31' with split spoon in hole to get sample of gray shale and limesto			
		BORING COMPLETED					

REMARKS:

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.
By

Form No. 504—10-58

THE H. C. NUTTING COMPANY
TESTING ENGINEERS AND SOIL CONSULTANTS • SINCE 1921
4120 AIRPORT ROAD • CINCINNATI, OHIO 45226 • TEL. 513-321-5816

4-8-71 -kg

TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt.Complex,Grand & Warsaw Aves.Cinti., Ohio HOLE No. 17

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 28 DATE STARTED 3-21-71

ELEVATION REFERENCE Sewer M.H. Lid Elev. 864.1 Opposite 1030 Considine DATE COMPLETED 3-21-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. ____ FALL ____

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION None

DEPTH TO WATER ____ DAYS AFTER COMPLETION Backfilled same day WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
883.0'	0'						
		10.0' Brown silty clay with cinders, brick fragments,rock fragments and coal (fill) moist - soft to medium stiff	1	0-1.5	SS	1-2-3	10"
			2	2.5-4	SS	2-4-3	8"
			3	5-6.5	SS	2-1-2	4"
			4	7.5-9	SS	20-17-3	6"
873.0'	10.0'		5	10-11	SS	3-4	6"
		5.0' Brown silty clay with rock and coal fragments (fill) moist - stiff	6	11-11.5	SS	9	4"
			7	12.5-14	SS	6-7-7	10"
868.0'	15.0'		8	15-16.5	SS	12-12-12	5"
		5.0' Brown and gray clay with limestone fragments (floaters possible) moist - very stiff	9	17.5-18	SS	125-10	12"
863.0'	20.0'		10	20-21.5	SS	16-27-14	10"
		10.0' Layered brown and gray weathered shale and limestone	11	25-26	SS	27-100	6"
853.0'	30.0'		12	30-30.5	SS	125	4"
		0.5' Layered gray shale and limestone					
852.5'	30.5'						
		Refusal at 30.5'					

REMARKS: BORING COMPLETED

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.
By ____

Form No. 504—10-68

THE H. C. NUTTING COMPANY
TESTING ENGINEERS AND SOIL CONSULTANTS • SINCE 1921
4120 AIRPORT ROAD • CINCINNATI, OHIO 45226 • TEL. 513-321-5816

4-8-71 -kg

TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt.Complex,Grand & Warsaw Aves. Cinti., Ohio HOLE No. 18

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 28 DATE STARTED 3-20-71

ELEVATION REFERENCE Sewer M.H. Lid Elev. 864.1 Opposite 1030 Considine DATE COMPLETED 3-20-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. FALL

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION None

DEPTH TO WATER DAYS AFTER COMPLETION Backfilled WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
885.9'	0'						
		2.5' Blacktop, Cinders, coal, brick fragments, concrete, and rock fragments (fill) moist - loose	1	0-1.5	SS	10-7-3	6"
883.4'	2.5'		2	2.5-4	SS	2-2-2	4"
		2.5' Brown silty clay, moist - medium stiff					
880.9'	5.0'		3	5-6.5	SS	7-12-13	10"
		5.0' Brown weathered shale with limestone fragments and floaters, moist to dry - very stiff to hard	4	7.5-8.5	SS	61-20	6"
875.9'	10.0'		5	10-11.5	SS	40-50-39	16"
		6.0' Layered brown weathered shale and limestone	6	12.5-14	SS	20-55-67	16"
			7	15-15.5	SS	70	2"
869.9'	16.0'						
		3.0' Layered gray shale and limestone	8	17.5-19	SS	100-75-110	10"
866.9'	19.0'						
		Refusal at 19.0'					
		BORING COMPLETED					

REMARKS:

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.
By

Form No. 504—10-59

THE H. C. NUTTING COMPANY

TESTING ENGINEERS AND SOIL CONSULTANTS • SINCE 1921

4120 AIRPORT ROAD • CINCINNATI, OHIO 45226 • TEL. 513-321-5816

4-8-71 - kg

TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt. Complex,Grand & Warsaw Aves.Cinti., Ohio HOLE No. 19

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 28 DATE STARTED 3-21-71

ELEVATION REFERENCE Sewer M.H. Lid Elev. 864.1 Opposite 1030 Considine DATE COMPLETED 3-21-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. FALL

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION None

DEPTH TO WATER DAYS AFTER COMPLETION Backfilled same day WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
888.8'	0'						
		5.0' Brown silty clay with rock fragments and fine gravel (fill) moist - medium stiff	1	0-1.5	SS	1-2-2	8"
			2	2.5-4	SS	2-2-2	7"
883.8'	5.0'		3	5-6.5	SS	9-19-23	8"
		5.0' Layered brown weathered shale and limestone	4	7.5-8.5	SS	31-73	8"
878.8'	10.0'						
		Refusal at 10.0'					
		BORING COMPLETED					

REMARKS:

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.
By

Form No. 504—10-58

THE H. C. NUTTING COMPANY
TESTING ENGINEERS AND SOIL CONSULTANTS • SINCE 1921
4120 AIRPORT ROAD • CINCINNATI, OHIO 45226 • TEL. 513-321-5816

4-8-71 - kg

TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop.Apt.Complex, Grand & Warsaw Aves. Cinti., Ohio HOLE No. 20

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 28 DATE STARTED 3-21-71

ELEVATION REFERENCE Sewer M.H. Lid Elev. 864.1 Opposite 1030 Considine DATE COMPLETED 3-21-71

CASING: DIAMETER 2.25" I.D. Hollow Stem Auger HAMMER WT. ____ FALL ____

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE None UPON COMPLETION None

DEPTH TO WATER ____ DAYS AFTER COMPLETION Backfilled upon completion WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
885.7'	0'						
		6.5' Brown silty clay with fine gravel, rock fragments and cinders, (fill) moist - medium stiff to stiff	1	0-1.5	SS	1-2-3	18"
			2	2.5-4	SS	3-4-4	12"
			3	5-6.5	SS	3-4-5	7"
879.2'	6.5'						
		5.0' Layered brown weathered shale and limestone	4	7.5-9	SS	7-8-12	10"
			5	10-11.5	SS	27-33-100	6"
874.2'	11.5'						
		Refusal at 11.5'					
		BORING COMPLETED					

