Geotechnical Evaluation Report

Bluff Boulevard Reconstruction
Between College Avenue and 7th Avenue North
Clinton, Iowa

Prepared for

Shive-Hattery, Inc.

Professional Certification:
I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa. My license renewal date is December 31, 2023.

Timothy T. Wiles, PE
Principal Engineer
License Number: 12939
August 9, 2022

LICENSED PROFESSIONAL ENGINEER
TIMOTHY T. WILES
12939
8.9.22
IOWA

Project B2204326

Braun Intertec Corporation

BRAUN INTERTEC
The Science You Build On.

Braun Intertec Corporation
1901 16th Avenue SW, Suite 2
Cedar Rapids, IA 52404

Phone: 319.365.0961
Web: braunintertec.com

August 9, 2022 Project B2204326

Mr. Justin H. Campbell, PE
Shive-Hattery, Inc.
222 Third Avenue SE, Suite 300
Cedar Rapids, IA 52401

Re: Geotechnical Evaluation
Bluff Boulevard Reconstruction
Between College Avenue and 7th Avenue North
Clinton, Iowa

Dear Mr. Campbell:

We are pleased to present this Geotechnical Evaluation Report for the proposed Bluff Boulevard reconstruction project in Clinton, Iowa.

Thank you for making Braun Intertec your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact Holly Haywood at 816.807.8212 or hhaywood@braunintertec.com or Tim Wiles at 319.375.5801 or twiles@braunintertec.com.

Sincerely,

BRAUN INTERTEC CORPORATION

Holly Haywood
Project Consultant

Timothy T. Wiles, PE
Principal Engineer

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Appendix: Figure A-1: Soil Boring Location Plan (All); Figures A-2 to A-4 Soil Boring Location Plan (West, Center and East); Figure A-5 to A-7: Subsurface Profiles; Core Photo Log; Log of Borings Sheets; Sieve Analysis Test Results; California Bearing Ratio Test Results; Standard Proctor Test Results; Descriptive Terminology of Soil

A. Introduction

A.1. Project Description

This Geotechnical Evaluation Report addresses the proposed design and reconstruction of approximately 2.1 miles of Bluff Boulevard from College Avenue to 7th Avenue North and 500 feet of 7th Avenue North in Clinton, Iowa. The project includes widening Bluff Boulevard in some areas to a three-lane road with middle turning lane. Additionally, we understand two roundabouts are planned along the planned Bluff Boulevard reconstruction. The general outline of the proposed road alignment is shown in Figures A-2 through A-4 in the attachments. Table 1 provides project details.

Table 1. Project Description

Aspect	Description
Nature of construction	PCC (Portland Cement Concrete) or HMA (Hot Mix Asphalt)
Estimated Traffic Volume	Unknown
Site grading	Less than about 5 feet (Provided)

A.2. Existing Site Conditions and Proposed Site Layout

Currently, the roadway segment exists as a two- to four-lane, approximately 2.1 miles of HMA pavement along Bluff Boulevard and 500 feet of HMA along 7th Avenue North. The project area begins approximately 150 feet west of College Avenue to approximately 180 feet west of North 5th Street along 7th Avenue North. The site is bordered by residential houses and various commercial properties and associated pavements.

Current grades range from approximate elevations of 595 to 616 feet. Generally, the profile of the site is rolling hills with about 10 to 12 feet of grade change. However, between 2nd Avenue and 4th Avenue along Bluff Boulevard the profile dips lower than the remaining portion of the road with up to 20 feet of elevation difference in that area. A detailed history of construction and maintenance of this roadway was not provided to us.

A.3. Purpose

The purpose of this geotechnical evaluation is to provide information about the pavement and subsurface geologic conditions at selected boring locations, evaluate their impact on the project, and provide geotechnical recommendations for the design and reconstruction of Bluff Boulevard.

A.4. Background Information and Reference Documents

We reviewed the following information:

- Drive to Prosperity - Bluff Boulevard, Concept Exhibit dated July 8, 2022, provided by Shive-Hattery, Inc.
- Email and phone communications with Shive-Hattery, Inc.
- Publicly available sources of information

We have described our understanding of the proposed construction and site to the extent others reported it to us. Depending on the extent of available information, we may have made assumptions based on our experience with similar projects. If we have not correctly recorded or interpreted the project details, the project team should notify us. New or changed information could require additional evaluation, analyses, and/or recommendations.

A.5. Scope of Services

We performed our scope of services for the project in accordance with our Proposal for a Geotechnical Evaluation, dated March 24, 2022, and in accordance with our Master of Services Agreement (MSA) dated November 7, 2018. The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewed the background information and reference documents previously cited.
- Staked and cleared the exploration location of underground utilities. The Soil Boring Location Plan included in the Appendix shows the approximate locations of the borings.
- Performed 24 pavement cores follow by standard penetration test (SPT) borings and two SPT borings that did not include pavement cores, denoted as B-1 through B-26, within the proposed pavement improvement and new pavement area to nominal depths of 1.5 to 15 feet below grade across the site.
- Performed laboratory testing on selected samples to aid in soil classification and engineering analysis.
- Prepared this report containing a boring location plan, logs of soil borings, a summary of the soils encountered, results of laboratory tests, and recommendations for pavement subgrade preparation and the design and reconstruction of pavements.

Our scope of services did not include environmental services or testing and our geotechnical personnel performing this evaluation are not trained to provide environmental services or testing. We can provide environmental services or testing at your request.

B. Results

B.1. Geologic Overview

We based the geologic origins used in this report on the soil types, in-situ and laboratory testing, and available common knowledge of the geological history of the site. Because of the complex depositional history, geologic origins can be difficult to ascertain. We did not perform a detailed investigation of the geologic history for the site.

B.2. Coring Results

Table 2 on the following page provides a summary of the pavement cores including pavement type and thickness.

B.3. Boring Results

Table 3 on page 5 of this report provides a summary of the soil boring results; in the general order we encountered the strata. We indicate the depths as measured from existing grade. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology sheets in the Appendix include definitions of abbreviations used in Table 3.

B.4. Laboratory Test Results

The boring logs show the results of laboratory testing we performed, next to the tested sample depth. Additionally, the California Bearing Ratio (CBR), Standard Proctor, and sieve analysis test reports are included in the Appendix.

The moisture content of the sandy soils ranged from 6 to 17 percent. The moisture contents of the native clayey soils ranged from 14 to 27 percent. Two unconfined compression tests were performed on Shelby tube samples consisting of lean clay. The resulting strength ranged from 0.7 tsf to 2.0 tsf.

Table 2. Pavement Core Summary

Boring Location	HMA Thickness (inches)	PCC Thickness (inches)	Brick Thickness (inches)	Notes
B-1	NA	9.5	NA	Subbase: Approx. 5 inches of gravel
B-2	NA	6	NA	Subbase: Approx. 3 inches of clayey sand
B-3	NA	8	NA	Subbase: Approx. 12 inches of clayey sand
B-4	NA	8	NA	Subbase: Approx. 3 inches of clayey sand
B-5	NA	8	NA	Subbase: Approx. 4 inches of sandy clay
B-7	4	NA	3.5	Subbase: Approx. 3 inches of clayey sand
B-8	5	NA	3.5	Subbase: Approx. 3 inches of sand
B-9	5.5	NA	3.5	Subbase: Approx. 4 inches of clayey sand
B-10	4.25	NA	3.5	Subbase: Approx. 2 inches of clayey sand
B-11	4	NA	3.5	Subbase: Approx. 3 inches of clayey sand
B-12	3.5	8	NA	No apparent subbase
B-13	4.5	NA	NA	Subbase: Approx. 3 inches of gravel
B-14	3.25	7	NA	No apparent subbase
B-15	9	6.5	NA	No apparent subbase
B-16	3.5	7.5	NA	Subbase: Approx. 4 inches of clayey sand
B-17	9	NA	NA	No apparent subbase
B-18	8	NA	NA	Subbase: Approx. 2 inches of clayey sand
B-19	5	NA	NA	No apparent subbase
B-20	7.5	NA	NA	No apparent subbase
B-21	7	NA	NA	No apparent subbase
B-22	8.5	NA	NA	No apparent subbase
B-23	8.5	NA	NA	No apparent subbase
B-25	9.5	NA	NA	No apparent subbase
B-26	7.5	NA	NA	No apparent subbase

Our mechanical analyses indicated that the native soils contained a wide array of compositions including clay, silt, silty sand, clayey sand, and sand with gravel. The boring logs show the material type based on the sieve analysis. The liquid limit determined for the clay or silt soils ranged from 22 to 38 and plasticity index of 4 to 21. These results indicate that the fine-grained portion of the fill soils tested classify as lean clay or low plasticity silt. Our analysis included performing CBR and Standard Proctor tests on the proposed subgrade soils. The results of our CBR tests ranged from 2.2 to 8.9 with an average of 5.8 and included silty sand and lean clay soil types. The results of the Standard Proctor test provided maximum dry densities of 112 pcf to 123 pcf and optimum moisture contents of 10.3% to 15.3%.

Table 3. Subsurface Profile Summary

Strata	Soil Type - ASTM Classification	Range of Penetration Resistances (Blows Per Foot)	Commentary and Details
Pavement section	--	--	▪ Present at all borings, excluding B-6 and B-24 to depths of approximately 4.5 to 15.5 inches. ▪ PCC pavement in B-1 through B-5 ▪ HMA overlying PCC or brick in B-7 through B-12, B-14, B-15, and B-16; and HMA only in B-13, B-17 through B-26 (excluding B-24).
Pavement Subbase	CL, SC, SP, GC, GP	--	▪ Where observed the pavement subbase consisted generally of sandy soils with some clay and gravel ▪ Thickness ranges from 2 to 12 inches
Existing Fill	CL	5 to 13	▪ Present in B-1 through B-5, B-7, B-11, B-13, B-16, B-18, and B-22 below pavement ▪ Encountered to depths of 0.7 to 5 feet ▪ Generally sandy and may contain gravel
Loess and Eolian Deposits	CL, SM, SC, SP	4 to 14	▪ Present in B-1, B-3 through B-7, B-11, and B-22 below existing fill, topsoil, or pavement ▪ Loess soils are generally medium to stiff CL ▪ Eolian soils generally loose, fine-grained sand ▪ Encountered to a depth of 3 to 9 feet and until termination depth in B-4.
Glacial Deposits	CL (Till)	5 to 10	▪ Present in borings B-1, B-2, B-3, B-11, B-20, B-22, and B-25 below fill, loess/eolian soil, or pavement. ▪ Typically sandy, with trace gravel ▪ Generally medium to stiff ▪ Encountered to depths of 3 to 13 feet
Residuum	CL, CH, SM, SP, GP	4 to 45	▪ Present in all borings excluding B-1, B-4, B-11 through B-13, B-16, B-18, B-20, B-21, B-23 below pavement, fill, loess/eolian deposits, or glacial till ▪ Typically gravel or with gravel and sand ▪ Medium to stiff clays or medium dense to dense sands or gravels ▪ Encountered to depths of 2 to 15 feet typically above limestone bedrock.
Bedrock	Limestone	50 to 50 blows per 0 inches	▪ Present in all borings, except B-3, B-4, and B-7 ▪ Encountered at depths of 0.6 to 13 feet ▪ Generally, highly weathered and hard

B.5. Groundwater

Groundwater was observed in Borings B-5 and B-7 at depths of 13½ and 14½ feet, respectively, but was not observed in the other borings. The attached Log of Boring sheets also include this information and additional details. There will be seasonal and annual fluctuations of groundwater as well as fluctuations based on periods of heavy or prolonged precipitation and the level of nearby bodies of water.

