DODDRIDGE COUNTY COMMISSION
DODDRIDGE COUNTY, WEST VIRGINIA

DODDRIDGE COUNTY ADMINISTRATIVE ANNEX
WEST UNION, WEST VIRGINIA
THRASHER PROJECT #060-0981

ADDENDUM #1
October 30, 2020

Prospective Bidders:

This Addendum forms a part of the Contract Documents and modifies the original Bidding Documents dated October 16, 2020. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

GENERAL / CLARIFICATIONS:

1. The Pre-Bid Sign-In Sheet and Agenda are included with this Addendum.
2. Link to drawings:
    a. https://qap.questcdn.com/qap/projects/prj_browse/ipp_browse_grid.html?projType=all&provider=5828748&group=5828748
3. All questions need sent to Sarah Nutt – ssimar@thethrashergroup.com and Lori Providenti – lprovidenti@thethrashergroup.com
4. Geotechnical reports are attached to this Addendum.
5. The Owner noted that there are approximately 500 tons of 18" deep stone in the parking area that has been there for about one year and is available for reuse in engineer approved backfill locations.
6. Logistics – Large delivery vehicles can be made taking the route straight up from bottom of Court Street.
7. Note that sidewalks along Church & Court Street around bed and breakfast are included in the Contract.
8. Utilities are owned by the City of West Union
9. The Owner is responsible for utility tap fees
10. Protect adjacent property (Bed & Breakfast and the Church properties) during construction.
11. Liquidated damages will be $750 per calendar day.

BIDDING REQUIREMENTS:

1. The 2-envelope bidding system will be strictly adhered to.

CHANGES TO SPECIFICATIONS: NONE

CHANGES TO DRAWINGS: NONE

BIDDER QUESTIONS:

Q1: Is funding in place?
A1: Yes.

Q2: Estimated start date?
A2: Anticipated start date would be February but will be clarified in Final Addendum.

Q3: Any Union or Prevailing wage rates?
A3: No.

Q4: WV Jobs Act
A4: No.

Q5: Will Utility Pole be handled by the Power company?
A5: Yes.

Q6: New electric feeds to courthouse & jail?
A6: Conduit and cabling are to be installed between building locations by the Contractor but connected by associated companies. Refer to Site & MEP plans.

Q7: Camera System tie in by?
A7: Conduits between buildings

Q8: Who pays for testing?
A8: Independent testing will be hired and paid for by the Owner as specified in Section 014000 of the Specifications. Testing requirements are specified in various sections of the specifications and will include but not be limited to soils and compaction testing, concrete, masonry grout and mortar, and steel welding. There may also be testing required for non-structural products at the Architect's discretion.

Q9: Are there any work restrictions?

A9: Refer to section 011000 or the specifications, Article 1.5 Work Restrictions.

THE THRASHER GROUP, INC.

Lee Gustafson
Architect

DODDRIDGE COUNTY COMMISSION
DODDRIDGE COUNTY, WEST VIRGINIA
FOR THE
DODDRIDGE COUNTY COURTHOUSE ANNEX
THRASHER PROJECT # 060-0981

PRE-BID CONFERENCE
THURSDAY, OCTOBER 29, 2020 @ 10:30 A.M.

PLEASE PRINT

Name	Representing	Phone #	Email Address
Rob Lowther	GRAE-CON	740-373-0849	RLOWTHER@GRAECON.COM
Mark Stolle	Foster	304.206.7808	mark@fostersupply.co
Howard Ottenberger	Wolf Creek	(740) 749-5818	hottenberger@wolfcreekcontractors.com
David Crupe	March-Westin	(504) 281-8125	dcrupe@marchwestin.com
Tom Hacke	Rycon Construction	412-292-4002	Hackeerycon.com
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GEOTECHNICAL INVESTIGATION
DODDRIDGE COUNTY ANNEX BUILDING
DODDRIDGE COUNTY, WEST VIRGINIA

NGE PROJECT No. W20037

SUBMITTED TO:

THRASHER
BRIDGEPORT, WEST VIRGINIA

SUBMITTED BY:

NGE, LLC
ST. ALBANS, WEST VIRGINIA

APRIL 2020

NGE
Environmental & Geotechnical Engineering Solutions

April 28, 2020

Mr. Lee Gustafson
The Thrasher Group
600 White Oaks Boulevard
Bridgeport, WV 26630

Subject: Geotechnical Investigation
Doddridge County Annex Building
Doddridge County, West Virginia
NGE Project No. W20037

Dear Mr. Gustafson:

In accordance with your request, we have performed a geotechnical investigation at the site of the proposed Doddridge County Annex Building in Doddridge County, West Virginia. Our services were performed in accordance with the scope of work outlined in our Proposal No. PW20518, dated February 7, 2020.

This report presents the results of the field and laboratory investigation performed to determine the subsurface conditions, as well as our conclusions and recommendations pertaining to site earthwork and design of the building foundations and retaining wall.

We appreciate the opportunity to assist you with this project. Please contact us if you have any questions concerning this report, or if we can provide any further assistance with this project.

Respectfully submitted,
NGE, LLC

Noah Stevens, P.E.
Project Engineer

John E. Nottingham, P.E.
Principal Engineer

650 MacCorkle Avenue West St. Albans, WV 25177
(304) 201-5180 tel • (304) 201-5182 fax • www.ngeconsulting.com

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1.0 SCOPE OF SERVICES

The purpose of our investigation was to evaluate subsurface conditions and develop site earthwork and foundation design recommendations. The results of our field exploration and geotechnical engineering evaluation are presented in the following report. Our actual scope of services consisted of the following items:

- Engineering field work including site reconnaissance and drilling supervision.
- Drilling of 13 test borings at the planned building and retaining wall location. Each boring included standard penetration testing and sampling.
- Laboratory testing of selected soil specimens.
- Preparation of a geotechnical engineering report to address the following items:
    - A description of the subsurface conditions encountered at the test boring locations.
    - Results of our laboratory testing.
    - Recommendations for site preparation.
    - Fill placement and compaction recommendations.
    - Recommendations concerning foundation type, depth, allowable bearing pressure, and estimated foundation settlement.
    - Recommendations for concrete slab-on-grade design and construction including subgrade preparation.
    - Wall design recommendations including recommended foundation type, bearing depth, allowable bearing capacity, estimated foundation settlement, IBC Seismic Class, and lateral earth pressure values.

2.0 SITE & PROJECT DESCRIPTION

The proposed Doddridge County Annex Building site is located just south of Church Street and west of Court Street in Doddridge County, West Virginia. The project will consist of a three story “L” shaped building with maximum dimensions of approximately 112 x 133 feet. The ground floor will have a finished floor elevation (FFE) of 857 feet.

The annex building will be constructed in the area of the recently demolished library and sheriff’s office. The existing ground surface within the proposed building footprint varies by about 18 feet (elevation ranges from 857 to 875 feet). Proposed grading plans were not available during the preparation of this report. The boring locations and planned building footprint are shown on Figure 1.

3.0 TEST BORINGS

3.1 Boring Locations & Depths

A total of 13 test borings were drilled for the project. Borings B-1 through B-11 were drilled at the location of the planned annex building. Borings B-12 and B-13 were drilled for a proposed retaining wall. The boring locations were selected and staked in the field by Thrasher.

The borings were extended to depths ranging from 15.1 to 26.4 feet below the existing ground surface. A site plan showing all the boring locations is provided in Figure No.1.

3.2 Subsurface Exploration Methods

Within each test boring, standard penetration testing (SPT) and sampling was performed at 2.5 ft. intervals from the ground surface to the boring termination depth. The standard penetration testing and sampling was performed in accordance with ASTM D-1586. Standard penetration testing is performed by driving a 2.0 inch O.D. split-barrel sampler into the soil with a 140-lb. hammer dropping a distance of 30 inches. The sampler is driven a distance of 18 inches in three 6-inch increments, and the number of hammer blows required to produce the last two 6-inch increments of penetration is termed the "Standard Penetration Resistance" or "N-value". These values provide an indication of the consistency or relative density of the soil. A 1-3/8 inch diameter soil and rock samples were retrieved from the split-barrel sampler in conjunction with each penetration test. A representative portion of each split-barrel sample was placed in an air-tight glass jar.

Upon completion of drilling, all soil and rock samples were delivered to our laboratory where they were examined by a geologist and geotechnical engineer. Soil and rock descriptions, standard penetration numbers, and other pertinent subsurface information are provided on the boring logs included in the back of this report.

4.0 SUBSURFACE CONDITIONS

Details of the subsurface conditions encountered by the soil test borings are shown on the boring logs (Figures 2 to 14). The boring logs represent our interpretation of the subsurface conditions based on examination of the split-spoon samples. The stratification lines indicated on the boring logs represent approximate boundaries between soil and rock types; however, the actual transition may be gradual. Conditions represented by the test borings should be considered applicable only at the boring locations. It should be assumed that the reported conditions might be different at other locations. The general subsurface conditions observed in the test borings are described in the following paragraphs.