REMARKS:

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.
By

Form No. 804—10-68

THE H. C. NUTTING COMPANY

TESTING ENGINEERS AND SOIL CONSULTANTS • SINCE 1921

4120 AIRPORT ROAD • CINCINNATI, OHIO 45226 • TEL. 513-321-5816

4-8-71 - kg

TEST BORING REPORT

CLIENT Redwine Construction Co., Inc. ORDER No. 4531.27

PROJECT Prop. Apt. Complex, Grand & Warsaw Aves. Cinti., Ohio HOLE No. 21

LOCATION As shown on plan

DRILLER Donald Dunaway DRILL No. 28 DATE STARTED 3-19-71

ELEVATION REFERENCE Sewer M.H. Lid Elev, 864.1 Opposite 1030 Considine DATE COMPLETED 3-19-71

CASING: DIAMETER 2.25"I.D. Hollow Stem Auger HAMMER WT. FALL

SAMPLER: DIAMETER & TYPE 2"O.D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE Undetermined UPON COMPLETION None

DEPTH TO WATER 2 DAYS AFTER COMPLETION None WATER USED IN DRILLING No

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
887.3'	0'						
		13.5' Blacktop and brown silty clay with cinders, rock fragments and gravel (fill) moist - stiff to medium stiff	1	0-1.5	SS	6-5-5	14"
			2	2.5-4	SS	4-4-3	7"
			3	5-6.5	SS	2-2-2	7"
			4	7.5-9	SS	2-2-2	8"
			5	10-11.5	SS	3-4-4	8"
			6	12.5-13.5	SS	6-6	6"
873.8'	13.5'		7	13.5-14	SS	6	6"
		0.5' Topsoil, moist - medium dense					
873.3'	14.0'						
		2.5' Brown clay with limestone fragments, moist - very stiff	8	15-16.5	SS	8-9-11	16"
870.8'	16.5'						
		10.0' Gray and brown weathered shale with thin limestone layers, moist - very stiff	9	17.5-19	SS	12-9-11	16"
			10	20-21.5	SS	14-15-20	16"
			11	25-26.5	SS	18-21-26	16"
860.8'	26.5'						
		Refusal at 26.5'					
		BORING COMPLETED					

REMARKS:

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical characteristics of materials penetrated in the boring.

Respectfully submitted,
THE H. C. NUTTING CO.
By

THE H. C. NUTTING COMPANY
CINCINNATI, OHIO 45226

REDWINE CONSTRUCTION CO., INC.
PROPOSED APT. COMPLEX-GRAND & WARSAW AVE., CINCINNATI, OHIO

TABLE I

CLASSIFICATION TEST DATA

Hole No.	Sample Number	Depth (Ft.)	Moisture Content (%)	P.P.
1	8	16-16.5	30.6	2.4
	10	20-21.5	18.8	4.3
	11	25-26.5	20.4	4.4
	12	30-30.5	12.7	+4.5
	13	32.5-33	5.6	+4.5
2	12	35-36.5	18.5	2.5
	13	40-41.5	17.2	+4.5
3	11	30-31.5	20.1	+4.5
	12	35-36	14.3	+4.5
	13	40-40.5	13.4	+4.5
4	3	5-6.5	25.5	1.8
	4	7.5-9	22.4	+4.5
	5	10-11.5	12.2	
	6	12.5-14	24.6	+4.5
	7	15-16.5	18.2	+4.5
5	3	5-6.5	8.6	+4.5
7	2	2.5-4	23.6	2.8
	3	5-6.5	23.1	1.8
8	2	2.5-4	19.2	1.9
	3	5-6.5	20.2	+4.5
9	3	5-6.5	29.1	2.0
	4	7.5-9	19.5	+4.5
10	3	5-6.5	21.9	2.3
	4	7.5-9	19.5	
12	2	2.5-4	25.9	1.8
13	2	2.5-4	21.7	3.8
14	4	7.5-9	21.7	3.1
	5	10-11.5	33.2	2.8
	6	12.5-14	28.4	2.1
	8	17.5-19	22.0	+4.5
	9	20-21.5	15.9	+4.5

THE H. C. NUTTING COMPANY
CINCINNATI, OHIO 45226

REDWINE CONSTRUCTION CO., INC.
PROP.APT. COMPLEX,-GRAND &
WARSAW AVE.,CINCINNATI, OHIO

TABLE I (CONT.)

CLASSIFICATION TEST DATA

Hole No.	Sample Number	Depth (Ft.)	Moisture Content (%)	P.P.
15	12	26.5-28	22.9	3.1
	13	30-31.5	23.7	3.0
16	10	25-26.5	18.5	
17	8	15-16.5	19.4	+4.5
	10	20-21.5	19.2	+4.5

THE H. C. NUTTING COMPANY
CINCINNATI, OHIO 45226

REDWINE CONSTRUCTION CO., INC.
PROP.APT.COMPLEX-GRAND &
WARSAW AVE., CINCINNATI, OHIO

TABLE II

TABULATION OF UNDISTURBED TEST DATA

Hole No.	Sample Number	Depth (Ft.)	Unconfined Compressive Strength TSF	Failure Strain (%)	Dry Density (Lbs./ft.^{3})	Water Content (%)
2	13	40-41.5	5.48	6.3	114.6	17.2
10	4	7.5-9	3.49	3.6	98.4	25.0
16	10	25-26.5	7.01	14.3	111.2	18.5

THE H. C. NUTTING COMPANY
TESTING ENGINEERS AND SOIL CONSULTANTS • SINCE 1921
4120 AIRPORT ROAD • CINCINNATI, OHIO 45226 • TEL. 513-321-5816