C. Recommendations

C.1. Design and Construction Discussion

Based on the results of our field exploration, laboratory testing, and our understanding of the project, it is our opinion that the site is suitable for the proposed construction with the following geotechnical design and construction considerations.

- A detailed grading plan or profile was not provided at this time; however, we assume grade changes will be less than about 5 feet. Settlement due to the weight of new fill less than 5 feet thick will not cause significant settlement in soils similar to those encountered by our borings.
- Pavement types and thickness vary across the project site with a general thickness of 4½ to 15½ inches below existing surface as shown in Table 2. We understand that it is planned to remove all pavement materials as part of the reconstruction. We agree that all pavement materials (cement concrete, HMA and brick) should be removed in their entirety.
- While we expect the existing fill was placed with some compactive effort, we were not provided records regarding observation of the fill placement or field density testing. Typically, untested fill can contain zones of soft of loose material that borings may or may not encounter resulting in a higher-than-normal risk of adverse settlement. However, the condition of the previous pavement may be an indicator of the performance of this existing fill. Lower portions of the existing fill may be left in place if there is a minimum of 2 feet of new, compacted fill below subgrade level to provide uniformity. If the untested existing fill is left in place, the owner should be willing to accept the risk settlement due to any soft or loose zones that were not detected during proofrolling.
- Based on our general understanding of the proposed cut and fill, it appears that excavation of limestone bedrock could be required along portions of the proposed road alignment to achieve design grades. Shallow limestone bedrock was typically encountered within 2 feet of existing grade in portions of the north half of the project. See Figure A-5 through A-7 for locations of shallow bedrock. We recommend that bedrock be excavated to a depth of 2 feet below

subgrade level to allow for a uniform layer of new compacted fill. In general, highly weathered limestone above refusal depths shown on our boring logs can be removed with conventional earthmoving equipment (i.e., backhoes and bulldozers). Weathered limestone below refusal depths can often require single-tooth rippers mounted on bulldozers or pneumatic breakers. The contractor should be prepared to remove more resistant rock.

- We anticipate the pavement layers (pavement and aggregate base) will be placed on 2 feet of new compacted fill extending to existing soils that have been proofrolled and corrected as necessary. In general, these soils should provide adequate support under the assumed traffic loads.
- The lean clays encountered at this site can become unstable from excessive moisture and earthwork construction activities. Disturbance of these soils may cause areas that were previously suitable for pavement support to become unstable, requiring additional moisture conditioning and compaction, chemical stabilization, or subcutting and replacement. To the extent possible the site should be maintained in a manner to promote sheet drainage and minimize the ponding of water during construction.
- We observed groundwater a depth of 13½ to 14½ feet below existing grade in two borings, but did not encounter groundwater in any of the other borings. We anticipate excavations to depths less than five feet will not likely encounter groundwater. However, we recommend the contractor control surface water from entering excavations. The design team should be aware that zones of perched water could develop at varying elevations and locations depending upon recent precipitation. We anticipate that sumps and pumps within the excavation will be adequate to control groundwater.
- Onsite soils free of organic matter can be reused as engineered fill. Proper moisture conditioning of the clayey soils will be required prior to compaction.

C.2. Site Grading and Subgrade Preparation

C.2.a. Subgrade Preparation

We recommend removing the existing pavement section and unsuitable materials from below the proposed pavement area. Due to the variability in strength and consistency of the existing subgrade soils, we recommend placing a 2-foot layer of new compacted fill below the proposed subgrade elevation. We define unsuitable materials as frozen materials, organic soils, existing structures, existing utilities, vegetation, and soft or loose soils. A geotechnical engineer or experienced soil technician should observe the excavations to make the necessary field judgement regarding the suitability of the exposed soil in the excavation bottoms.

C.2.b. Pavement Subgrade Preparation

We recommend the following steps for pavement subgrade preparation. Note that project planning may need to require additional subcuts to limit frost heave.

1. Strip unsuitable soils consisting of topsoil, organic soils, vegetation, existing structures, and pavements from the area. Excavate to a depth of 2 feet below the proposed subgrade level.
2. Proofroll the excavation bottom with a fully loaded tandem-axle truck prior to placing new fill. Have a geotechnical representative observe the proofroll and the excavated subgrade to evaluate if additional subgrade improvements are necessary. The contractor should correct areas that display excessive yielding or rutting during the proofroll, as determined by the geotechnical representative. Possible options for subgrade correction include moisture conditioning and recompaction, subcutting and replacement with soil or crushed aggregate, chemical stabilization, and/or geotextiles
3. Slope subgrade soils to areas of sand or drain tile to allow the removal of any accumulating water.
4. Place engineered fill to grade and compact in accordance with this report.

C.2.c. Engineered Fill Materials and Compaction

Table 4 below contains our recommendations for engineered fill materials. More select soils comprised of coarse sands with < 5% passing #200 sieve may be needed to accommodate work occurring in periods of wet or freezing weather.

Table 4. Engineered Fill Materials

Locations To Be Used	Engineered Fill Classification	Possible Soil Type Descriptions	Gradation	Additional Requirements
Pavements	Pavement fill	GP, SP, SM, SC, CL	100% passing 3-inch sieve	< 2% OC PI < 15%
Below landscaped areas, where subsidence is not a concern	Non-structural fill		100% passing 6-inch sieve	< 10% OC

We recommend spreading engineered fill in loose lifts of approximately 8 to 10 inches thick. We recommend compacting engineered fill in accordance with the criteria presented below in Table 5. The

project documents should specify relative compaction of engineered fill, based on the structure located above the engineered fill, and vertical proximity to that structure.

Table 5. Compaction Recommendations Summary

Reference	Relative Compaction, % (ASTM D698 – Standard Proctor)	Moisture Content Variance from Optimum, %-points	
		< 12% Passing #200 Sieve (typically SP, SP-SM)	> 12% Passing #200 Sieve (typically CL, SC, ML, SM)
Within 2 feet of pavement subgrade	98	±3	-1 to +3
More than 2 feet below pavement subgrade	95	±3	±3
Below landscaped surfaces	90	±5	±4

The project documents should not allow the contractor to use frozen material as engineered fill or to place engineered fill on frozen material. Frost should not penetrate under foundations during construction. We recommend performing density tests in engineered fill to evaluate if the contractors are effectively compacting the soil and meeting project requirements.

C.2.d. Pavement Section Recommendations

Our scope of services for this project includes laboratory testing on subgrade soils to determine a CBR or modulus value for pavement design. Based on the results of our tests, we recommend pavement design use a CBR of 5 and a modulus of subgrade reaction (k) of 100 pci for the pavement design. The design of pavement and subbase thicknesses should consider maintenance, such as seal coating and crack sealing and other factors such as variations in weather and traffic conditions.

We recommend designing the pavement sections based on the anticipated traffic loading, road type, and anticipated subgrade support in accordance with Iowa SUDAS Section 5F-1. We understand the road type is a minor arterial road; however, we do not know the anticipated traffic loading or growth rate. We assume the road will be designed for 10,000,000 ESALs or less. As per Table 5F-1.15 in Iowa SUDA, the minimum rigid pavement thickness for an arterial road with 10,000,000 ESALs is 9 inches over 12 inches of granular subbase. We recommend specifying a granular subbase beneath the proposed pavement section consisting of a minimum 12-inch thickness, in accordance with Iowa SUDAS Section 5F-1. This layer should meet the material and compaction specifications of “Section 4121 Granular Subbase” as stated in the Iowa Department of Transportation Standard Specifications. If traffic loading is expected to be greater than 10,000,000 ESALs additional pavement is required.

C.2.e. Subdrain Design

We recommend installing longitudinal subdrains below the granular base, along the edge of the pavements where practical, due to the presence of frost-susceptible soils in the proposed construction areas. Longitudinal subdrain should drain the permeable base to decrease the potential for frost heave, increase the stability of the roadbed and prolong pavement life. The contractor should install subdrains to extend to a depth of at least 2 feet below subgrade, be hydraulically connected to the granular base, and discharge to a reliable outlet in accordance with Iowa SUDAS Section 6G-1.

We recommend the subdrain consist of a trench lined with filter fabric and a drainage pipe surrounded by granular backfill. The backfill should be free draining and meet the requirements of IDOT Specification 4131 (Gradation 29). An alternate subdrain design could include the filter fabric wrapped around the drainage pipe instead of between the backfill and native soils. In this case, we recommend using granular backfill that is graded to prevent the intrusion of fines. We also recommend using clean sand as backfill materials around the fabric-wrapped pipe.

C.2.f. Performance and Maintenance

Many conditions affect the overall performance of the pavements. Some of these conditions include the environment, loading conditions, and the level of ongoing maintenance. We recommend developing a regular maintenance plan for filling cracks in pavements to lessen the potential impacts for cold weather distress due to frost heave or warm weather distress due to wetting and softening of the subgrade.

C.3. Utilities

C.3.a. Subgrade Stabilization

Earthwork activities associated with utility installations located inside the building area should adhere to the recommendations in this report. For exterior utilities, the soils at typical invert elevations will be suitable for utility support. However, if construction encounters conditions such as debris or organic soils at invert grades, these soils may require subcutting and replacement with sand or crushed rock for pipe support. Project design should not place utilities within the 1H:1V oversizing of foundations.