4.1 Soil and Bedrock Conditions

Annex Building Borings

A layer of gravel ranging from approximately 1.0 to 2.5 ft. thick was encountered at the ground surface in Borings B-1, B-2, B-3, B-5, B-6, and B-8. Approximately 1 to 3 inches of topsoil were encountered at the ground surface in Borings B-4, 9, and 10. About 3 inches of asphalt pavement were at the surface in Borings B-7 and B-11. Beneath the surface layer of gravel, asphalt or topsoil, the soil encountered in the building area consisted primarily of natural residual silty and sandy clay. Residual soil is formed in place by weathering of the parent bedrock. Neglecting surficial samples, standard penetration N-values within the residual clay ranged from 6 to 40 bpf, indicative of a medium stiff to hard soil condition. A layer of silty to sandy clay fill material was also encountered below the topsoil in Borings B-9 and B-10. SPT N-values within the fill ranged from 4 to 10 bpf, indicating a soft to stiff cohesive soil condition. In addition to the natural clay soils, a natural residual layer of silty to clayey sand was encountered in Borings B-1, B-2, B-7, and B-11. SPT N-values within the sand ranged from 11 to 63 bpf,

indicating a medium dense to very dense granular soil condition. The total soil overburden thickness varied between 6.0 and 16.0 feet at the test boring locations.

Each test boring was extended into bedrock. The depth to bedrock varied from 6 to 16 feet at the test boring locations. Bedrock encountered in the borings consisted primarily of extremely soft claystone, extremely soft to medium hard shale, and extremely soft to medium hard sandstone.

Retaining Wall Borings

In Boring B-12, soil overburden consisted of an upper layer of stiff natural residual silty to sandy clay, underlain by clayey sand at a depth of 5.0 feet. The sand layer extended to the top of bedrock at a depth of 7.5 feet. In Boring B-13, a layer of silty to sandy clay fill with rock fragments was encountered below the surface layer of topsoil. The fill material was underlain by natural residual silty to sandy clay soil at a depth of 3.0 feet. The natural clay extended to the top of bedrock at a depth of 6.0 feet.

Bedrock was encountered in the wall borings at depths ranging from approximately 6.0 feet in Boring B-13 to 7.5 ft. in Boring B-12. Bedrock strata encountered in the borings consisted primarily of medium hard to hard sandstone. A layer of very soft to medium hard shale was also encountered in Boring B-13 above the sandstone layer.

4.2 Results of Laboratory Testing

Laboratory testing of recovered soil specimens included natural moisture content and Atterberg liquid and plastic limit testing. The results of the laboratory testing are shown on the boring logs. The results of the Atterberg limit testing are summarized in Table 4.2 below. Results of the laboratory testing are also provided in Appendix A.

Table 4.2 – Summary of Engineering Classification Testing

Boring & Depth	Atterberg Limits		Soil Description
	LL	PI	
B-1 / S-5 10 – 11.5 ft.	53	25	Red SILTY CLAY
B-5 / S-3 5 – 6.5 ft.	48	22	Red and gray SILTY CLAY
B-6 / S-3 5 – 6.5 ft.	33	12	Reddish brown SANDY CLAY
B-13 / S-2 2.5 – 4 ft.	45	17	Red and brown SILTY to SANDY CLAY w/rock fragments

4.3 Groundwater

All of the test borings were observed to be dry during drilling and upon drilling completion, with the exception of Boring B-1, in which water was noted at a depth of 13.0 ft.

during drilling operations. The absence or presence of water in the boreholes at the time of drilling does not necessarily mean that groundwater will or will not be present at other times or locations. Seasonal variations in rainfall will cause fluctuations in groundwater levels and influence the presence of water in upper soils. Perched water levels may be present above more impervious soil or rock layers.

5.0 SITE PREPARATION & GRADING RECOMMENDATIONS

5.1 Site Preparation

All existing vegetation, topsoil, and debris located within the development area should be removed prior to beginning site grading and/or other construction activities. Any underground utility lines located in the developed area should be removed and/or relocated. All voids created by removal of underground items should be properly backfilled in accordance with Section 5.2 of this report.

The development of the site should address surface drainage. Appropriate drainage should be provided both during and after site grading is complete such that surface water does not become ponded or entrapped around or under the new building, pavement, or around cut or fill slopes. All storm water runoff should be effectively conveyed away from the structures using proper grading and storm water collection systems. Roof drains should be properly constructed and maintained to ensure all roof runoff is conveyed away from the structures. Any groundwater seeps which are encountered during site grading operations should be reported to NGE for evaluation.

Proof-rolling of soil subgrades within the construction areas should be performed prior to placing any fill or base stone for slab-on-grade construction. Proof rolling should be performed using a minimum 10-ton static weight smooth-drum roller or loaded dump truck. The proof-rolling will cause rutting and deformations of softer soils and densify firmer soils. Any areas which exhibit excessive deflection should be undercut and replaced with engineered fill. An experienced geotechnical engineer or technician should observe and document the performance of the proof-rolling. As previously discussed, the zone at a depth interval of 2.5 to 5.0 feet was observed to be soft at the location of Boring B-10.

The onsite clayey soils are prone to rutting and pumping when subjected to construction traffic, particularly, heavy rubber tired vehicles. The likelihood that these conditions will develop can be reduced by providing adequate site drainage and limiting construction traffic areas. Soil which has become over-worked and excessively soft must be undercut and replaced with compacted backfill prior to construction.

5.2 Fill and Backfill Recommendations

As previously discussed, proposed grading plans were not available during the preparation of this report. We recommend permanent fill slopes be graded no steeper than a 2H:1V ratio. Stability analysis should be performed for fill slopes in excess of 10 feet in height to verify an adequate slope stability factor of safety is achieved. Prior to placement of fill, all existing vegetation and topsoil must be removed. Any soft areas encountered during the site development should be undercut and backfilled at the direction of a qualified geotechnical engineering firm.

Fill material placed for the project can consist of non-organic soil and rock material with a maximum particle size of 6 inches. Soil fill should be placed in maximum 9-inch thick loose lifts. Each lift of fill placed within five feet of the proposed building footprint should be compacted to at least 98 percent of the maximum dry density as determined by the standard Proctor laboratory test (ASTM D698). Fill placed in pavement and or slab-on-grade areas should be compacted to at least 95 percent of the maximum dry density. Each layer of fill or backfill should be tested by a qualified soils technician to determine that adequate compaction has been achieved prior to placement of additional fill lifts. The moisture content of fill or backfill material should be within three percent of the optimum moisture content as determined by a standard Proctor test. We recommend clayey structural soil fill be restricted to material with a plasticity index not greater than 18 percent. Based on limited lab testing results, some of the soils present onsite are excessively plastic (PI > 18 percent) for use as structural fill.

5.2.1 Limited Space Backfilling

Limited spaces are defined as areas where backfill operations are restricted to the use of small mechanical compaction equipment. Most deficiencies in compacted backfill around subsurface structures have occurred in limited spaces where required densities are difficult to achieve because of restricted working room and relatively low compaction effort or use of equipment that is too lightweight. All structural backfill, including that placed in limited spaces must be systematically compacted to the project requirements, even if crushed aggregate is placed. Oversized rock fragments should not be placed around pipes or other below-ground structures. Backfilling in limited access areas such as utility trenches and around below grade structures such as manholes, junction boxes, curb inlets, etc. should have a lift thickness limited to 4 to 6 inches loose measure. A sufficient amount of testing or observation should be conducted to verify that proper compaction is achieved. In extremely tight spaces, use of alternate backfill materials such as flowable fill should be considered.

5.3 Excavation Considerations

The existing ground surface along the northwestern portion of the planned building footprint is at an elevation of about 875 feet. The ground floor elevation of the planned building is 857 feet. As such, we anticipate a maximum excavation depth of about 18 feet will be necessary to construct the building. We recommend temporary excavation slopes in soil be configured not steeper than 1.5H:1V ratio. Temporary excavations made into competent sandstone bedrock can be sloped at a 0.5H:1V ratio. We expect it will be necessary to use temporary shoring at some locations due to space limitations.

Based on the results of the test borings, we expect some excavation of medium hard sandstone bedrock will be required in the northern portion of the building footprint. We expect excavation of some of the sandstone rock will require the use of a large excavator mounted hydraulic breaker (jackhammer). Some of the sandstone was relatively soft and weathered and could likely be excavated with a large excavator. The hardness of the sandstone encountered in each boring is noted on the test boring logs (Figure Nos. 2 through 14). Sandstone bedrock was encountered above the proposed ground floor elevation in the following test borings:

- Boring B-2: Approximate sandstone elevation = 862.4 feet
- Boring B-3: Approximate sandstone elevation = 864.6 feet
- Boring B-6: Approximate sandstone elevation = 864.1 feet

As previously discussed, proposed grading plans were not available during the preparation of this report. We recommend permanent soil cut slopes for the project be inclined no steeper than a 2H:1V ratio. Any excavation deeper than 4 feet in which workers are required to enter must be properly shored or sloped in accordance with OSHA requirements. Any water which collects within excavations should be promptly removed by pumping from a strategically located sump(s).

6.0 FOUNDATION & SLAB RECOMMENDATIONS

Assuming spread foundations for the building structure will be designed to bear 3.0 feet below the ground floor elevation (i.e., design spread footing bearing elevation = 854 ft.), bedrock will be present at foundation level over most of the building footprint. Only in the lowest lying areas of the site (at or below approximate ground elevation = 861 ft.) is the depth of the bedrock surface below elevation 854 feet (in Borings B-7, B-9, and B-10). The depth to the bedrock surface is summarized in Table 6.0 below.

Spread foundations bearing partially on bedrock and partially on soil would experience excessive localized differential settlement resulting is potential cracking of walls and unlevel floors. In order to provide for uniform support for the building foundations and eliminate the concern of localized differential foundation settlement, **we recommend all the building foundations be extended as necessary to bear entirely on bedrock.** Total and differential settlement of foundations bearing on bedrock should be less than ½ inch. We have provided two options to extend the foundations to bedrock. Recommendations for both foundation options are included in Sections 6.1 and 6.2 of this report.