UNCONFINED COMPRESSION TEST

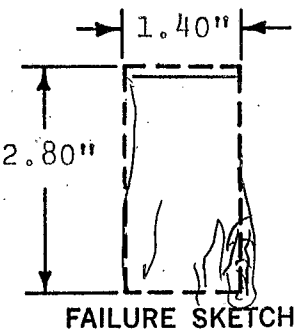
DATE: 4-3-71

REDWINE CONSTRUCTION CO., INC. — CLIENT

PROPOSED APT. COMPLEX - GRAND & WARSAW AVE., CINCINNATI, OHIO — PROJECT

BORING NO. 2
SAMPLE NO. 13
DEPTH (FT.) 40-41.5'
LAB NO. 2289

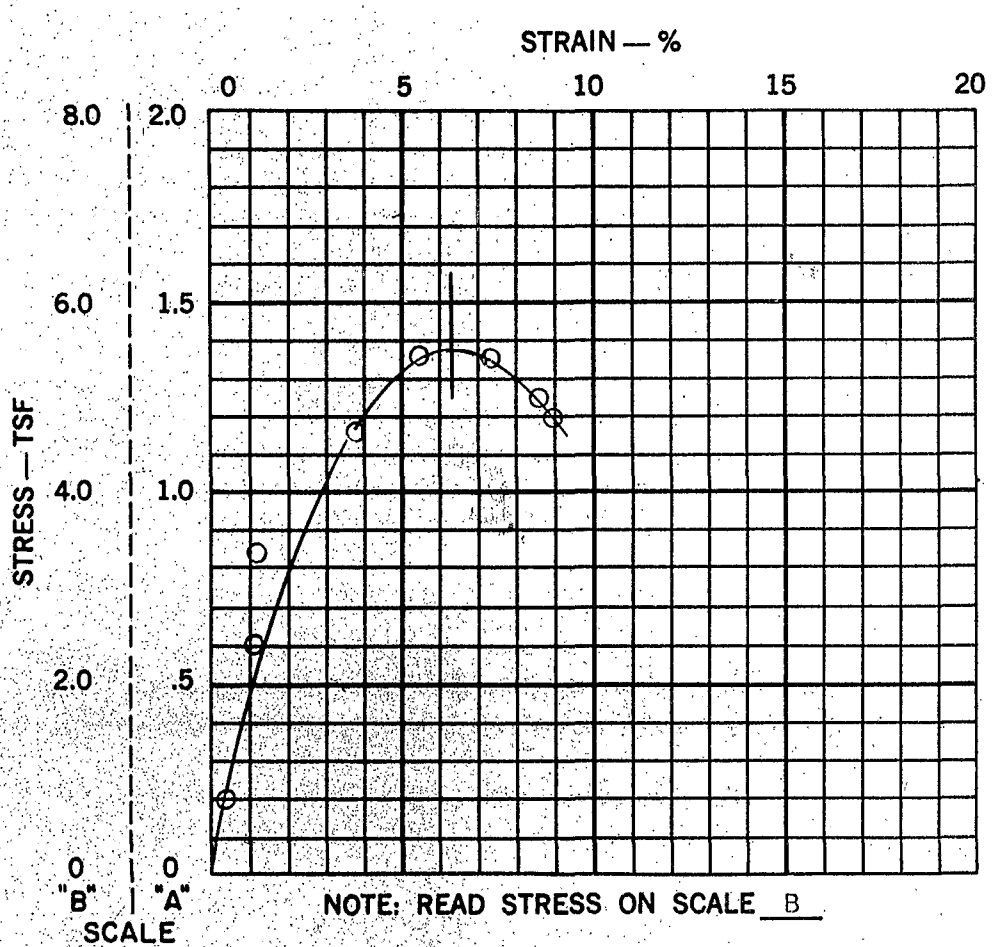
CONFINING PRESSURE 0 PSI
DRY DENSITY 114.6 PCF
WATER CONTENT 17.2 %



FAILURE SKETCH

DESCRIPTION OF MATERIAL:
BROWN WEATHERED SHALE

STRESS TSF	STRAIN %
0.82	0.4
2.46	1.1
3.38	1.1
4.69	3.6
5.48	5.4
5.48	7.1
5.01	8.6
4.81	8.9



NOTE: READ STRESS ON SCALE B

UNCONFINED COMPRESSIVE STRENGTH: 5.48 TSF

FAILURE STRAIN: 6.3 %

REMARKS:

FIGURE NO. 1

THE H. C. NUTTING COMPANY
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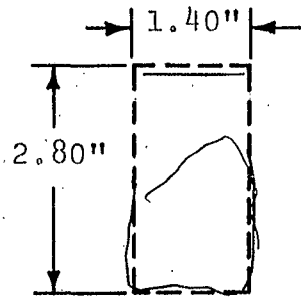
UNCONFINED COMPRESSION TEST