C.3.b. Corrosion Potential

Based on our experience, the soils encountered by the borings are moderately corrosive to metallic conduits, but only marginally corrosive to concrete. We recommend specifying non-corrosive materials or providing corrosion protection, unless project planning chooses to perform additional tests to demonstrate the soils are not corrosive.

C.4. Equipment Support

The recommendations included in the report may not be applicable to equipment used for the construction and maintenance of this project. We recommend evaluating subgrade conditions in areas of shoring, scaffolding, cranes, pumps, lifts, and other construction equipment prior to mobilization to determine if the exposed materials are suitable for equipment support or require some form of subgrade improvement. We also recommend project planning consider the effect that loads applied by such equipment may have on structures they bear on or surcharge – including pavements, buried utilities, below-grade walls, etc. We can assist you in this evaluation.

D. Procedures

D.1. Coring and Penetration Test Borings

We drilled the cores with a coring fill rig equipped with a 6-inch pavement core bit. We then drilled the penetration test borings through the core holes with a track-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2½- or 5-foot intervals in general accordance with ASTM D1586. We collected thin-walled tube samples in general accordance with ASTM D1587 at selected depths. The boring logs show the actual sample intervals and corresponding depths.

D.2. Exploration Logs

D.2.a. Log of Boring Sheets

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials and present the results of penetration resistance and other in-situ tests performed. The logs also present the results of laboratory tests performed on soil samples and groundwater measurements.

We inferred strata boundaries from changes in the soil samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

D.2.b. Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based

on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance testing performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past.

D.3. Material Classification and Testing

D.3.a. Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The Appendix includes a chart explaining the classification system.

D.3.b. Laboratory Testing

The exploration logs in the Appendix note the results of the laboratory tests performed on geologic material samples. We performed the tests in general accordance with ASTM or AASHTO procedures.

E. Qualifications

E.1. Variations in Subsurface Conditions

E.1.a. Material Strata

We developed our evaluation, analyses, and recommendations from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation, and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may reevaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

E.1.b. Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the

exploration logs and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

E.2. Continuity of Professional Responsibility

E.2.a. Plan Review

We based this report on a limited amount of information, and we made a number of assumptions to help us develop our recommendations. We should be retained to review the geotechnical aspects of the designs and specifications. This review will allow us to evaluate whether we anticipated the design correctly, if any design changes affect the validity of our recommendations, and if the design and specifications correctly interpret and implement our recommendations.

E.2.b. Construction Observations and Testing

We recommend retaining us to perform the required observations and testing during construction as part of the ongoing geotechnical evaluation. This will allow us to correlate the subsurface conditions exposed during construction with those encountered by the borings and provide professional continuity from the design phase to the construction phase. If we do not perform observations and testing during construction, it becomes the responsibility of others to validate the assumption made during the preparation of this report and to accept the construction-related geotechnical engineer-of-record responsibilities.

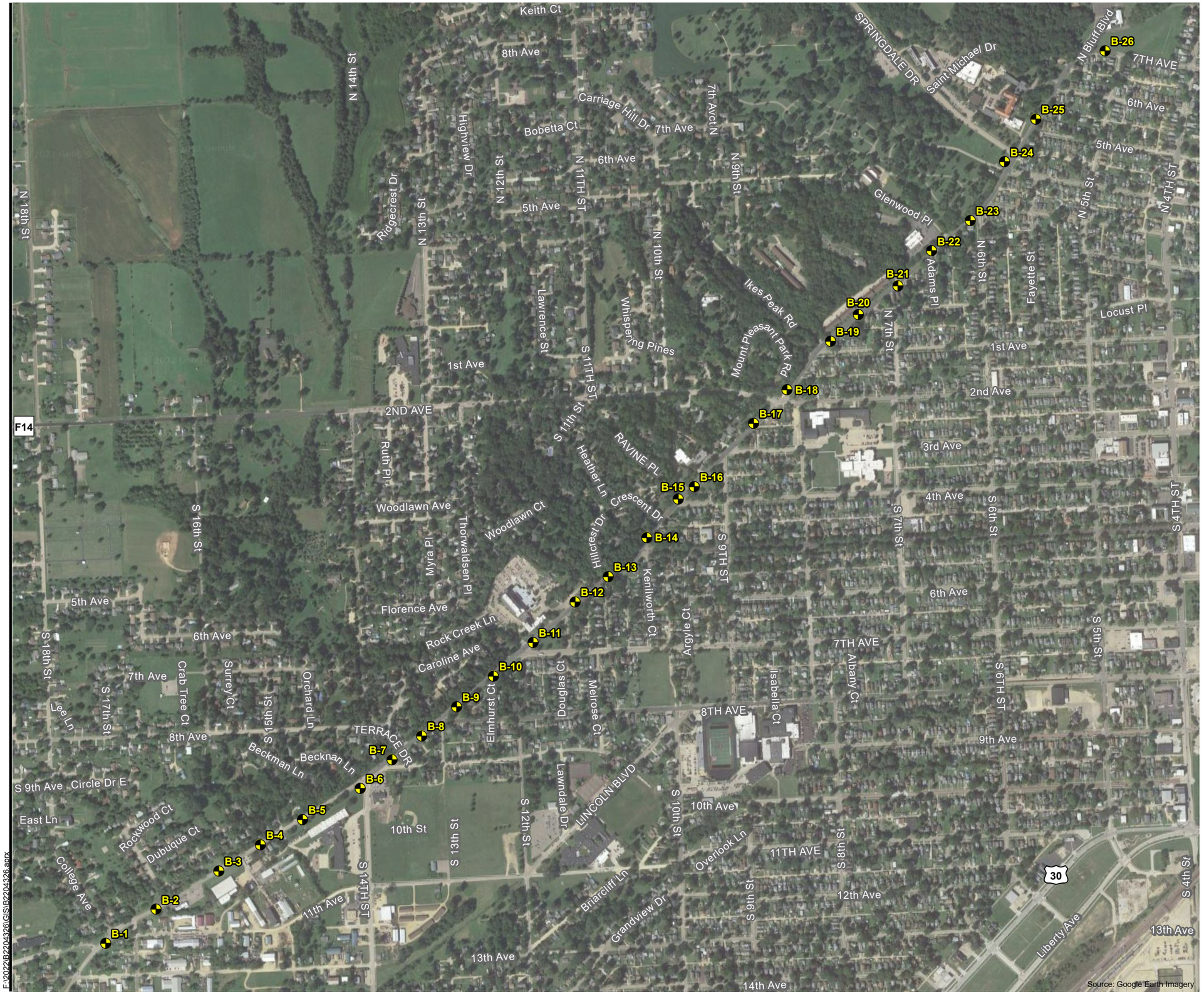
E.3. Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report. Our evaluation, analyses and recommendations may not be appropriate for other parties or projects.

E.4. Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix



Approximate Boring Location

N

0 400 800 Feet

1" = 800 Feet

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BRAUN INTERTEC
The Science You Build On.
11529 W 79th St Suite 21
Lenexa, KS 66214
913.962.0909
braunintertec.com

Drawing Information

Project No: B2204326

Drawing No: FA1

Drawn By:	ZS
Drawn Drawn:	7/18/2022
Checked By:	HGH
Last Modified:	7/18/2022

Project Information

Bluff Boulevard Reconstruction

Between College Avenue and 7th Avenue North

Clinton, Iowa

Soil Boring Location Sketch

Figure A-1

Approximate Boring Location

N

0 150 300 Feet

1" = 300 Feet

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The Science You Build On.
11529 W 79th St Suite 21
Lenexa, KS 66214
913.962.0909
braunintertec.com