Table 6.0 - Summary of Bedrock Depth and Elevation - Building Area

Test Boring No.	Depth of Bedrock Surface (ft.)	Elevation of Bedrock Surface (ft.)
B-1	16.0	857.7
B-2	12.5	862.4
B-3	8.0	864.6
B-4	8.5	854.2
B-5	8.5	859.2
B-6	8.0	864.1
B-7	7.5	852.9
B-8	7.5	856.4
B-9	11.0	846.3
B-10	11.0	849.7
B-11	7.5	854.2

6.1 Foundation Option No. 1

This foundation option is to use conventional spread foundations bearing entirely on bedrock. Spread foundations bearing on bedrock can be designed using an allowable bearing pressure of 5,000 psf. In addition to the requirement of bearing on bedrock, we recommend all exterior foundations be constructed to bear at least 36 inches below finish grade to provide protection against frost heave. Depending upon the building grading plans, we expect bedrock will be present at the recommended frost depth over much of the building footprint. However, any foundation base which is not on bedrock at the design bearing elevation should be over-excavated to bedrock and then backfilled with unreinforced concrete to the design footing elevation. Based on the test boring results, we anticipate the maximum over-excavation depth below the design footing elevation of 854 ft. would be about 8 feet at the location of Boring B-9. We recommend the use of 3,000 psi concrete (28-day strength) for backfill. A conventional reinforced concrete foundation can then be constructed atop the unreinforced concrete backfill. The foundation constructed on the concrete backfill can utilize the recommended allowable bearing pressure of 5,000 psf.

Based on the results of the test borings, we expect the southern portion of the building (area of Borings B-7, B-9, and B-10) will require over excavation below the recommended frost depth in order to bear on bedrock. The minimum required foundation bearing depth at the southern test boring locations is as follows:

- Boring B-7: Minimum foundation bearing depth = 852.9 ft.
- Boring B-9: Minimum foundation bearing depth = 846.3 ft.
- Boring B-10: Minimum foundation bearing depth = 849.7 ft.
- Boring B-11: Minimum foundation bearing depth = 854.0 ft.

All loose soil and rock fragments should be removed from the foundation excavation prior to concrete backfill and/or footing concrete placement. In addition, any standing water which accumulated in footing excavations should be promptly removed and not allowed to pond. Foundation excavations should be inspected by NGE's engineer to verify that all foundations are bearing on bedrock prior to placement of concrete (including concrete backfill).

6.2 Foundation Option No. 2

If desired, a combination of spread and deep foundations can be used to support the structure on bedrock. Where bedrock is present at the design foundation level, the spread footing recommendations provided in Section 6.1 should be followed. In areas where the depth to bedrock is excessive for construction of spread foundations, we recommend drilled concrete caissons socketed into bedrock be used. Reinforced concrete grade beams can be used to support walls between the caisson locations.

Drilled Concrete Caisson Recommendations

The caissons should be socketed into bedrock as necessary to encountered medium hard to hard bedrock. Based on the test borings, we anticipate suitable bearing rock for caissons will be encountered within an approximate elevation range of 840 to 846 feet. We recommend the foundation contractor be required to drill a minimum of six preinstallation

borings to a minimum elevation of 835 feet. The locations of the preinstallation borings should be selected by NGE's engineer once foundation plans are developed. The final design tips of the caissons will be determined based on the results of the preinstallation core borings. The requirements for the preinstallation borings should follow those specified in Section 625 (Drilled Caisson Foundations) of the WVDOH Standard Specifications for Roads and Bridges, 2017 edition. Caissons bearing on competent medium hard to hard bedrock as recommended can be designed using an allowable tip bearing pressure of 50 ksf.

A minimum caisson diameter of 30 inches is recommended. Each drilled shaft bottom should be thoroughly cleaned and inspected by qualified personnel immediately prior to placement of the reinforcement cage and concrete. The use of temporary steel casing seated on bedrock is recommended to prevent the soil overburden from caving into the shaft prior to concrete placement. The casing should be extracted as concrete is placed; however, a minimum 5 ft. head of concrete should be maintained above the bottom of the casing to prevent collapse of soil into the shaft during concrete placement. Concrete with a slump of 5 to 8 inches is recommended for use in drilled shaft construction. We recommend the use of Class DC concrete be used in accordance with WVDOH specifications. No concrete should be placed in standing water greater than two inches in depth. Concrete may be placed by the "free-fall" method provided that the contractor does not allow the concrete to hit the sides of the excavation or the reinforcing cage. The use of a hopper or other suitable device is recommended to control concrete placement.

6.3 Concrete Slabs-On-Grade

We expect slabs-on-grade for the proposed structure could bear on bedrock, existing natural soil, existing fill, or newly placed engineered fill constructed in accordance with Section 5.2 of this report. We recommend the subgrade be thoroughly compacted and proof-rolled using a minimum 10-ton applied force smooth-drum roller. Any areas which will not properly compact and exhibit excessive rutting or pumping should be undercut and backfilled with crushed stone under the direction of a qualified inspector. As a minimum, the upper four inches of concrete slab subgrade should consist of free draining crushed stone, such as No. 57 stone to serve as a capillary water barrier and a leveling surface.

The use of a vapor barrier between the gravel layer and bottom of the floor slab should be at the discretion of the designer who can evaluate the potential impact of water vapor transmission on floor coverings, equipment and/or interior furnishings. In order to control slab cracking, floor slabs should be jointed as per ACI guidelines and any crack control inclusion such as wire mesh should be permanently supported in its proper position and not pulled up with hook bars during concrete placement.

Often there is some delay between initial grading and the time when the contractor is ready to construct the slab-on-grade. Although the subgrade soils may have been thoroughly compacted and passed initial proof-roll testing, exposure to weather, excess moisture and/or construction traffic can destroy the soil's integrity. We recommend that the construction specifications include provisions for the restoration of the subgrade soils to an acceptable condition prior to construction of floor slabs.

7.0 BELOW-GRADE WALL AND RETAINING WALL DESIGN RECOMMENDATIONS

Below Grade Building Walls:

We understand below grade walls will also be required for the annex building. Any structural walls that also function as retaining walls and are restricted from lateral movement should be designed for an "*at rest*" earth pressure condition. We recommend free draining crushed gravel (like No. 57 stone) be used as backfill behind all subsurface walls where possible. The gravel should extend behind below grade walls for a minimum distance equal to one-half of the retained height (e.g., a 12 feet high subsurface wall should have gravel backfill within the zone extending 6 feet behind the wall), except for the portion of the below grade wall which is below the bedrock elevation. The portion of below grade walls which is below the bedrock surface (see Table 6.0 for bedrock elevations) can be backfilled with as little as a two foot width of gravel provided all fill placed between the wall and bedrock consists of gravel. Subgrade building wall design should incorporate permanent subsurface drainage measures to prevent the buildup of water in the retained gravel behind the walls. Water building up behind a below grade wall can more than double the forces acting on the wall. **Table No. 7.1** provides recommended soil parameters for design of below grade building walls with No. 57 crushed stone as the retained material.

Table 7.1 – Below-Grade Wall Design Parameters – No. 57 Crushed Stone Backfill

PARAMETER	RECOMMENDED VALUE
At-Rest Earth Pressure Coefficient	0.41
Soil Internal Friction Angle	36 degrees
No. 57 Crushed Stone Unit Weight	115 pcf

Retaining Wall:

We understand a retaining wall may be constructed southeast of the proposed building. Details concerning the type, size, and height of the wall were not available at the time this report was prepared. If MSE, cast-in-place concrete, or other types of gravity retaining walls are planned, they must be designed to provide an adequate factor of safety against the following modes of external failure:

1. Bearing capacity
2. Overturning
3. Base Sliding
4. Global stability

Based on soil conditions encountered in Borings B-12 and B-13, we recommend an allowable soil bearing pressure of 3,000 psf be used for retaining wall design. The wall foundation should be constructed to bear a minimum of 3 feet below finish grade. We estimate total settlement of a gravity type retaining wall would be on the order of one inch or less. NGE can perform global stability of the retaining wall once preliminary design drawings and cross-

sections are available. A base sliding friction factor of 0.3 is recommended for analyzing base sliding of a gravity wall.

Table No. 7.2 provides recommended soil parameters for gravity retaining wall design if the existing soil is the retained material. Our recommended design parameters are based on a level back-slope on the retained side. These parameters are ultimate values without factors of safety. The retaining walls should be designed to withstand active lateral soil pressure as well as any live or dead load surcharge loads which are expected behind the walls.

Table 7.2 – Retaining Wall Design Parameters – Existing Soil

PARAMETER	RECOMMENDED VALUE
Active Earth Pressure Coefficient	0.4
Passive Earth Pressure Coefficient	2.5
Soil Internal Friction Angle	28 degrees
Soil Moist Unit Weight	125 pcf

Care should be taken not to over-compact wall backfill since this could result in damage to the walls. Retaining wall design should incorporate aggressive subsurface drainage measures to prevent the buildup of water in the retained soil behind the wall. Water building up behind a retaining wall can more than double the forces acting on the wall.

8.0 IBC SEISMIC SITE CLASS

Subsurface conditions encountered at the site including soil depth, standard penetration values, and material types were considered to calculate the Seismic Site Class according to the International Building Code (IBC). Using available subsurface data and guidelines established by IBC, this site falls within Seismic Site Class “C”.