DATE: 4-3-71

REDWINE CONSTRUCTION CO., INC. — CLIENT

PROPOSED APT. COMPLEX - GRAND & WARSAW AVE., CINCINNATI, OHIO — PROJECT

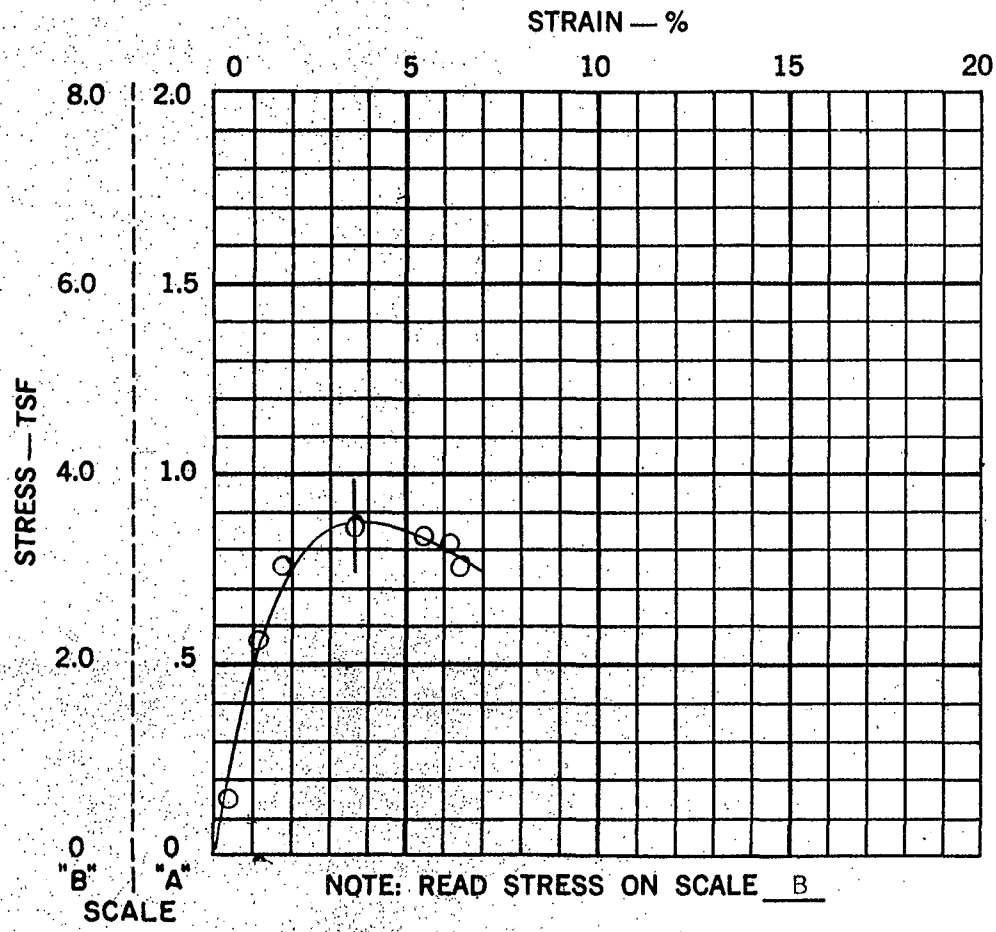
BORING NO.	10	CONFINING PRESSURE	0	PSI
SAMPLE NO.	4	DRY DENSITY	98.4	PCF
DEPTH (FT.)	7.5-9.0'	WATER CONTENT	25.0	%
LAB NO.	2306			



FAILURE SKETCH

DESCRIPTION OF MATERIAL:
BROWN CLAY, MOIST - STIFF

STRESS TSF	STRAIN %
0.62	0.4
2.25	1.1
3.05	1.8
3.49	3.6
3.43	5.4
3.30	6.1
3.10	6.4



NOTE: READ STRESS ON SCALE B

UNCONFINED COMPRESSIVE STRENGTH: 3.49 TSF

FAILURE STRAIN: 3.6 %

REMARKS:

FIGURE NO. 2

THE H. C. NUTTING COMPANY
TESTING ENGINEERS AND SOIL CONSULTANTS • SINCE 1921
4120 AIRPORT ROAD • CINCINNATI, OHIO 45226 • TEL. 513-321-5816

UNCONFINED COMPRESSION TEST

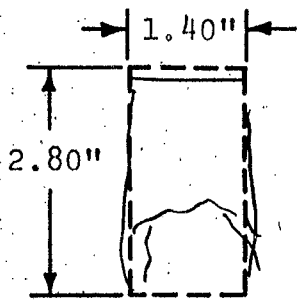
DATE: 4-3-71

REDWINE CONSTRUCTION CO., INC. — CLIENT

PROPOSED APT. COMPLEX - GRAND & WARSAW AVE., CINCINNATI, OHIO — PROJECT

BORING NO. 16
SAMPLE NO. 10
DEPTH (FT.) 25-26.5'
LAB NO. 2316

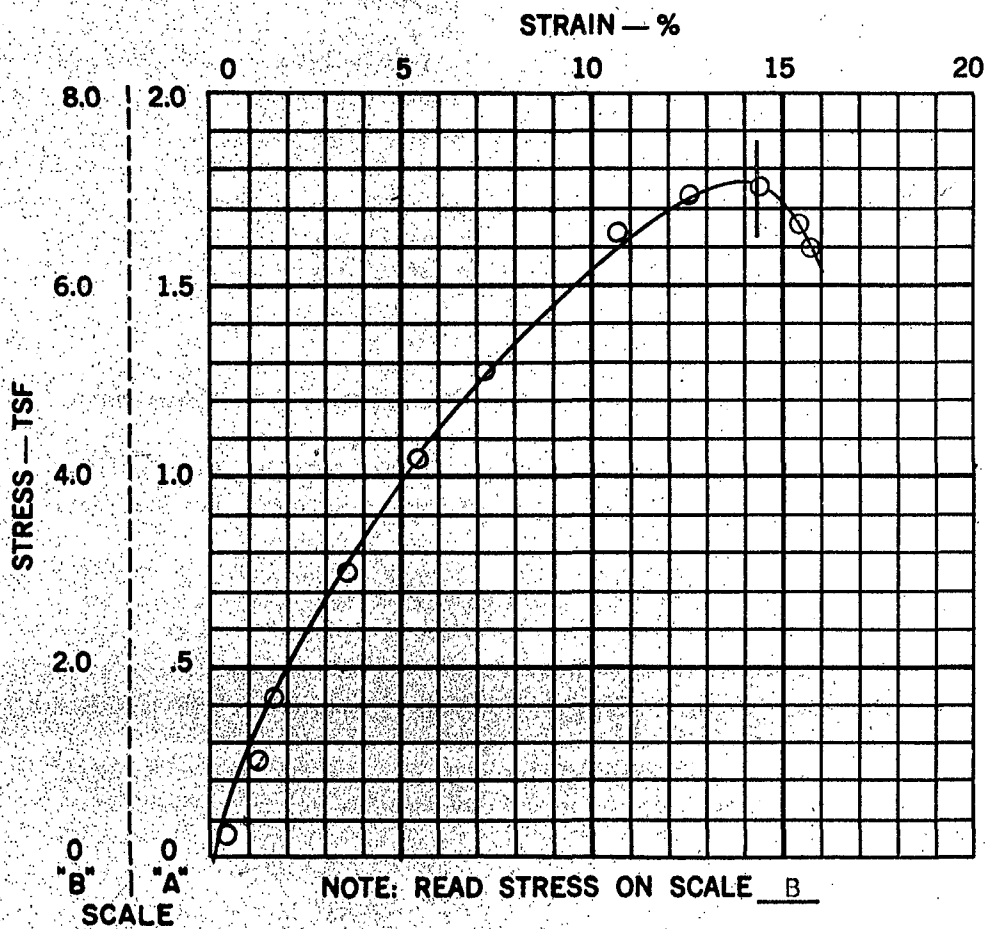
CONFINING PRESSURE 0 PSI
DRY DENSITY 111.2 PCF
WATER CONTENT 18.5 %



FAILURE SKETCH

DESCRIPTION OF MATERIAL:
BROWN WEATHERED SHALE

STRESS TSF	STRAIN %
0.31	0.4
1.02	1.1
1.73	1.8
3.09	3.6
4.21	5.4
5.19	7.1
6.56	10.7
6.97	12.5
7.01	14.3
6.74	15.4
6.45	15.7