Drawing Information

Project No: B2204326

Drawing No: FA2

Drawn By:	ZS
Drawn Drawn:	7/18/2022
Checked By:	HGH
Last Modified:	7/18/2022

Project Information

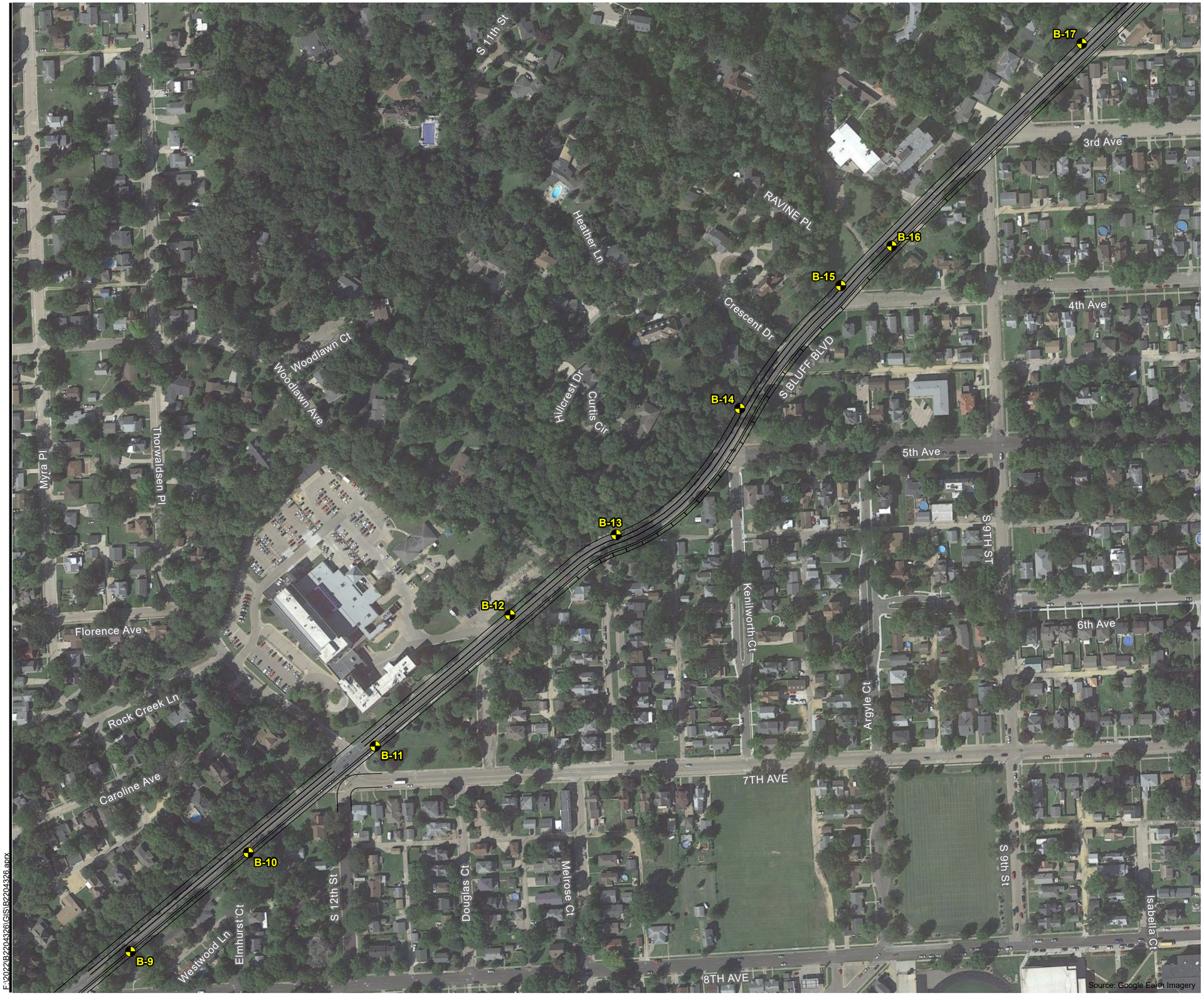
Bluff Boulevard Reconstruction

Between College Avenue and 7th Avenue North

Clinton, Iowa

Soil Boring Location Sketch - West

Figure A-2



Approximate Boring Location

N

0 125 250 Feet

1" = 250 Feet

BRAUN INTERTEC
The Science You Build On.
11529 W 79th St Suite 21
Lenexa, KS 66214
913.962.0909
braunintertec.com

Drawing Information

Project No: B2204326

Drawing No: FA3

Drawn By:	ZS
Drawn Drawn:	7/18/2022
Checked By:	HGH
Last Modified:	7/18/2022

Project Information

Bluff Boulevard Reconstruction

Between College Avenue and 7th Avenue North

Clinton, Iowa

Soil Boring Location Sketch - Central

Figure A-3

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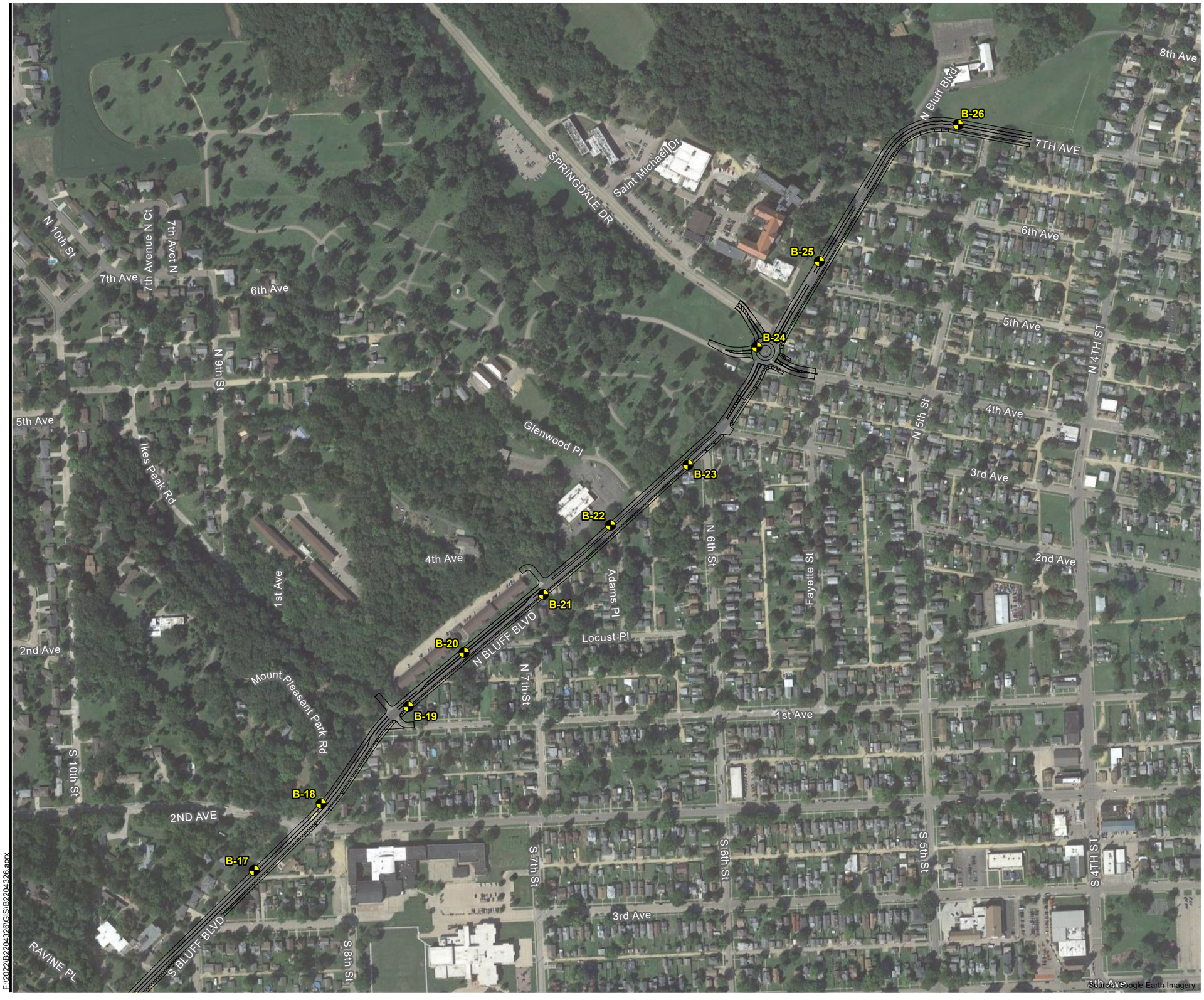

Approximate Boring Location

N

0 200 400 Feet

1" = 400 Feet

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The Science You Build On.
11529 W 79th St Suite 21
Lenexa, KS 66214
913.962.0909
braunintertec.com