9.0 CONSTRUCTION TESTING

We recommend that a qualified geotechnical firm be retained by the owner to provide a comprehensive construction-testing program to assist the owner in determining that certain aspects of construction are being carried out in general conformance with the applicable plans and specifications. This construction testing primarily includes inspection of foundation excavations to verify adequate bearing on bedrock is achieved, foundation preparation for fill areas, testing of fill materials during placement and compaction, and observation of foundation installation.

10.0 REPORT LIMITATIONS

- This report has been prepared for the exclusive use of **The Thrasher Group** for specific application to the subject project. All recommendations contained in this report have been made in accordance with generally accepted soil and foundation engineering practices in the area and at the time where the services were performed. No other warranties are implied or expressed.

- The scope of services represented by this report does not include an environmental assessment, or exploration for the presence or absence of wetlands, hazardous, or toxic material at the site. Moreover, the scope of services does not include evaluation of the potential for subsidence from past underground mining.

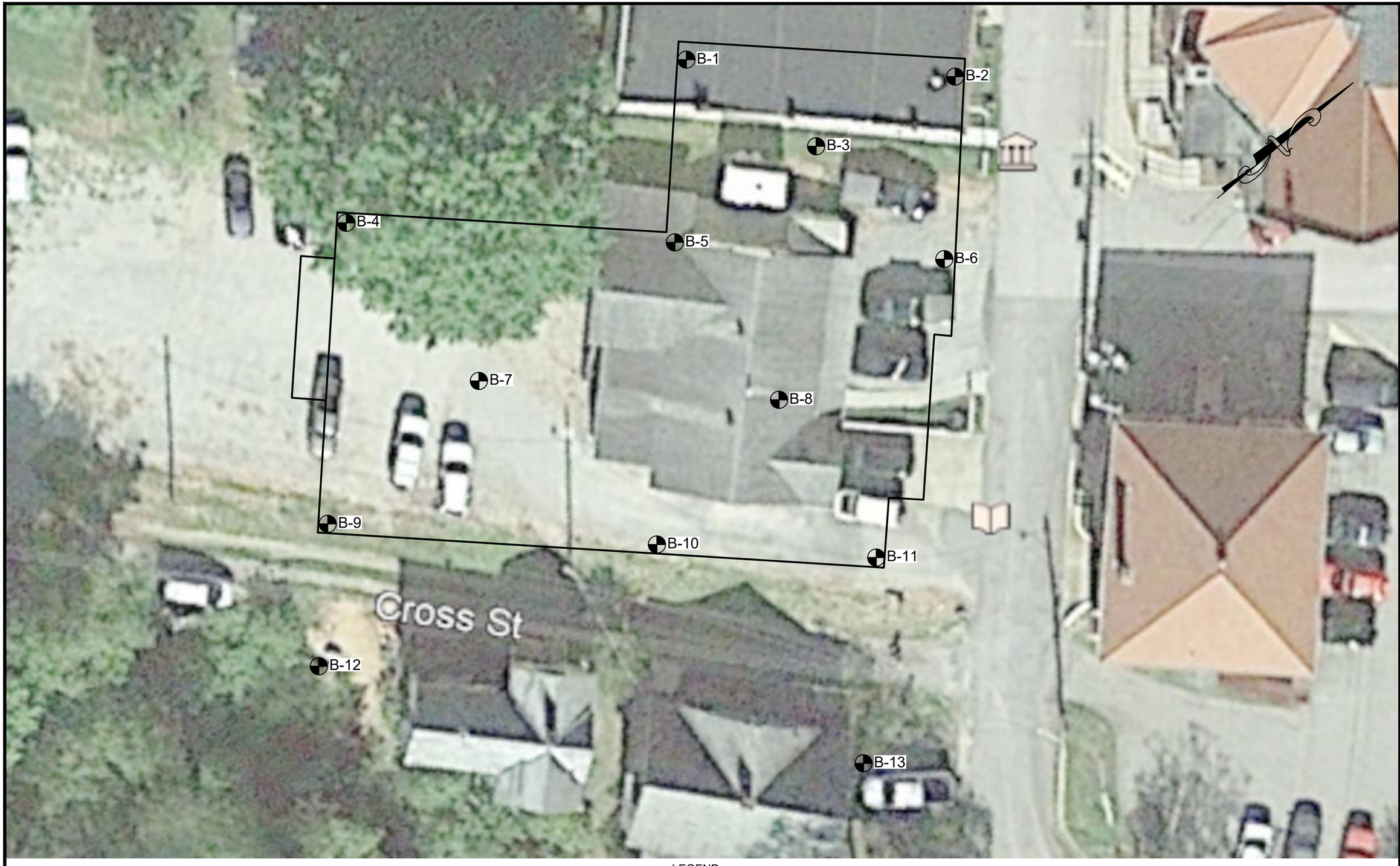
- The analysis and recommendations submitted in this report are based, in part, upon the data obtained from a limited number of soil test borings. The nature and extent of variations in soil conditions between the borings may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations of this report and provide additional recommendations.

- Contractors reviewing this report should acknowledge that the discussions and recommendations contained herein are for design information purposes only and may not be sufficient to prepare accurate bids. Any conclusions drawn by the contractor regarding subsurface conditions, quantities of unsuitable soils, rock, groundwater or methods and means of construction are at their sole risk.

- It is important that the geotechnical engineer be provided the opportunity to review the final geotechnical construction related plans and specifications to verify that the recommendations in this report are properly interpreted and incorporated in the design. If the geotechnical engineer is not accorded the privilege of making this recommended review, he can assume no responsibility for misinterpretation of these recommendations.

Figures

NGE
Environmental & Geotechnical
Engineering Solutions



NOTES

1. BORING LOCATION PLAN IS FOR ILLUSTRATIVE PURPOSES ONLY; BORING LOCATIONS ARE APPROXIMATE.
2. SITE PLAN IS BASED ON AN IMAGE FROM GOOGLE EARTH.

LEGEND

B-# APPROXIMATE LOCATION OF BORING

0 50 100 200 FEET

DATE	NO.	REVISION

NGE Environmental & Geotechnical Engineering Services

Geotechnical & Environmental Engineering Services
650 MacCorkle Avenue, West
Suite 1, Nitro, WV 25143-2477
(304) 201-3180 FAX 201-5182
www.ngeconsulting.com

PROJECT: DODDRIDGE CO. ANNEX BUILDING
CLIENT: THRASHER

SHEET: BORING LOCATION PLAN

Project No.	W20037
Drawn:	CTD
Checked:	---
Approved:	---
Scale:	1" = 100'
Date:	4-13-20
CAD File #	NA

FIGURE No. 1

NGE Environmental & Geotechnical Engineering Solutions

Project Name: **Doddridge County Annex Building**
Doddridge County, West Virginia

Project Number: **W20037**

BORING NO.

B- 1

Location: **See Figure 1** Offset:

Surface El.: **873.7 ft.**

Split Spoon | Shelby Tube | Rock Core | Bag Sample

Elevation	Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Blow Count (N-Value)	Moisture %	Liquid Limit	Plasticity Index	Silt and Clay %	Sand %
				GRAVEL 1.0			3-3-4 (7)					
870				Reddish brown **SILTY to SANDY CLAY**, moist, medium stiff to stiff								
				- w/rock fragments (1.0 - 4.0 ft.)			3-5-7 (12)					
	5			- sandy from 5.0 ft.			5-7-8 (15)	17				
				7.5								
865				Brown **CLAYEY SAND**, damp, dense			17-19-29 (48)					
				10.0								
	10			Red **SILTY CLAY**, moist, very stiff to hard			8-10-10 (20)	20	53	25		
				- brown and gray, silty to sandy (12.5 -14.0 ft.)			16-19-21 (40)	17				
860				- wet @ 13.0 ft.								
	15			- red and gray @ 15.0 ft.			18-19-25 (44)					
				16.0 Gray and red **CLAYSTONE**, extremely soft, weathered								
				17.5			50/3"					
855				Gray **SANDSTONE**, medium hard								
	20			20.0			50/3"					
				Gray **SILTY to SANDY SHALE**, soft to medium hard								
							50/1"					
850												
	25			- brown @ 25.0 ft. 25.4			50/5"					
				Bottom of Test Boring @ 25.4 ft.								
845												
	30											

Completion Depth:	**25.4 ft.**
Date Boring Started:	**4/1/20**
Date Boring Completed:	**4/1/20**
Engineer/Geologist:	**CEM**
Driller:	**NGE**

Remarks: **Water was noted at a depth of 13.0 ft. during drilling operations. Boring was noted to be dry at completion.**

Depth to Water @ 24 hrs.: **---**

NGE BASIC LOG - NO PENETROMETER LOG REPORTS.GPJ NGE_1.GDT 4/27/20

Novel Geo-Environmental

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

Figure **2**

NGE Environmental & Geotechnical Engineering Solutions

Project Name: **Doddridge County Annex Building**
Doddridge County, West Virginia

Project Number: **W20037**

BORING NO.