UNCONFINED COMPRESSIVE STRENGTH: 7.01 TSF

FAILURE STRAIN: 14.3 %

NOTE: READ STRESS ON SCALE B

REMARKS:

FIGURE NO. 3

August 26, 2022

Model Group
1826 Race Street
Cincinnati, Ohio 45202

Attn: Mr. Jason Chamlee – Vice President of Mixed-Use Development
P: (513) 559 5896
E: jchamlee@modelgroup.net

Re: Geophysical Exploration Report
Considine Ave
1044 Considine Avenue
Cincinnati, Hamilton County, Ohio
Terracon Project No. N1225199

Dear Mr. Chamlee:

Terracon Consultants, Inc. (Terracon) performed geophysical exploration services consisting of Electromagnetic Induction (EMI), Ground Penetrating Radar (GPR), and a refraction seismic survey using the Multi-Channel Analysis of Surface Waves (MASW) method on July 25th, July 28th and August 3rd, 2022. The primary goal of this survey was to characterize the site subsurface conditions, specifically regarding concerns with existing fill quality/depth and potential remnants of previous structures on the site.

1.0 GEOPHYSICAL EXPLORATION

Electromagnetic Induction (EMI) – An EM-31 ground conductivity meter was used to survey the project site. The antenna has an approximate penetration depth of 10 to 18 feet, but penetration ultimately depends on the site conditions. The system consists of a 12-foot-long pipe antenna that is carried on the side of the operator. Data was collected in a 15-foot by 15-foot grid encompassing the accessible areas of the site. The meter is very sensitive to above-ground metal objects and can therefore not be used near metal fences or vehicles. The field data was continuously recorded as the antenna was carried across the surface and each measurement was referenced to GPS coordinates. The meter maps soil materials or subsurface features (utilities or buried objects) associated with changes in ground conductivity (quad-phase) and magnetic susceptibility (in-phase).

Ground Penetrating Radar (GPR) – The GPR field collection was performed in general accordance with the procedures referenced in ASTM D6432; and more information on both the general method and collection procedures can be found in the ASTM standard. Terracon used a GPR system consisting of a 400 MHz push-cart antenna with an approximate penetration depth

of 4 feet, to perform the geophysical survey. Grid scans were collected at EMI anomaly locations displayed on Exhibit 1.

GPR uses high frequency electromagnetic waves to detect certain electrical property changes in the subsurface of the area being scanned. Changes or reflections in the signal generally indicate material property changes, including electromagnetic conductivity and dielectric constant, which in some cases can be qualitatively linked to other material properties (e.g., density). These changes can be effective in identifying the presence and location of numerous subsurface anomalies including subsurface voids, buried concrete, underground tanks, disturbed soils, underground utilities, and embedded objects in concrete and masonry structures, among others.

Multi-Channel Analysis of Surface Waves (MASW) – Our method of investigation also used a seismograph and a linear array of twenty-four 4.5Hz geophones to collect MASW data. Three (3) lines were collected across the site, as displayed on Exhibit 1. The geophone spacing was 10 feet along each line. MASW is performed by collecting surface waves created by a seismic source consisting of a sledgehammer striking an aluminum ground plate. The data is then processed using dispersion analysis software (SurfSeis, engineered by the Kansas Geological Survey) that extracts the fundamental-mode dispersion curve(s). The curves are inverted and modeled to yield a 1D shear-wave velocity profile along the array for a corresponding depth. Using subsets of geophones, many 1D profiles are created along an array and then combined to yield a 2D profile. These 2D profiles are then examined for changes in shear wave velocities to indicate the top of bedrock and potential fill material.

2.0 GEOPHYSICAL FINDINGS

EMI – The ground conductivity contour map created from the recorded EMI data is overlaid on Exhibit 1. Six (6) anomalous areas as compared to the surrounding area were interpreted and highlighted for the GPR survey. EMI provides lateral extents of potential anomalies but does not yield imaging or depth information.

GPR – Grid surveys were completed at the 6 EMI anomalies. The GPR surveys located anomalies consistent with low quality rubble fill, buried obstructions, and possible utilities. Example GPR cross-sections are displayed on Exhibit 1 with our anomaly interpretations. The anomalies are also outlined on the map on Exhibit 1. The potential utilities are displayed as yellow dots and lines. The potential buried lower-quality existing fill or obstructions are highlighted with magenta polygons. The cross-sections also have blue lines highlighting potential sloped walls of a previous excavation.

MASW – The top of bedrock varies from approximately 5 to 40 feet below existing surface grades with a potential weathered rock zone at the interpreted top of bedrock. The existing fill material could not be definitively identified in the MASW cross-sections displayed on Exhibit 2. The cross-sections include our interpretation of the approximate bottom of existing fill and the top of bedrock

with potential native soils between the two layers. The approximate existing fill depths were primarily interpreted based on archive geotechnical test borings in our files completed at the site during previous Terracon (formerly H.C. Nutting) explorations. Due to the distance between the seismic lines and archive borings, the depth of existing fill and top of bedrock may vary across the site.

3.0 LIMITATIONS

All geophysical testing methods rely on instrument signals to indicate physical conditions in the field. Signal information can be affected by on-site conditions beyond the control of the operator, such as, but not limited to, cultural features, standing water, ground water, buried objects, and cultural noise (e.g. traffic). Interpretation of those signals is based on a combination of known factors combined with the experience of the operator and geophysical scientist evaluating the results. The provided depth measurements are estimations based on an estimation of the electrical properties of the subsurface material.