Drawing Information

Project No: B2204326

Drawing No: FA4

Drawn By:	ZS
Drawn Drawn:	7/18/2022
Checked By:	HGH
Last Modified:	7/18/2022

Project Information

Bluff Boulevard Reconstruction

Between College Avenue and 7th Avenue North

Clinton, Iowa

Soil Boring Location Sketch - East

Figure A-4

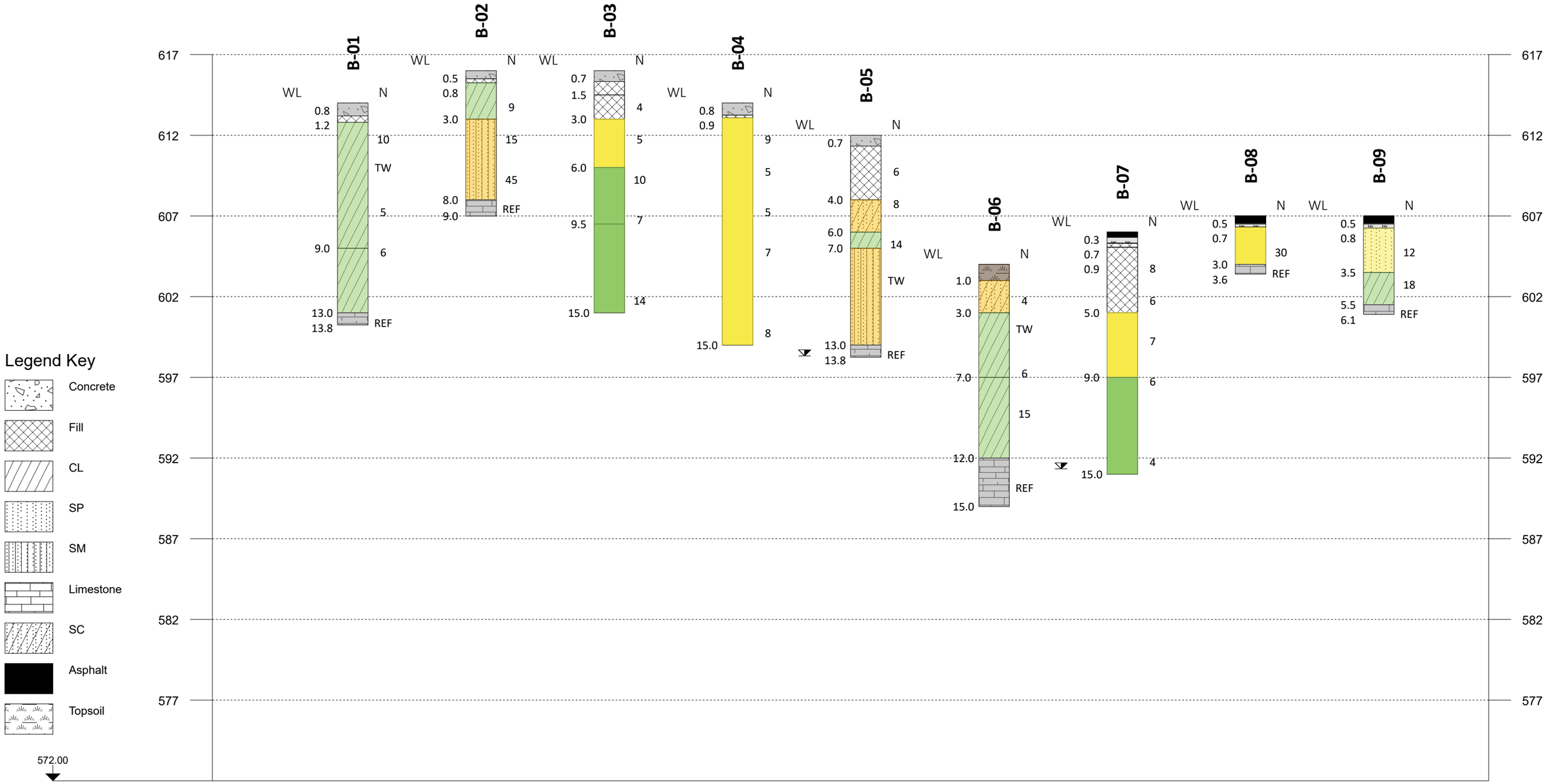

Figure A-5: Subsurface Profile

Fence Diagram
Geotechnical Evaluation
Bluff Blvd. Reconstruction

Clinton, Iowa

Project ID:	B2204326
Vert. Scale:	1"= 6'
Hor. Scale:	NTS
Date:	08/08/2022

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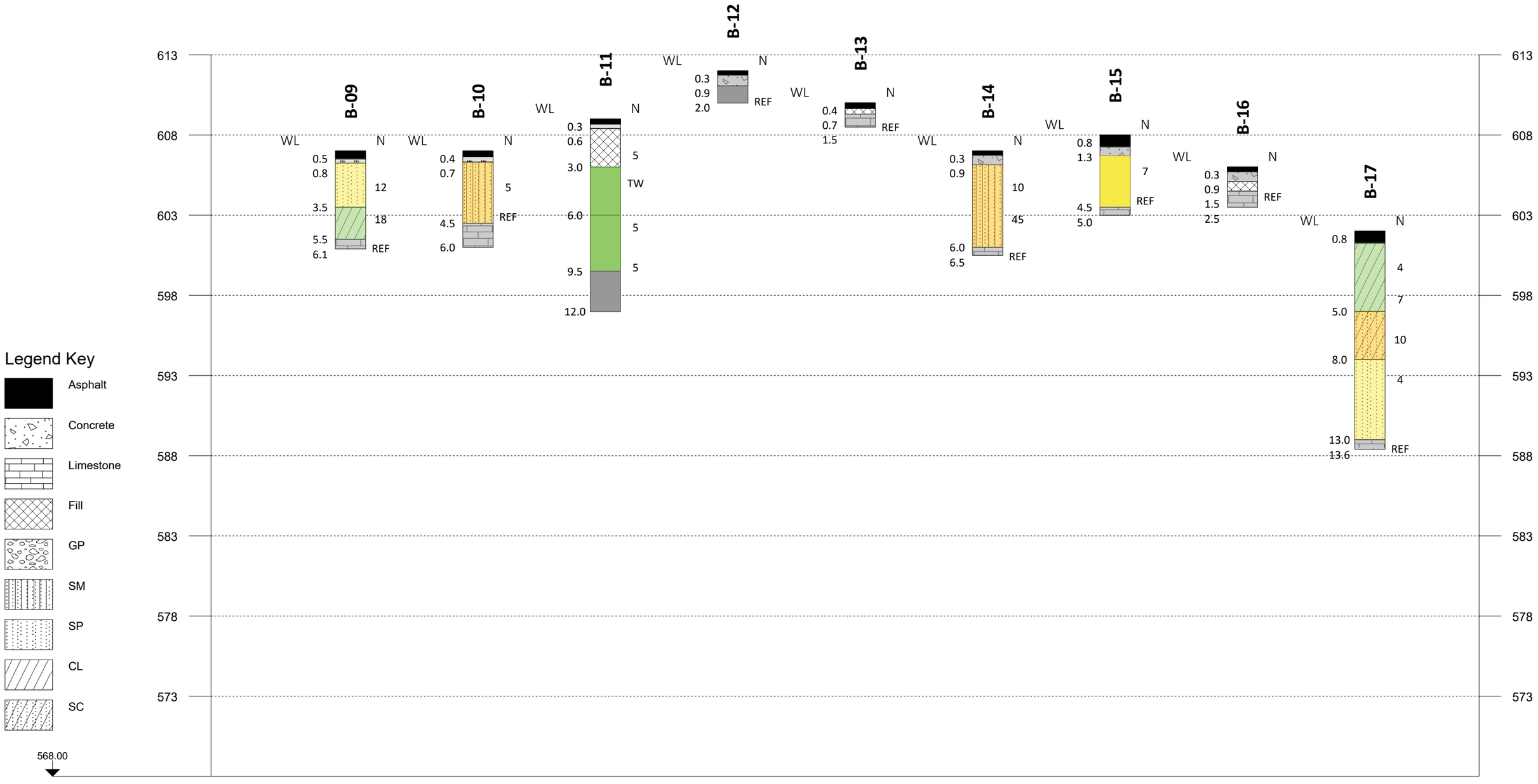

Figure A-6: Subsurface Profile

Fence Diagram
Geotechnical Evaluation
Bluff Blvd. Reconstruction

Clinton, Iowa

Project ID:	B2204326
Vert. Scale:	1"= 6'
Hor. Scale:	NTS
Date:	08/08/2022

BRAUN INTERTEC
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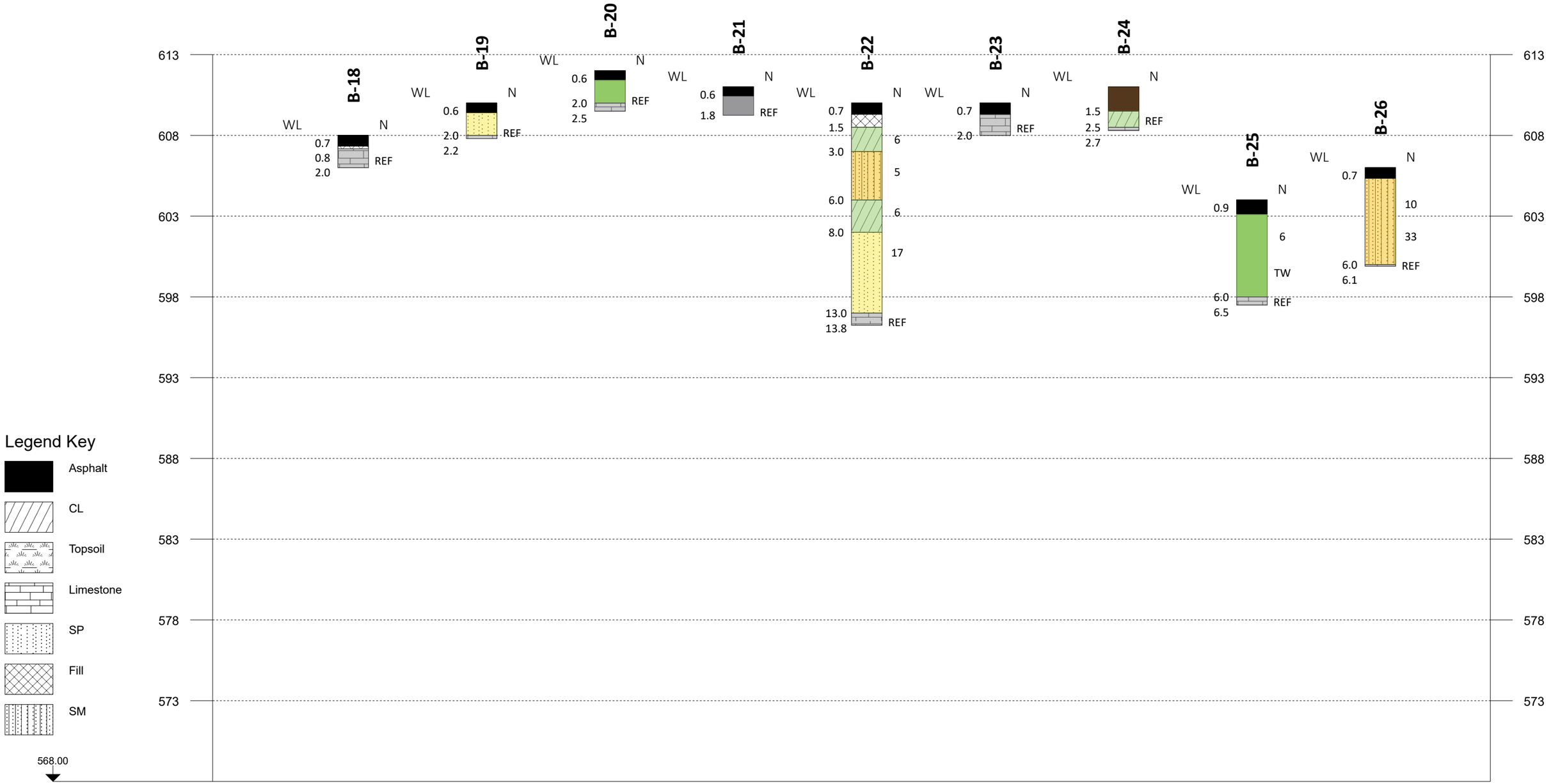

Figure A-7: Subsurface Profile

Fence Diagram
Geotechnical Evaluation
Bluff Blvd. Reconstruction

Clinton, Iowa

Project ID:	B2204326
Vert. Scale:	1"= 6'
Hor. Scale:	NTS
Date:	08/08/2022

BRAUN INTERTEC
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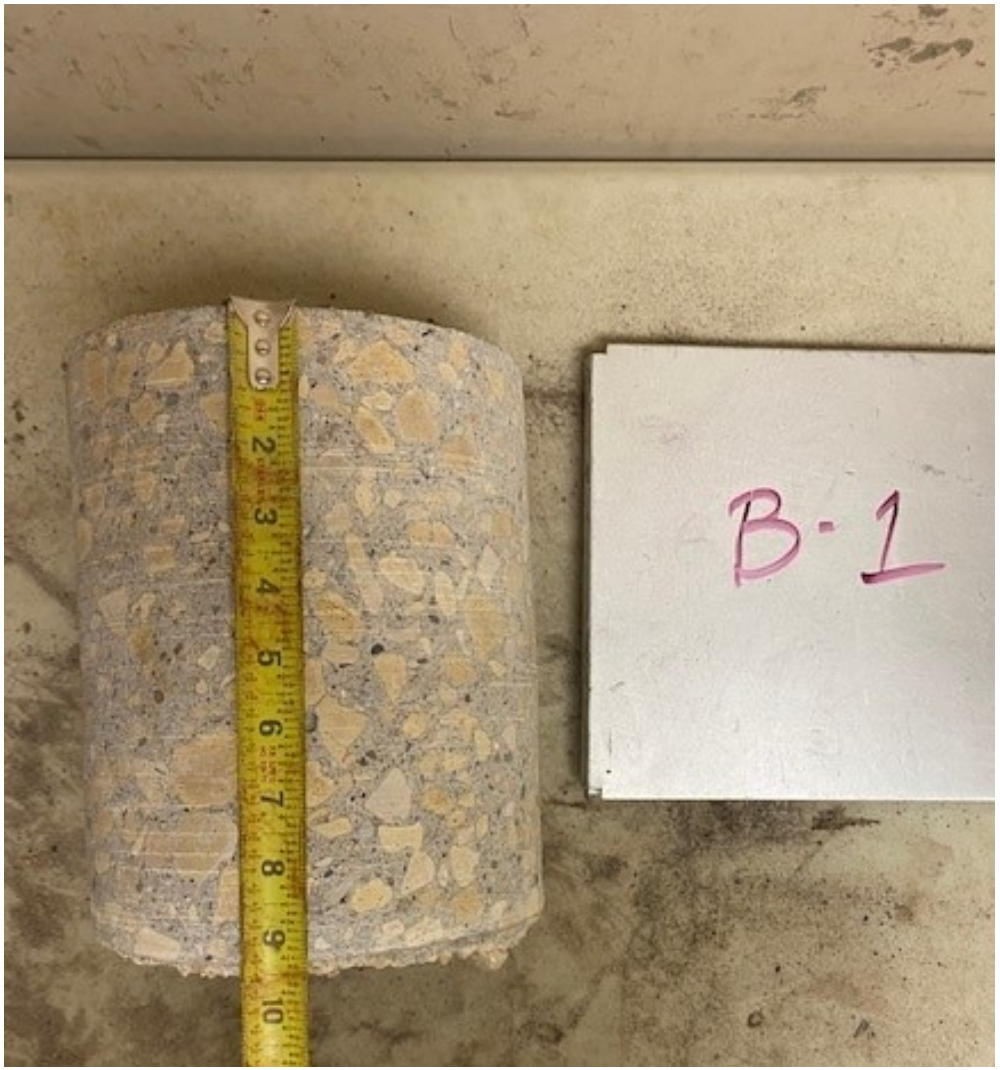