B- 2

Location: **See Figure 1** Offset:

Surface El.: **874.9 ft.**

Split Spoon | Shelby Tube | Rock Core | Bag Sample

Elevation	Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Blow Count (N-Value)	Moisture %	Liquid Limit	Plasticity Index	Silt and Clay %	Sand %
				GRAVEL 1.0			4-4-2 (6)					
				Reddish brown **SANDY CLAY**, moist, medium stiff to stiff								
							3-5-7 (12)	17				
870	5											
							6-7-6 (13)	20				
				7.5								
				Reddish brown to brown **CLAYEY SAND**, damp, medium dense			5-5-6 (11)					
865	10											
							5-5-7 (12)	21				
				12.5								
				Brown **SANDSTONE**, soft to medium hard, highly weathered, poorly cemented			50/5"					
860	15						50/3"					
							50/3"					
855	20						50/5"					
				22.5								
				Brown and gray **SILTY to SANDY SHALE**, extremely soft, weathered			17-19-24 (43)					
850	25						28-31-50/5"					
				26.4								
				Bottom of Test Boring @ 26.4 ft.								
845	30											

Completion Depth:	**16.4 ft.**
Date Boring Started:	**4/1/20**
Date Boring Completed:	**4/1/20**
Engineer/Geologist:	**CEM**
Driller:	**NGE**

Remarks: **Boring was noted to be dry during drilling operations and at boring completion.**

Depth to Water @ 24 hrs.: **---**

NGE BASIC LOG - NO PENETROMETER LOG REPORTS.GPJ NGE_1.GDT 4/27/20

Novel Geo-Environmental

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

Figure **3**

NGE Environmental & Geotechnical Engineering Solutions

Project Name: **Doddridge County Annex Building**
Doddridge County, West Virginia

Project Number: **W20037**

BORING NO.

B- 3

Location: **See Figure 1** Offset:

Surface El.: **872.6 ft.**

Split Spoon | Shelby Tube | Rock Core | Bag Sample

Elevation	Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Blow Count (N-Value)	Moisture %	Liquid Limit	Plasticity Index	Silt and Clay %	Sand %
				GRAVEL 1.0			3-4-2 (6)	16				
870				Reddish brown to brown **SILTY to SANDY CLAY**, moist, medium stiff to stiff			3-4-4 (8)	19				
	5			- sandy from 5.0 ft.			4-5-5 (10)	18				
865				8.0			12-50/5"					
	10			Brown **SANDSTONE**, soft, weathered, poorly cemented			50/6"					
860				12.5			13-19-21 (40)					
	15			15.5			12-21-36 (57)					
855				Red and gray **SHALE**, extremely soft, weathered 16.5								
	20			Bottom of Test Boring @ 16.5 ft.								
850												
	25											
845												
	30											

Completion Depth:	**16.5 ft.**
Date Boring Started:	**4/1/20**
Date Boring Completed:	**4/1/20**
Engineer/Geologist:	**CEM**
Driller:	**NGE**

Remarks: **Boring was noted to be dry during drilling operations and at boring completion.**

Depth to Water @ 24 hrs.: **---**

NGE BASIC LOG - NO PENETROMETER LOG REPORTS.GPJ NGE_1.GDT 4/27/20

Novel Geo-Environmental

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

Figure **4**

NGE Environmental & Geotechnical Engineering Solutions

Project Name: **Doddridge County Annex Building**
Doddridge County, West Virginia

Project Number: **W20037**

BORING NO.

B- 4

Location: **See Figure 1** Offset:

Surface El.: **862.7 ft.**

Split Spoon | Shelby Tube | Rock Core | Bag Sample

Elevation	Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Blow Count (N-Value)	Moisture %	Liquid Limit	Plasticity Index	Silt and Clay %	Sand %
				TOPSOIL 0.2			3-3-2 (5)	22				
860				Reddish brown **SILTY to SANDY CLAY**, moist, medium stiff to very stiff								
				- red and gray, silty (2.5 - 7.5 ft.)			3-5-4 (9)					
	5			- red from 7.5 ft.			7-8-12 (20)	16				
855				8.5			28-32-50/5"					
				Brown **SANDSTONE**, extremley soft, highly weathered, poorly cemented								
	10						12-12-13 (25)					
				12.5								
850				Red **SHALE**, very soft to soft			28-50/3"					
	15						31-50/5"					
845				- brown @ 17.5 ft.			50/5"					
	20			- no recovery (20.0 - 21.5 ft.)			50/1"					
				- auger refusal @ 21.5 ft. 21.5								
840				Bottom of Test Boring @ 21.5 ft.								
	25			Note - boring was offset 3 ft. uphill								
835												
	30											

Completion Depth:	**21.5 ft.**
Date Boring Started:	**4/2/20**
Date Boring Completed:	**4/2/20**
Engineer/Geologist:	**CEM**
Driller:	**NGE**

Remarks: **Boring was noted to be dry during drilling operations and at boring completion.**

Depth to Water @ 24 hrs.: **---**

NGE BASIC LOG - NO PENETROMETER LOG REPORTS.GPJ NGE_1.GDT 4/27/20

Novel Geo-Environmental

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

Figure **5**

NGE Environmental & Geotechnical Engineering Solutions

Project Name: **Doddridge County Annex Building**
Doddridge County, West Virginia

Project Number: **W20037**

BORING NO.

B- 5

Location: **See Figure 1** Offset:

Surface El.: **867.7 ft.**

Split Spoon | Shelby Tube | Rock Core | Bag Sample

Elevation	Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Blow Count (N-Value)	Moisture %	Liquid Limit	Plasticity Index	Silt and Clay %	Sand %
				GRAVEL 1.0			4-5-5 (10)					
865				Reddish brown **SILTY to SANDY CLAY**, moist, medium stiff to very stiff			2-3-3 (6)	27				
	5			- red and gray, silty from 5.0 ft.			6-6-8 (14)	19	48	22		
860				8.5			12-18-21 (39)					
	10			Red and brown **SILTY to SANDY SHALE**, extremley soft, highly weathered			27-32-45 (77)					
855							18-12-24 (36)					
	15						28-31-42 (73)					
				16.5								
850				Bottom of Test Boring @ 16.5 ft.								
	20											
845												
	25											
840												
	30											

Completion Depth:	**16.5 ft.**
Date Boring Started:	**4/1/20**
Date Boring Completed:	**4/1/20**
Engineer/Geologist:	**CEM**
Driller:	**NGE**

Remarks: **Boring was noted to be dry during drilling operations and at boring completion.**

Depth to Water @ 24 hrs.: **---**

NGE BASIC LOG - NO PENETROMETER LOG REPORTS.GPJ NGE_1.GDT 4/27/20

Novel Geo-Environmental

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

Figure **6**

NGE Environmental & Geotechnical Engineering Solutions

Project Name: **Doddridge County Annex Building**
Doddridge County, West Virginia

Project Number: **W20037**

BORING NO.

B- 6

Location: **See Figure 1** Offset:

Surface El.: **872.1 ft.**

Split Spoon | Shelby Tube | Rock Core | Bag Sample

Elevation	Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Blow Count (N-Value)	Moisture %	Liquid Limit	Plasticity Index	Silt and Clay %	Sand %
				GRAVEL 1.0			6-3-3 (6)					
870				Reddish brown **SANDY CLAY**, moist, medium stiff to stiff								
							3-5-7 (12)	18				
	5											
							3-4-4 (8)	20	33	12		
865				8.0								
				Brown **SANDSTONE**, very soft to medium hard, highly weathered, poorly cemented			18-29-50/6"					
	10						50/5"					
860							50/2"					
				15.0								
	15			Red **SHALE**, soft 15.5			50/6"					
				Bottom of Test Boring @ 15.5 ft.								
855												
	20											
850												
	25											
845												
	30											

Completion Depth:	**15.5 ft.**
Date Boring Started:	**4/1/20**
Date Boring Completed:	**4/1/20**
Engineer/Geologist:	**CEM**
Driller:	**NGE**

Remarks: **Boring was noted to be dry during drilling operations and at boring completion.**

Depth to Water @ 24 hrs.: **---**

NGE BASIC LOG - NO PENETROMETER LOG REPORTS.GPJ NGE_1.GDT 4/27/20

Novel Geo-Environmental

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

Figure **7**

NGE Environmental & Geotechnical Engineering Solutions

Project Name: **Doddridge County Annex Building**
Doddridge County, West Virginia

Project Number: **W20037**

BORING NO.

B- 7

Location: **See Figure 1** Offset:

Surface El.: **860.4 ft.**

Split Spoon | Shelby Tube | Rock Core | Bag Sample

Elevation	Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Blow Count (N-Value)	Moisture %	Liquid Limit	Plasticity Index	Silt and Clay %	Sand %
860				**ASPHALT PAVEMENT** 0.3			3-8-12 (20)	11				
				Brown **SILTY to SANDY CLAY**, moist, very stiff								
							4-7-9 (16)					
	5			5.0								
855				Brown **CLAYEY SAND**, damp, dense			16-18-24 (42)	14				
				7.5								
				Red **SHALE**, extremely soft to very soft, weathered			21-34-45 (79)					
	10											
850							29-50/6"					
							17-21-32 (53)					
	15			- red and brown @ 15.0 ft.								
845				15.9			29-50/5"					
				Bottom of Test Boring @ 15.9 ft.								
840	20											
835	25											
	30											

Completion Depth:	**15.9 ft.**
Date Boring Started:	**4/2/20**
Date Boring Completed:	**4/2/20**
Engineer/Geologist:	**CEM**
Driller:	**NGE**

Remarks: **Boring was noted to be dry during drilling operations and at boring completion.**

Depth to Water @ 24 hrs.: **---**

NGE BASIC LOG - NO PENETROMETER LOG REPORTS.GPJ NGE_1.GDT 4/27/20

Novel Geo-Environmental

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

Figure **8**

NGE Environmental & Geotechnical Engineering Solutions

Project Name: **Doddridge County Annex Building**
Doddridge County, West Virginia

Project Number: **W20037**

BORING NO.