This report has been prepared for the application discussed and in accordance with generally accepted geophysical practices. No warranties, expressed or implied, are intended or made. The findings presented in this report are based upon the data obtained from the geophysical surveys and from other information discussed in this report. This report does not reflect variations that may occur in areas not tested or inaccessible to the geophysical equipment, across the site, or due to the modifying effects of construction or weather.

4.0 CONCLUSION AND RECOMMENDATIONS

The geophysical survey located six (6) anomalous areas that may represent buried obstructions or lower-quality existing fill. The archive borings and MASW survey indicated considerable existing fill material beneath the site. We recommend direct exploration using test pits and geotechnical test borings to further characterize the anomalous areas.

We appreciate the opportunity to be of service to you on this project. Please don't hesitate to contact the undersigned, if you may have any questions.

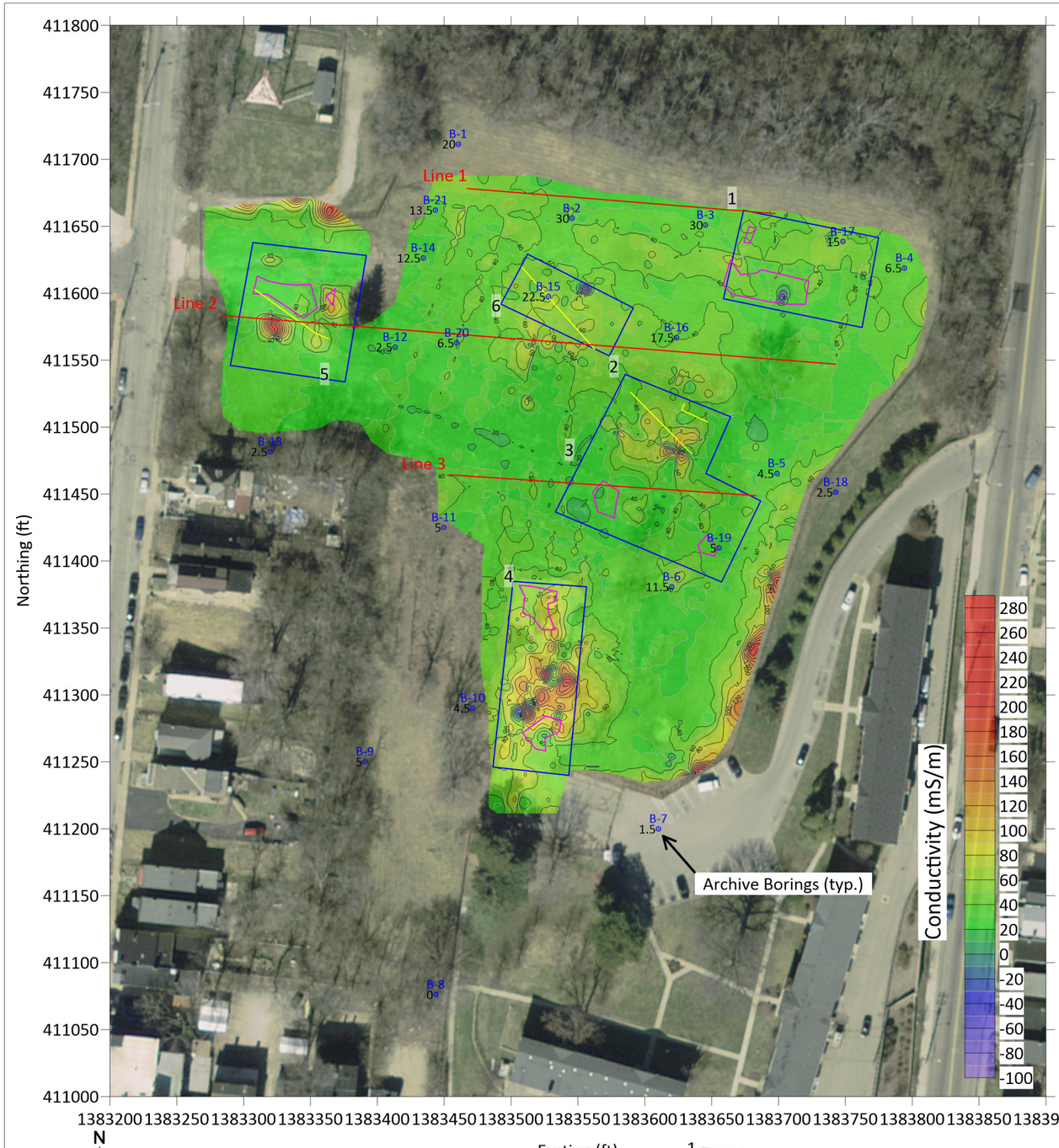
Sincerely,

Terracon Consultants, Inc.

Kyle J. Shalek, Ph.D.
Senior Geophysicist

Jeffrey D. Dunlap, P.E.
Group Manager / Senior Associate

Attachments: Exhibits 1-2



Project Manager:	ATN
Drawn by:	KJS
Checked by:	SEB
Approved by:	JDD

Project No.	N1225199
Scale:	As Shown
File Name:	GPX
Date:	08/12/2022

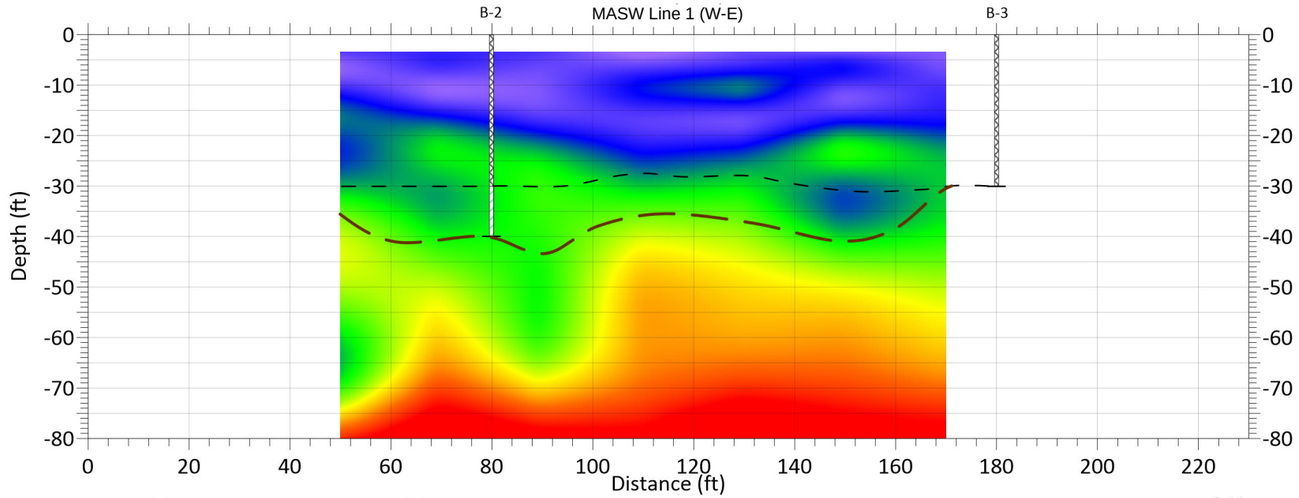
Terracon
Consulting Engineers & Scientists
611 Lunken Park Drive
Cincinnati, Ohio 45226