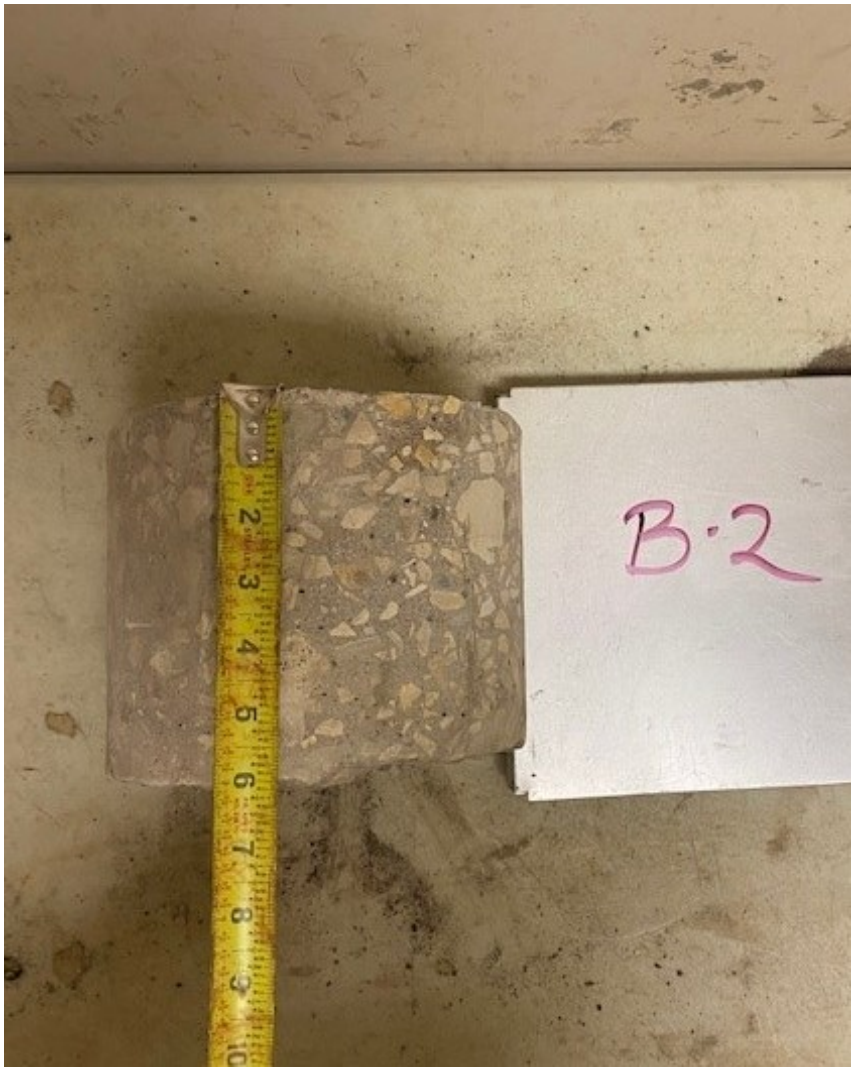
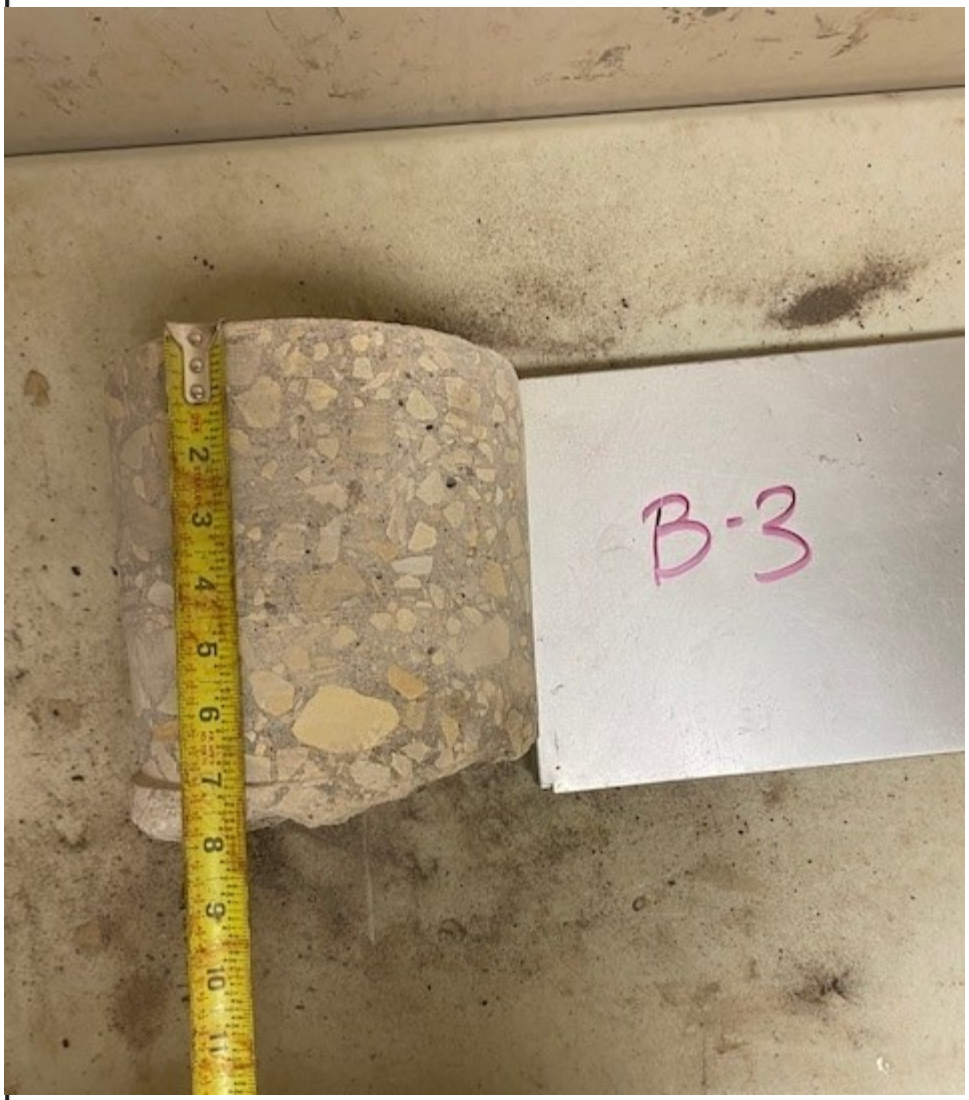


FIGURE NO.	INT		DATE	
	DRAWN BY:	HGH	7/21/2022	
	APP'D BY:	TW	7/21/2022	
	JOB NO.	B2204326		
	DWG. NO.	1	SHEET 1	OF 12
	SCALE	NA		

Borings B-1 and B-2 Pavement Cores
Bluff Boulevard Reconstruction
Clinton, Iowa

BRAUN INTERTEC

sketch



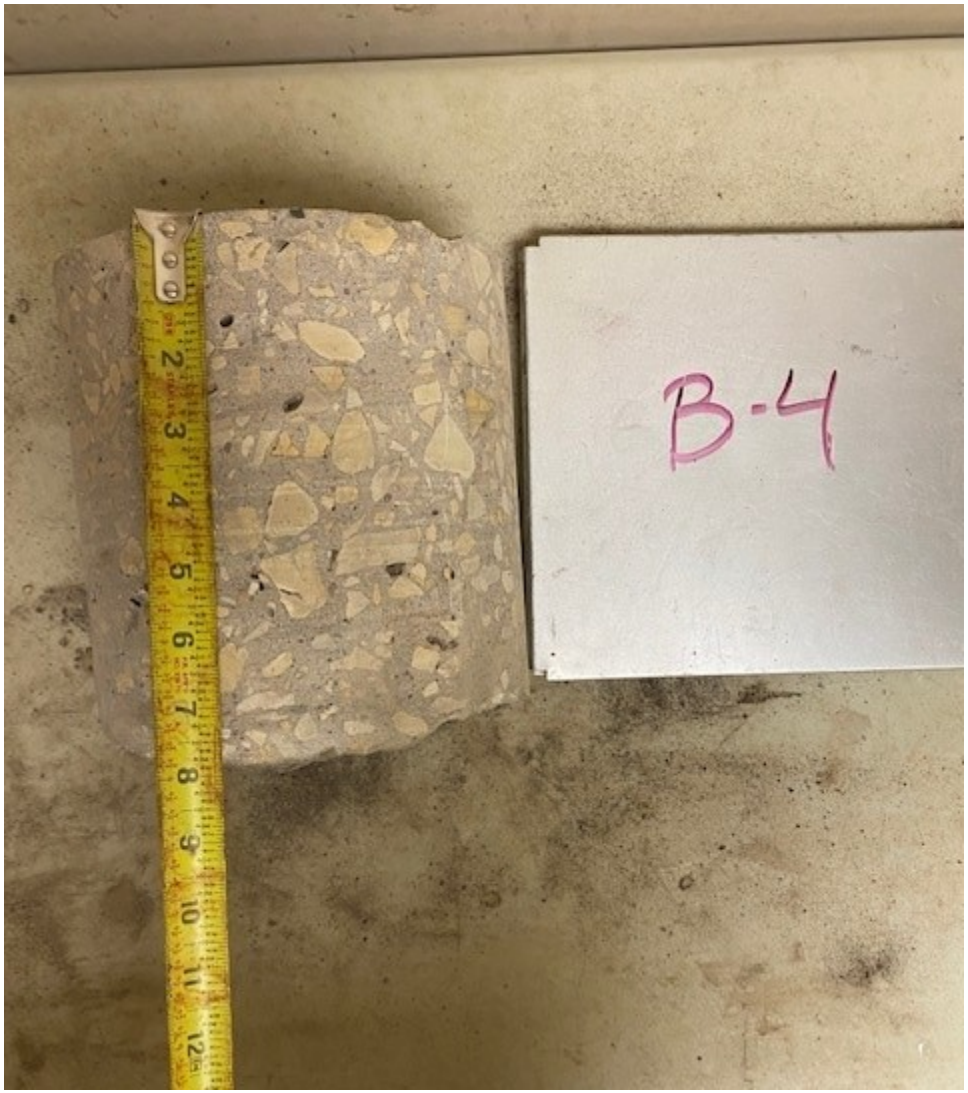


FIGURE NO.