B- 8

Location: **See Figure 1** Offset:

Surface El.: **863.9 ft.**

Split Spoon | Shelby Tube | Rock Core | Bag Sample

Elevation	Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Blow Count (N-Value)	Moisture %	Liquid Limit	Plasticity Index	Silt and Clay %	Sand %
				GRAVEL and SILTY CLAY			2-2-3 (5)					
				2.5								
860	5			Brown **SILTY to SANDY CLAY**, moist, very stiff to hard			6-7-10 (17)					
				- no recovery (2.5 - 4.0 ft.)			7-12-19 (31)	17				
				- poor recovery (5.0 - 6.5 ft.)								
				7.5			50/6"					
855				Brown **SANDSTONE**, extremely soft, weathered								
	10			10.0								
				Red **SHALE**, extremely soft, weathered			15-19-31 (50)					
850							7-10-19 (29)					
	15			- brown and gray from 16.0 ft.			18-19-31 (50)					
				16.5								
				Bottom of Test Boring @ 16.0 ft.								
845												
	20											
840												
	25											
835												
	30											

Completion Depth:	**16.5 ft.**
Date Boring Started:	**4/1/20**
Date Boring Completed:	**4/1/20**
Engineer/Geologist:	**CEM**
Driller:	**NGE**

Remarks: **Boring was noted to be dry during drilling operations and at boring completion.**

Depth to Water @ 24 hrs.: **---**

NGE BASIC LOG - NO PENETROMETER LOG REPORTS.GPJ NGE_1.GDT 4/27/20

Novel Geo-Environmental

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

Figure **9**

NGE Environmental & Geotechnical Engineering Solutions

Project Name: **Doddridge County Annex Building**
Doddridge County, West Virginia

Project Number: **W20037**

BORING NO.

B- 9

Location: **See Figure 1** Offset:

Surface El.: **857.3 ft.**

Split Spoon | Shelby Tube | Rock Core | Bag Sample

Elevation	Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Blow Count (N-Value)	Moisture %	Liquid Limit	Plasticity Index	Silt and Clay %	Sand %
				TOPSOIL 0.1			3-3-2 (5)	21				
855				Brown and red **SILTY to SANDY CLAY** with rock fragments, moist, medium stiff								
							3-2-4 (6)					
				- FILL -								
	5						3-3-3 (6)	18				
850				7.5								
				Brown and red **SILTY CLAY**, moist, very stiff			6-7-11 (18)	20				
	10			11.0			7-12-19 (31)					
845				Reddish brown **CLAYSTONE**. extremely soft, weathered								
				- brown, silty to sandy from 12.5 ft.			25-28-22 (50)					
	15			15.0								
				Brown **SHALE**, very soft, weathered			24-40-50/6"					
840												
				- no recovery (17.5 - 20.0 ft.)			50/1"					
				- auger refusal @ 20.0 ft.								
	20			20.0			50/0"					
				Bottom of Test Boring @ 20.0 ft.								
835												
	25											
830												
	30											

Completion Depth:	**20.0 ft.**
Date Boring Started:	**4/2/20**
Date Boring Completed:	**4/2/20**
Engineer/Geologist:	**CEM**
Driller:	**NGE**

Remarks: **Boring was noted to be dry during drilling operations and at boring completion.**

Depth to Water @ 24 hrs.: **---**

NGE BASIC LOG - NO PENETROMETER LOG REPORTS.GPJ NGE_1.GDT 4/27/20

Novel Geo-Environmental

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

Figure **10**

NGE Environmental & Geotechnical Engineering Solutions

Project Name: **Doddridge County Annex Building**
Doddridge County, West Virginia

Project Number: **W20037**

BORING NO.

B-10

Location: **See Figure 1** Offset:

Surface El.: **860.7 ft.**

Split Spoon | Shelby Tube | Rock Core | Bag Sample

Elevation	Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Blow Count (N-Value)	Moisture %	Liquid Limit	Plasticity Index	Silt and Clay %	Sand %
860				**TOPSOIL** 0.3			5-6-4 (10)	20				
				Brown **SILTY to SANDY CLAY** with rock fragments, moist, soft to medium stiff								
				- FILL -			3-2-2 (4)					
	5			5.0								
855				Brown and red **SILTY CLAY**, moist, stiff to very stiff			3-4-4 (8)	20				
							5-9-12 (21)	24				
	10			- brown and gray, w/residual shale from 10.0 ft.								
850				11.0			14-17-21 (38)					
				Brown **SANDY SHALE**, very soft, highy weathered								
							14-29-50/5"					
	15			- sandstone @ 15.0 ft. 15.1								
845				Bottom of Test Boring @ 15.1 ft.			50/1"					
	20											
840												
	25											
835												
	30											

Completion Depth:	**15.1 ft.**
Date Boring Started:	**4/2/20**
Date Boring Completed:	**4/2/20**
Engineer/Geologist:	**CEM**
Driller:	**NGE**

Remarks: **Boring was noted to be dry during drilling operations and at boring completion.**

Depth to Water @ 24 hrs.: **---**

NGE BASIC LOG - NO PENETROMETER LOG REPORTS.GPJ NGE_1.GDT 4/27/20

Novel Geo-Environmental

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

Figure **11**

NGE Environmental & Geotechnical Engineering Solutions

Project Name: **Doddridge County Annex Building**
Doddridge County, West Virginia

Project Number: **W20037**

BORING NO.

B-11

Location: **See Figure 1** Offset:

Surface El.: **861.7 ft.**

Split Spoon | Shelby Tube | Rock Core | Bag Sample

Elevation	Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Blow Count (N-Value)	Moisture %	Liquid Limit	Plasticity Index	Silt and Clay %	Sand %
				ASPHALT PAVEMENT 0.3								
860				Brown **SANDY CLAY**, moist, medium stiff to stiff			3-3-2 (5)	20				
				- brown and gray (2.5 - 4.0 ft.)			3-5-6 (11)	17				
	5			5.0								
855				Brown **SILTY SAND and SANDSTONE FRAGMENTS**, damp, very dense 7.5			16-29-34 (63)					
				Red **SHALE**, extremely soft to medium hard, weathered			18-22-29 (51)					
	10						12-14-13 (27)					
850				- brown and gray from 12.5 ft.			12-11-16 (27)					
	15			- sandy from 15.0 ft.			50/3"					
845				- auger refusal @ 17.0 ft. 17.0								
				Bottom of Test Boring @ 17.0 ft.								
840	20											
	25											
835												
	30											

Completion Depth:	**17.0 ft.**
Date Boring Started:	**4/2/20**
Date Boring Completed:	**4/2/20**
Engineer/Geologist:	**CEM**
Driller:	**NGE**

Remarks: **Boring was noted to be dry during drilling operations and at boring completion.**

Depth to Water @ 24 hrs.: **---**

NGE BASIC LOG - NO PENETROMETER LOG REPORTS.GPJ NGE_1.GDT 4/27/20

Novel Geo-Environmental

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

Figure **12**

NGE Environmental & Geotechnical Engineering Solutions

Project Name: **Doddridge County Annex Building**
Doddridge County, West Virginia

Project Number: **W20037**

BORING NO.

B-12

Location: **See Figure 1** Offset:

Surface El.: **849.1 ft.**

Split Spoon | Shelby Tube | Rock Core | Bag Sample

Elevation	Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Blow Count (N-Value)	Moisture %	Liquid Limit	Plasticity Index	Silt and Clay %	Sand %
				Red and brown **SILTY to SANDY CLAY**, moist, stiff			3-5-5 (10)	14				
							3-5-9 (14)	18				
845	5			5.0 Brown **CLAYEY SAND**, damp, loose			3-4-3 (7)					
				7.5 Brown **SANDSTONE**, medium hard to hard			50/3"					
840	10						50/3"					
							50/3"					
835	15			- gray from 15.0 ft.			50/2"					
							50/1"					
830	20			20.1 Bottom of Test Boring @ 20.1 ft.			50/1"					
				Note - boring was offset 6 ft. toward B-13								
825	25											
820	30											

Completion Depth:	**20.1 ft.**
Date Boring Started:	**4/2/20**
Date Boring Completed:	**4/2/20**
Engineer/Geologist:	**CEM**
Driller:	**NGE**

Remarks: **Boring was noted to be dry during drilling operations and at boring completion.**

Depth to Water @ 24 hrs.: **---**

NGE BASIC LOG - NO PENETROMETER LOG REPORTS.GPJ NGE_1.GDT 4/27/20

Novel Geo-Environmental

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

Figure **13**

NGE Environmental & Geotechnical Engineering Solutions

Project Name: **Doddridge County Annex Building**
Doddridge County, West Virginia

Project Number: **W20037**

BORING NO.