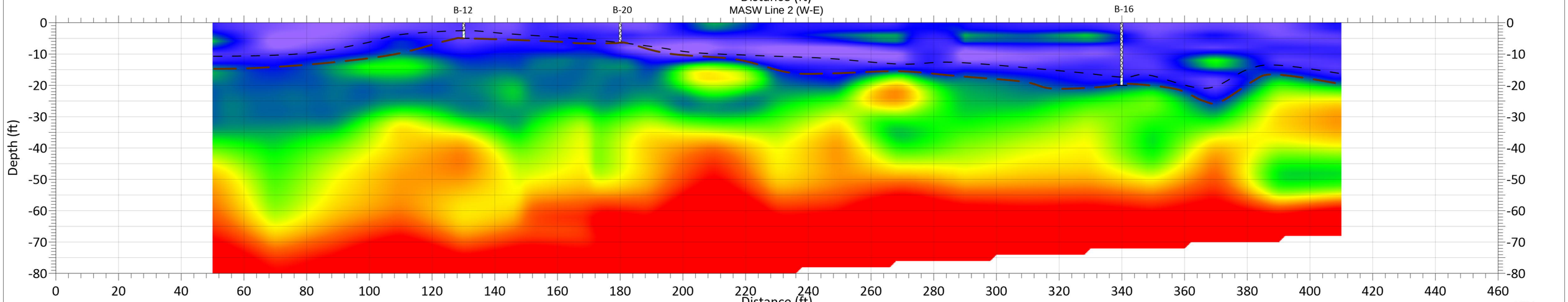
Geophysical Survey Results

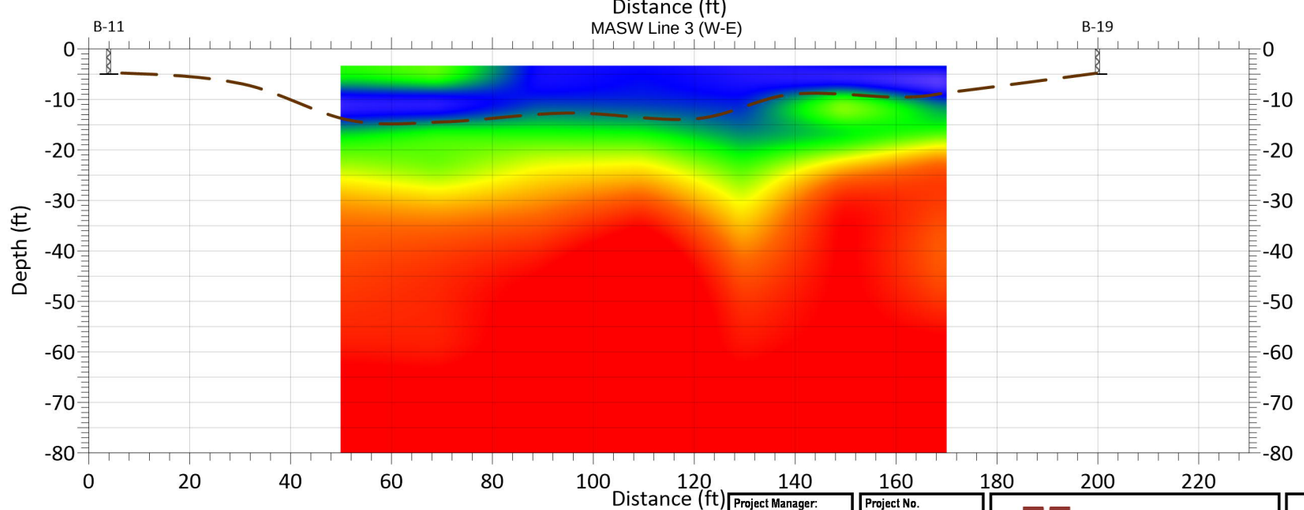
1044 Considine Avenue

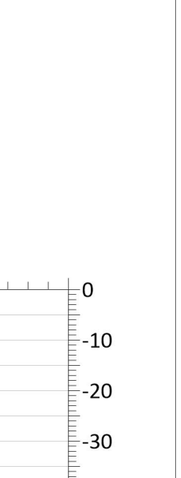
Cincinnati, Hamilton County, Ohio

EXHIBIT 1









N

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Approximate Bottom of Existing Fill

Approximate Top of Bedrock

Project Manager:	ATN
Drawn by:	KJS
Checked by:	SEB
Approved by:	JDD
Project No.	N1225199
Scale:	As Shown
File Name:	GPX
Date:	08/12/2022

Terracon
Consulting Engineers & Scientists
611 Lunken Park Drive
Cincinnati, Ohio 45226

Geophysical Survey Results

1044 Considine Avenue

Cincinnati, Hamilton County, Ohio

EXHIBIT 2

Supporting Information

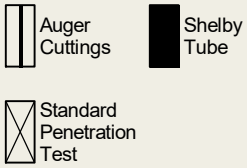
Contents:

Note: All attachments are one page unless noted above.