INT		DATE	
DRAWN BY:	HGH	7/21/2022	
APP'D BY:	TW	7/21/2022	
JOB NO.	B2204326		
DWG. NO.	1	SHEET	OF
SCALE	NA	2	12

Boring B-3 and B-4 Pavement Cores
Bluff Boulevard Reconstruction
Clinton, Iowa

BRAUN INTERTEC

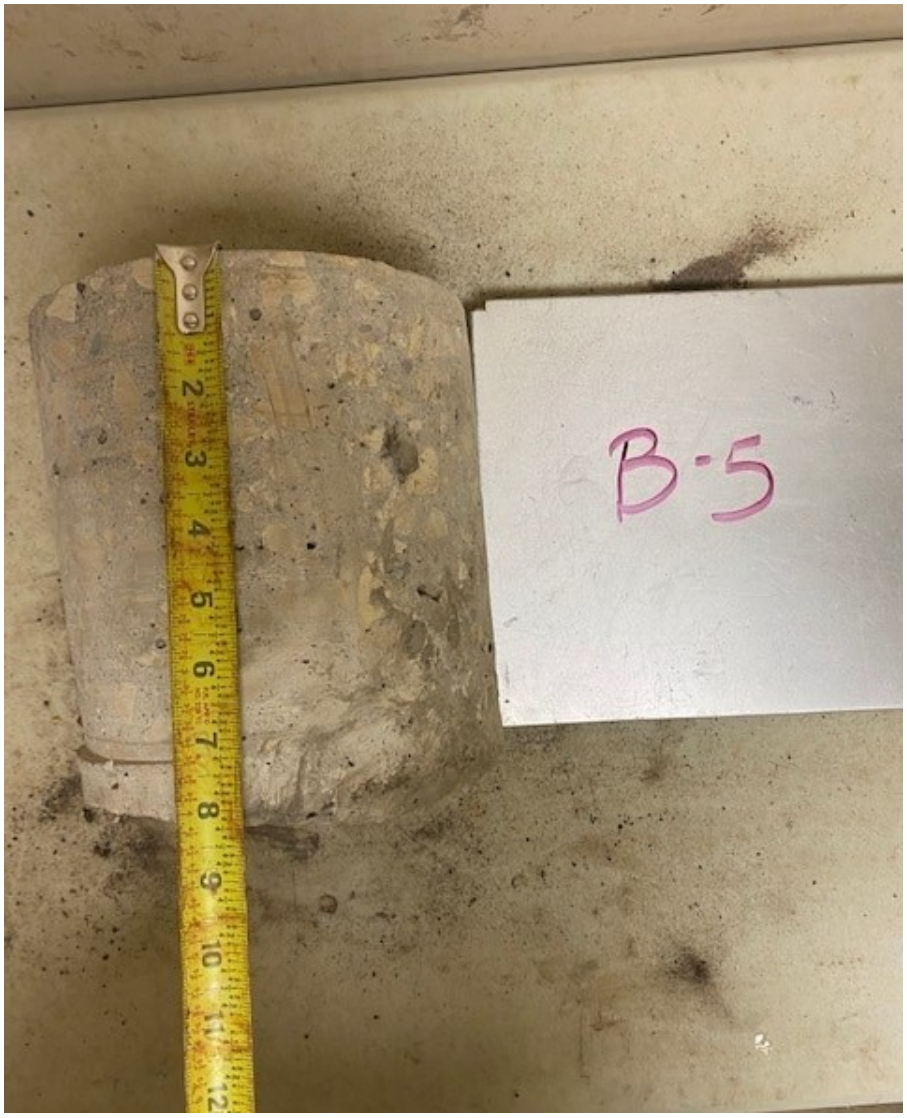


FIGURE NO.	INT		DATE	
	DRAWN BY:	HGH	7/21/2022	
	APP'D BY:	TW	7/21/2022	
	JOB NO.	B2204326		
	DWG. NO.	1	SHEET 3	OF 12
	SCALE	NA		

Borings B-5 and B-7 Pavement Cores
Bluff Boulevard Reconstruction
Clinton, Iowa

BRAUN INTERTEC

sketch

FIGURE NO.

INT		DATE	
DRAWN BY:	HGH	7/21/2022	
APP'D BY:	TW	7/21/2022	
JOB NO.	B2204326		
DWG. NO.	1	SHEET	OF
SCALE	NA	4	12

Boring B-8 and B-9 Pavement Cores
Bluff Boulevard Reconstruction
Clinton, Iowa

BRAUN INTERTEC

FIGURE NO.	INT		DATE	
	DRAWN BY:	HGH	7/21/2022	
	APP'D BY:	TW	7/21/2022	
	JOB NO.	B2204326		
	DWG. NO.	1	SHEET 5	OF 12
	SCALE	NA		

Borings B-10 and B-11 Pavement Cores
Bluff Boulevard Reconstruction
Clinton, Iowa

BRAUN INTERTEC

sketch

FIGURE NO.	INT		DATE	
	DRAWN BY:	HGH	7/21/2022	
	APP'D BY:	TW	7/21/2022	
	JOB NO.	B2204326		
	DWG. NO.	1	SHEET	OF
	SCALE	NA	6	12

Boring B-12 and B-13 Pavement Cores
Bluff Boulevard Reconstruction
Clinton, Iowa

BRAUN INTERTEC

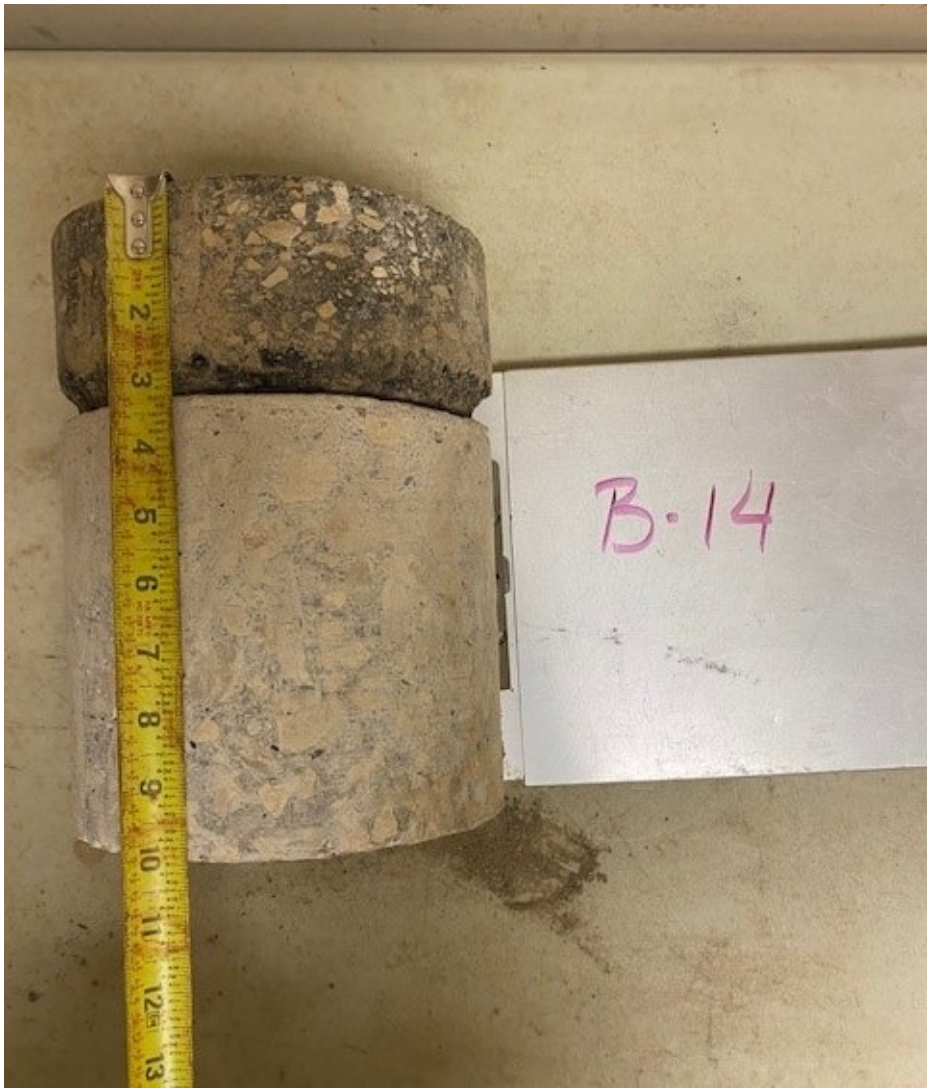


FIGURE NO.	INT		DATE	
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	APP'D BY:	TW	7/21/2022	
	JOB NO.	B2204326		
	DWG. NO.	1	SHEET 7	OF 12
	SCALE	NA		

Borings B-14 and B-15 Pavement Cores
Bluff Boulevard Reconstruction
Clinton, Iowa