B-13

Location: **See Figure 1** Offset:

Surface El.: **854.6 ft.**

Split Spoon | Shelby Tube | Rock Core | Bag Sample

Elevation	Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Blow Count (N-Value)	Moisture %	Liquid Limit	Plasticity Index	Silt and Clay %	Sand %
				TOPSOIL 0.2			3-4-6 (10)	21				
				Red and brown **SILTY to SANDY CLAY** with rock fragments, moist, stiff - FILL - 3.0			3-3-4 (7)	27	45	17		
850	5			Brown and gray **SILTY to SANDY CLAY**, moist, medium stiff 6.0			6-12-24 (36)					
				Brown and gray **SILTY to SANDY SHALE**, very soft to medium hard			50/3"					
845	10			10.0			50/3"					
				Brown and gray **SANDSTONE**, medium hard to hard			50/2"					
840	15						50/2"					
				17.6			50/1"					
				Bottom of Test Boring @ 17.6 ft.								
835	20			Note - boring was offset 4 ft. downhill								
830	25											
825	30											

Completion Depth:	**17.6 ft.**
Date Boring Started:	**4/2/20**
Date Boring Completed:	**4/2/20**
Engineer/Geologist:	**CEM**
Driller:	**NGE**

Remarks: **Boring was noted to be dry during drilling operations and at boring completion.**

Depth to Water @ 24 hrs.: **---**

NGE BASIC LOG - NO PENETROMETER LOG REPORTS.GPJ NGE_1.GDT 4/27/20

Novel Geo-Environmental

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

Figure **14**

Appendix A

NGE
Environmental & Geotechnical
Engineering Solutions

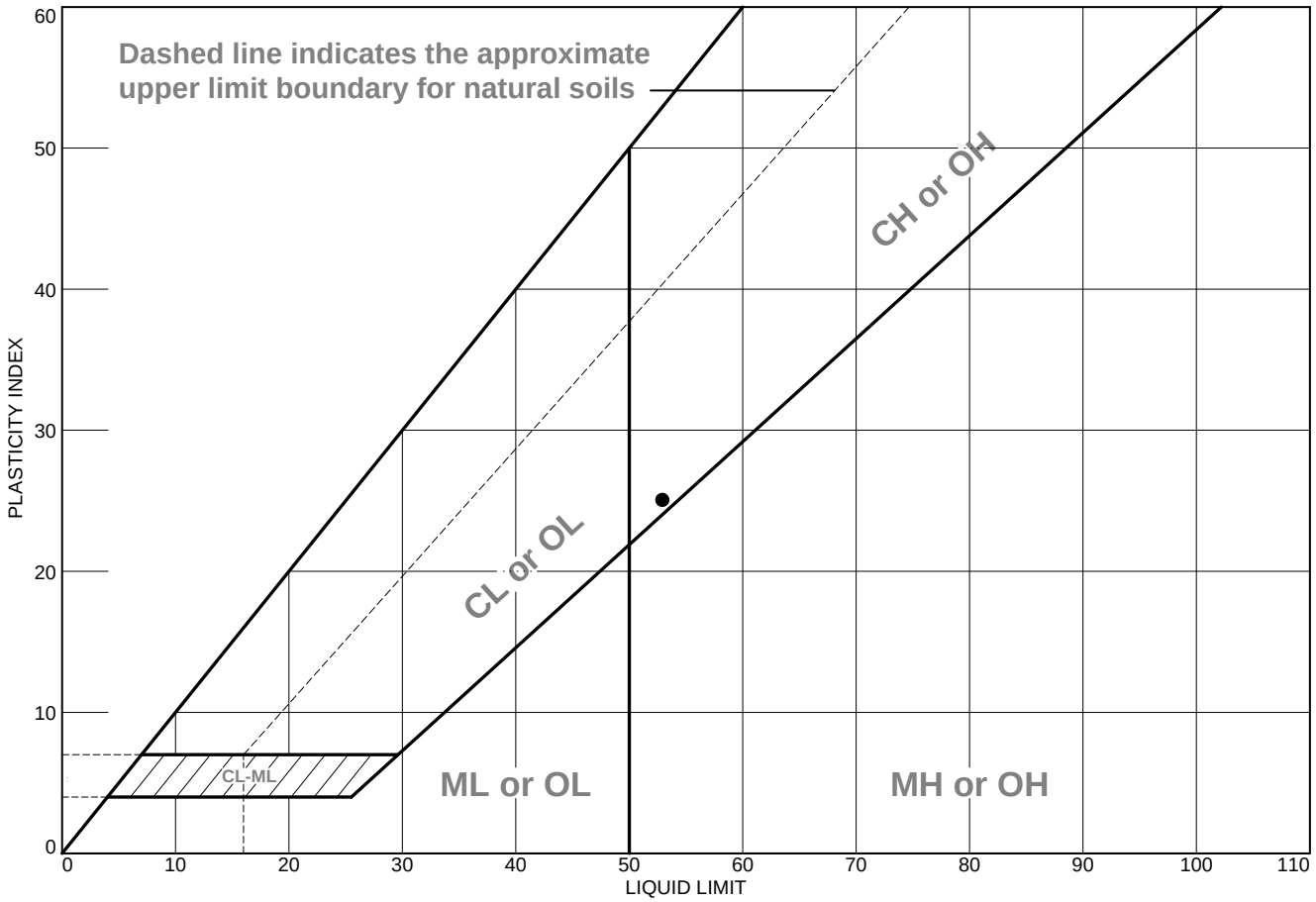
NGE
Environmental & Geotechnical Engineering Solutions

Phone: (304)201-5180
Fax: (304)201-5182
www.ngeconsulting.com

W20037
Doddridge County Annex Bldg.
MOISTURE CONTENT ANALYSIS SUMMARY

Boring No.	Sample Depth (ft.)	% Moisture	Boring No.	Sample Depth (ft.)	% Moisure
B-1	5-6.5	16.9%			
B-1	10-11.5	19.6%			
B-1	12.5-14	16.8%			
B-2	2.5-4	17.5%			
B-2	5-6.5	20.0%			
B-2	10-11.5	20.9%			
B-3	0-1.5	15.5%			
B-3	2.5-4	18.7%			
B-3	5-6.5	18.4%			
B-4	0-1.5	21.7%			
B-4	5-6.5	15.8%			
B-5	2.5-4	27.3%			
B-5	5-6.5	18.7%			
B-6	2.5-4	18.2%			
B-6	5-6.5	20.3%			
B-7	0-1.5	10.7%			
B-7	5-6.5	14.5%			
B-8	5-6.5	17.4%			
B-9	0-1.5	21.1%			
B-9	5-6.5	17.9%			
B-9	7.5-9	19.9%			
B-10	0-1.5	19.5%			
B-10	5-6.5	20.3%			
B-10	7.5-9	24.1%			
B-11	0-1.5	19.8%			
B-11	2.5-4	17.1%			
B-12	0-1.5	14.5%			
B-12	2.5-4	18.3%			
B-13	0-1.5	20.6%			
B-13	2.5-4	27.4%			

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Red SILTY CLAY	53	28	25			

Project No. W20037 **Client:** Thrasher

Project: Doddridge County Annex Building

●**Source of Sample:** B-1 **Depth:** 10.0 - 11.5 ft. **Sample Number:** 5

Remarks:

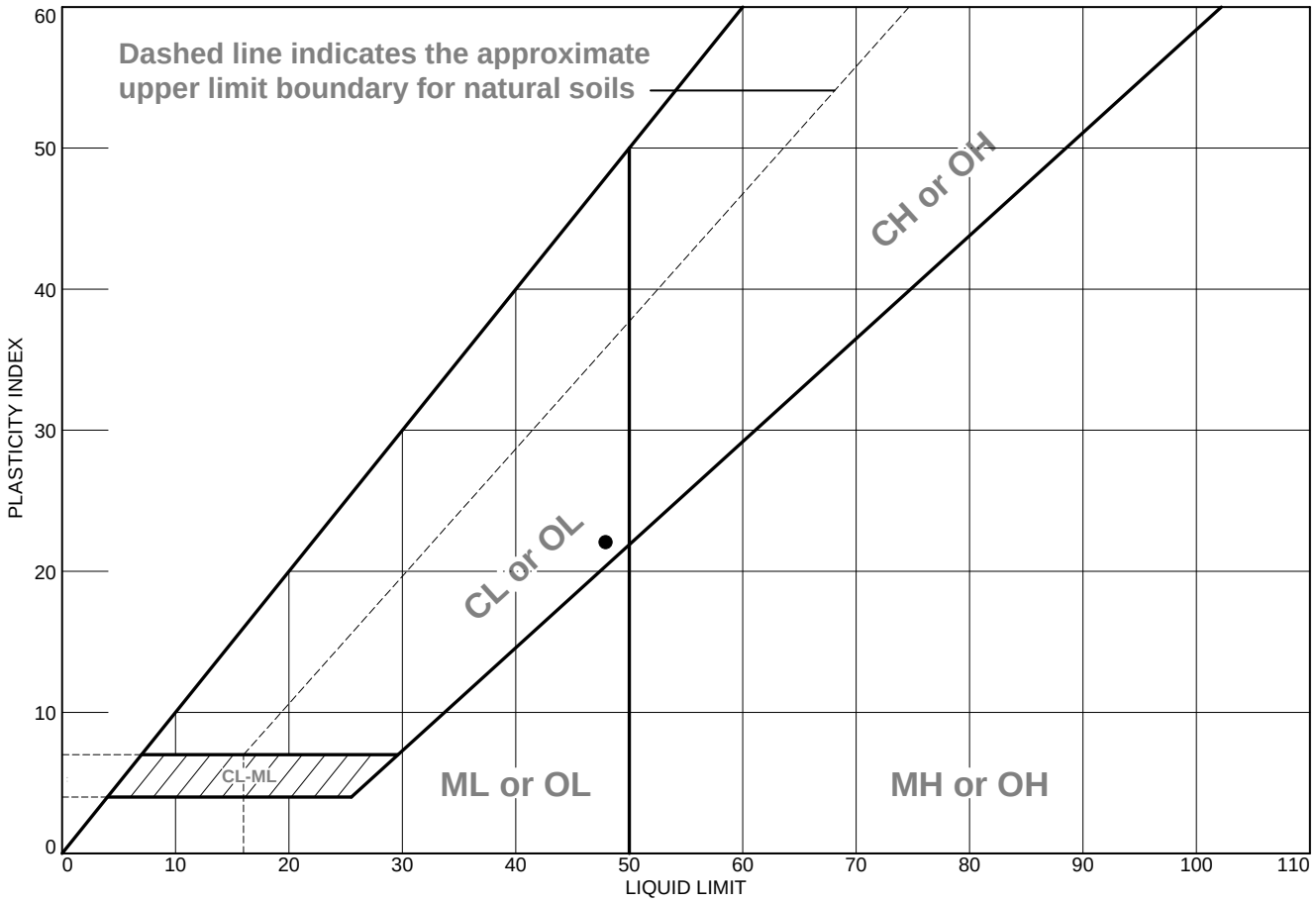
NGE, LLC

St. Albans, West Virginia

Figure

Tested By: MAJ **Checked By:** CEM

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Red and gray SILTY CLAY	48	26	22			