Santa Maria Considine
1048 Considine Ave | Cincinnati, OH
Terracon Project No. N1235237

Terracon
611 Lunken Park Dr
Cincinnati, OH

General Notes

Sampling	Water Level	Field Tests
	 Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

Descriptive Soil Classification

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

Strength Terms

Relative Density of Coarse-Grained Soils (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		Consistency of Fine-Grained Soils (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Relative Density	**Standard Penetration or N-Value (Blows/Ft.)**	**Consistency**	**Unconfined Compressive Strength Qu (tsf)**	**Standard Penetration or N-Value (Blows/Ft.)**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

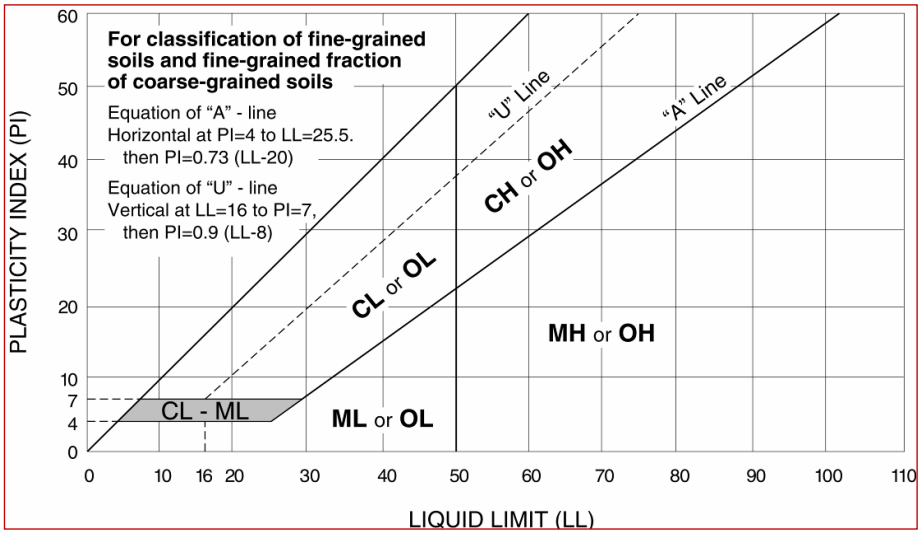
Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification	
				Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 4 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu≥4 and 1≤Cc≤3 [E]	GW	Well-graded gravel [F]
			Cu<4 and/or [Cc<1 or Cc>3.0] [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F, G, H]
			Fines classify as CL or CH	GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu≥6 and 1≤Cc≤3 [E]	SW	Well-graded sand [I]
			Cu<6 and/or [Cc<1 or Cc>3.0] [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G, H, I]
			Fines classify as CL or CH	SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OL	Organic clay [K, L, M, N]
					Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line	CH	Fat clay [K, L, M]
			PI plots below "A" line	MH	Elastic silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OH	Organic clay [K, L, M, P]
					Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
[E] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[F] If soil contains ≥ 15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.



Rock Classification Notes

WEATHERING	
Term	**Description**
Fresh	Mineral crystals appear bright; show no discoloration. Features show little or now staining on surfaces. Discoloration does not extend into intact rock.
Slightly weathered	Rock generally fresh except along fractures. Some fractures stained and discoloration may extend <0.5 inches into rock.
Moderately weathered	Significant portions of rock are dull and discolored. Rock may be significantly weaker than in fresh state near fractures. Soil zones of limited extent may occur along some fractures.
Highly weathered	Rock dull and discolored throughout. Majority of rock mass is significantly weaker and has decomposed and/or disintegrated; isolated zones of stronger rock and/or soil may occur throughout.
Completely weathered	All rock material is decomposed and/or disintegrated to soil. The rock mass or fabric is still evident and largely intact. Isolated zones of stronger rock may occur locally.

STRENGTH OR HARDNESS		
Description	**Field Identification**	**Uniaxial Compressive Strength, psi**
Extremely strong	Can only be chipped with geological hammer. Rock rings on hammer blows. Cannot be scratched with a sharp pick. Hand specimens require several hard hammer blows to break.	>36,000
Very strong	Several blows of a geological hammer to fracture. Cannot be scratched with a 20d common steel nail. Can be scratched with a geologist's pick only with difficulty.	15,000-36,000
Strong	More than one blow of a geological hammer needed to fracture. Can be scratched with a 20d nail or geologist's pick. Gouges or grooves to ¼ inch deep can be excavated by a hard blow of a geologist's pick. Hand specimens can be detached by a moderate blow.	7,500-15,000
Medium strong	One blow of geological hammer needed to fracture. Can be distinctly scratched with 20d nail. Can be grooved or gouged 1/16 in. deep by firm pressure with a geologist's pick point. Can be fractured with single firm blow of geological hammer. Can be excavated in small chips (about 1-in. maximum size) by hard blows of the point of a geologist's pick;	3,500-7,500
Weak	Shallow indent by firm blow with geological hammer point. Can be gouged or grooved readily with geologist's pick point. Can be excavated in pieces several inches in size by moderate blows of a pick point. Small thin pieces can be broken by finger pressure.	700-3,500
Very weak	Crumbles under firm blow with geological hammer point. Can be excavated readily with the point of a geologist's pick. Pieces 1-in. or more in thickness can be broken with finger pressure. Can be scratched readily by fingernail.	150-700

DISCONTINUITY DESCRIPTION			
Fracture Spacing (Joints, Faults, Other Fractures)		**Bedding Spacing (May Include Foliation or Banding)**	
Description	**Spacing**	**Description**	**Spacing**
Intensely fractured	< 2.5 inches	**Laminated**	< ½-inch
Highly fractured	2.5 – 8 inches	**Very thin**	½ – 2 inches
Moderately fractured	8 inches to 2 feet	**Thin**	2 inches – 1 foot
Slightly fractured	2 to 6.5 feet	**Medium**	1 – 3 feet
Very slightly fractured	> 6.5 feet	**Thick**	3 – 10 feet
		Massive	> 10 feet

ROCK QUALITY DESIGNATION (RQD) [1]	
Description	**RQD Value (%)**
Very Poor	0 - 25
Poor	25 – 50
Fair	50 – 75
Good	75 – 90
Excellent	90 - 100

1. The combined length of all sound and intact core segments equal to or greater than 4 inches in length, expressed as a percentage of the total core run length.