Project No. W20037 **Client:** Thrasher

Project: Doddridge County Annex Building

●**Source of Sample:** B-5 **Depth:** 5.0 - 6.5 ft. **Sample Number:** 3

Remarks:

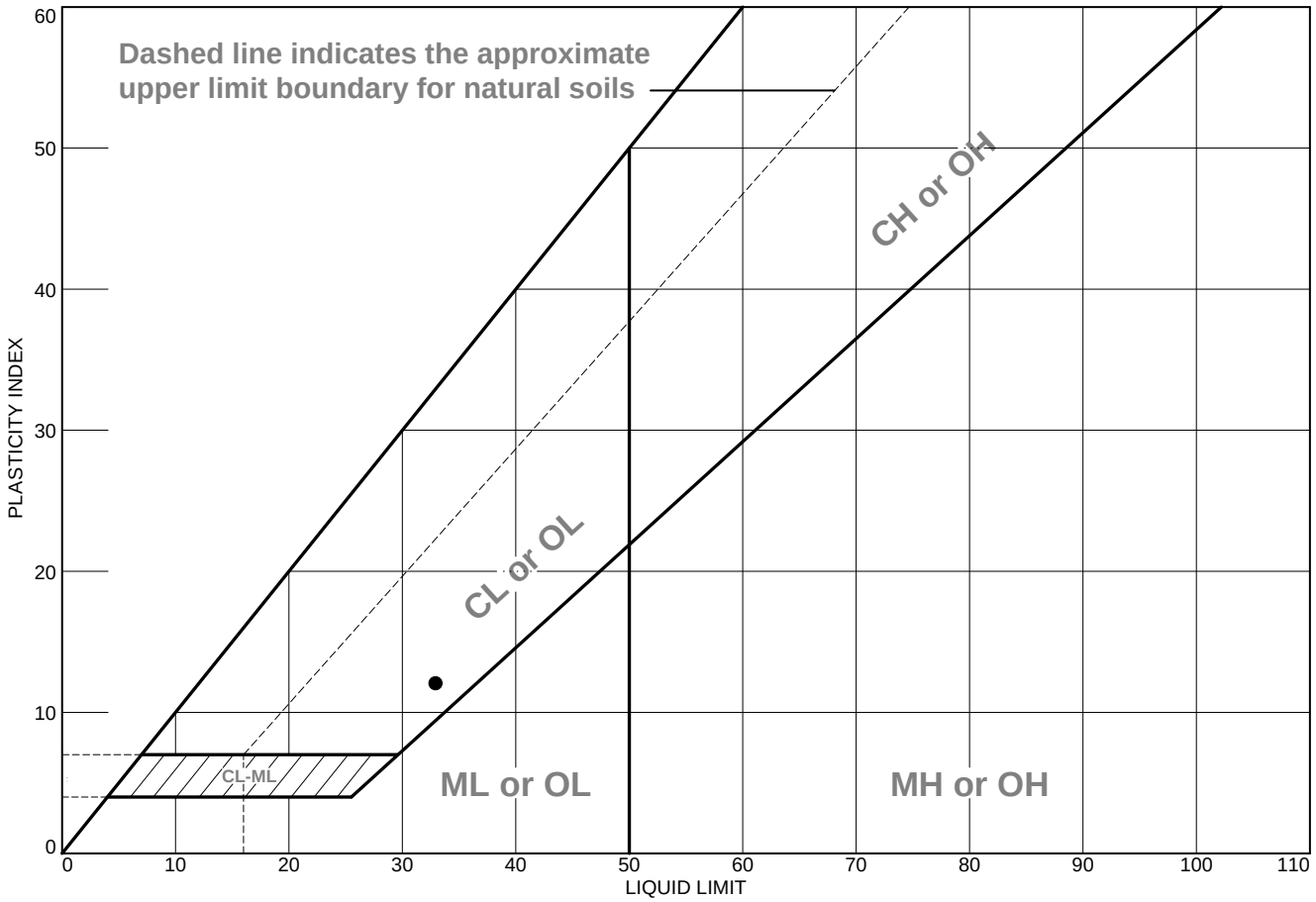
NGE, LLC

St. Albans, West Virginia

Figure

Tested By: MAJ **Checked By:** CEM

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Reddish brown SANDY CLAY	33	21	12			

Project No. W20037 **Client:** Thrasher

Project: Doddridge County Annex Building

●**Source of Sample:** B-6 **Depth:** 5.0 - 6.5 ft. **Sample Number:** 3

Remarks:

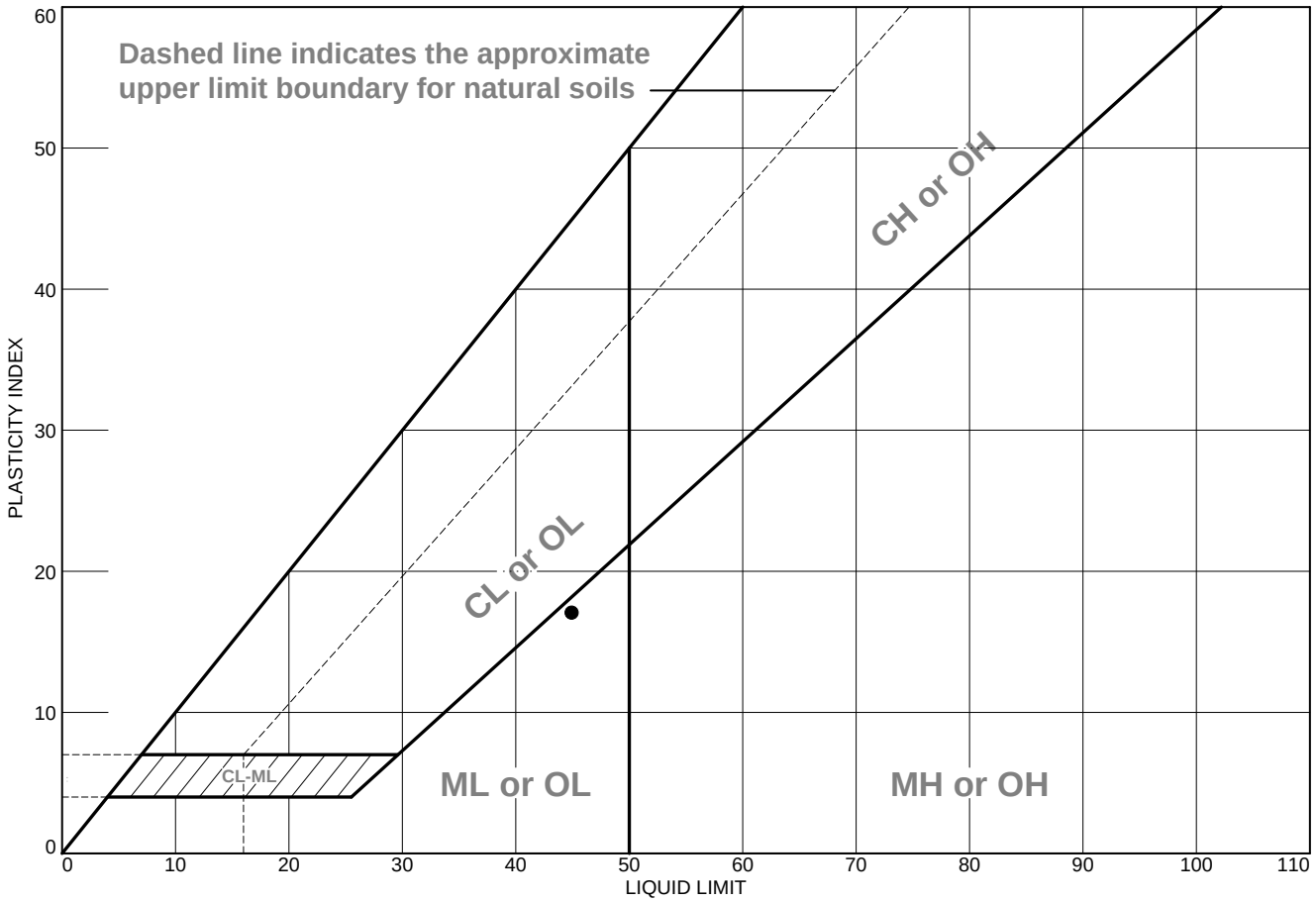
NGE, LLC

St. Albans, West Virginia

Figure

Tested By: MAJ **Checked By:** CEM

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Red and brown SILTY to SANDY CLAY w/rock frags	45	28	17			

Project No. W20037 **Client:** Thrasher

Project: Doddridge County Annex Building

●**Source of Sample:** B-13 **Depth:** 2.5 - 4.0 ft. **Sample Number:** 2

Remarks:

NGE, LLC

St. Albans, West Virginia

Figure

Tested By: MAJ **Checked By:** CEM