BRAUN INTERTEC

sketch

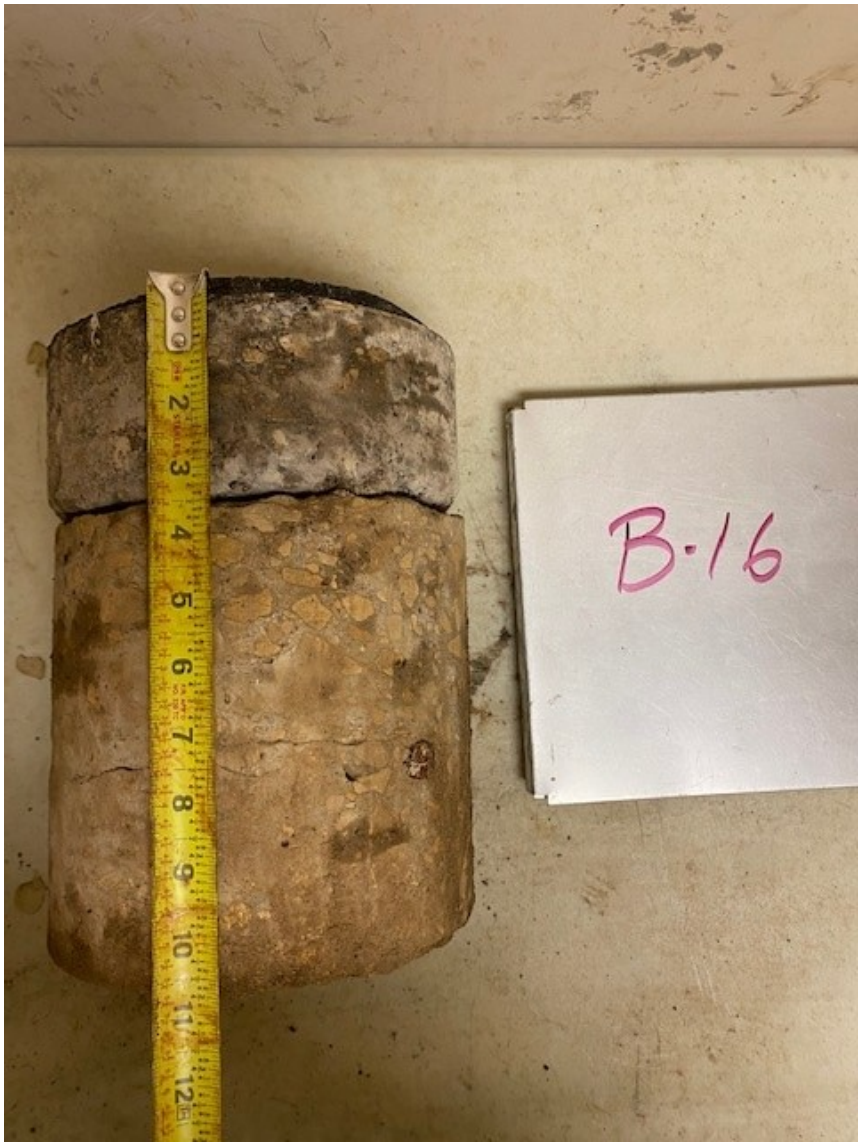

FIGURE NO.

INT		DATE	
DRAWN BY:	HGH	7/21/2022	
APP'D BY:	TW	7/21/2022	
JOB NO.	B2204326		
DWG. NO.	1	SHEET 8	OF 12
SCALE	NA		

Boring B-16 and B-17 Pavement Cores
Bluff Boulevard Reconstruction
Clinton, Iowa

BRAUN INTERTEC

FIGURE NO.	INT		DATE	
	DRAWN BY:	HGH	7/21/2022	
	APP'D BY:	TW	7/21/2022	
	JOB NO.	B2204326		
	DWG. NO.	1	SHEET 9	OF 12
	SCALE	NA		

Borings B-18 and B-19 Pavement Cores
Bluff Boulevard Reconstruction
Clinton, Iowa

BRAUN INTERTEC

sketch

	INT	DATE
DRAWN BY:	HGH	7/21/2022
APP'D BY:	TW	7/21/2022
JOB NO.	B2204326	
DWG. NO.	1	SHEET 10 OF 12
SCALE	NA	

FIGURE NO.

Boring B-20 and B-21 Pavement Cores
Bluff Boulevard Reconstruction
Clinton, Iowa

BRAUN INTERTEC

FIGURE NO.	INT		DATE	
	DRAWN BY:	HGH	7/21/2022	
	APP'D BY:	TW	7/21/2022	
	JOB NO.	B2204326		
	DWG. NO.	1	SHEET 11	OF 12
	SCALE	NA		

Borings B-22 and B-23 Pavement Cores
Bluff Boulevard Reconstruction
Clinton, Iowa

BRAUN INTERTEC

sketch

FIGURE NO.	INT		DATE	
	DRAWN BY:	HGH	7/21/2022	
	APP'D BY:	TW	7/21/2022	
	JOB NO.	B2204326		
	DWG. NO.	1	SHEET 12	OF 12
	SCALE	NA		

Boring B-25 and B-26 Pavement Cores
Bluff Boulevard Reconstruction
Clinton, Iowa

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-01**

LOCATION: See attached sketch

LATITUDE:	41.83252	LONGITUDE:	-90.22527
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	06/24/22	END DATE:	06/24/22
SURFACE ELEVATION:	614.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
613.2	CONCRETE, 9.5 inches					
0.8	APPARENT AGGREGATE BASE, 5 inches					
612.8	LEAN CLAY (CL), with Sand, brown to dark brown, moist, stiff to medium (LOESS)		3-4-6 (10) 8"			
1.2			TW 12"	2	17	LL=27, PL=19, PI=8 DD=108 pcf q_u=2 tsf
		5	1-2-3 (5) 8"			
605.0			1-3-3 (6) 10"		21	
9.0	LEAN CLAY with SAND (CL), trace Gravel, dark brown, moist, medium (GLACIAL TILL)	10				
601.0						
13.0	LIMESTONE, highly weathered, hard		50/3" (REF) 2"			AUGER REFUSAL AT 13.8 FEET. Water not observed while drilling. Boring patched with Asphalt.
600.2	END OF BORING					
13.8		15				
		20				
		25				
		30				

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-02**

LOCATION: See attached sketch

LATITUDE:	41.83326	LONGITUDE:	-90.22527
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	06/24/22	END DATE:	06/24/22
SURFACE ELEVATION:	616.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
615.5		CONCRETE, 6 inches					
0.5		FILL: CLAYEY SAND (SC), dark gray					
615.2		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, stiff (GLACIAL TILL)		6-4-5 (9) 10"			
0.8							
613.0		SILTY SAND with GRAVEL (SM), fine to coarse-grained, tan, moist, medium dense to dense (RESIDUUM)		7-8-7 (15) 8"		8	
3.0							
			5	7-15-30 (45) 8"			
608.0							
8.0		LIMESTONE, highly weathered, hard		50/1" (REF) 1"			
607.0							
9.0		END OF BORING					AUGER REFUSAL AT 9 FEET. Water not observed while drilling. Boring patched with Asphalt.
			10				
			15				
			20				
			25				
			30				

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-03**

LOCATION: See attached sketch

LATITUDE:	41.83409	LONGITUDE:	-90.22329
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	06/24/22	END DATE:	06/24/22
SURFACE ELEVATION:	616.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
615.3		CONCRETE, 8 inches					
0.7		FILL: CLAYEY SAND (SC), trace Gravel, dark gray		2-2-2 (4) 8"			
614.5		FILL: POORLY GRADED SAND (SP), fine-grained, trace Gravel, dark brown, moist					
1.5							
613.0		POORLY GRADED SAND (SP), fine-grained, brown, moist, loose (EOLIAN)		1-2-3 (5) 8"		13	
3.0			5				
610.0		SANDY LEAN CLAY (CL), brown, moist, stiff (GLACIAL TILL)		2-5-5 (10) 10"		20	LL=23, PL=19, PI=4
6.0							
606.5		LEAN CLAY (CL), trace Gravel, tan and white, moist, medium to stiff (RESIDUUM)	10	1-2-5 (7) 8"			
9.5							
601.0			15	5-6-8 (14) 14"			
15.0		END OF BORING					Boring patched with Asphalt. Water not observed while drilling.
			20				
			25				
			30				

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-04**

LOCATION: See attached sketch

LATITUDE:	41.83466	LONGITUDE:	-90.22198
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	06/24/22	END DATE:	06/24/22
SURFACE ELEVATION:	614.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
613.2		CONCRETE, 8 inches					
0.8							
613.1		FILL: CLAYEY SAND (SC), fine to coarse-grained, trace Gravel, gray and brown, moist		4-4-5 (9) 7"			
0.9		POORLY GRADED SAND (SP), fine-grained, brown, moist, loose (EOLIAN)		1-2-3 (5) 7"			
			5	1-2-3 (5) 7"			
				1-3-4 (7) 5"			
			10				
		becoming fine to medium grained at 13 feet.		2-2-6 (8) 8"		17	
599.0			15				
15.0		END OF BORING					Boring patched with Asphalt. Water not observed while drilling.
			20				
			25				
			30				

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-05**

LOCATION: See attached sketch

LATITUDE:	41.83521	LONGITUDE:	-90.22064
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	06/24/22	END DATE:	06/24/22
SURFACE ELEVATION:	612.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
611.3		CONCRETE, 8 inches					
0.7		FILL: CLAYEY SAND (SC), fine to coarse-grained, trace Gravel, with, Clay pockets, dark brown, moist		7-3-3 (6) 5"		12	
608.0				1-3-5 (8) 8"			
4.0		CLAYEY SAND (SC), fine-grained, brown, moist, loose (EOLIAN)	5				
606.0				2-4-10 (14) 8"			
6.0		LEAN CLAY (CL), brown, moist, stiff (LOESS)					
605.0							
7.0		SILTY SAND (SM), fine-grained, tan, moist (RESIDUUM)		TW	1.25	13	
			10				
599.0							
13.0	▽	LIMESTONE, highly weathered, hard	W	50/2" (REF) 2"			Water observed at 13.5 feet while drilling.
598.2		END OF BORING					AUGER REFUSAL AT 13.8 FEET.
13.8			15				Boring patched with Asphalt.
			20				
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-06**

LOCATION: See attached sketch

LATITUDE:	41.83588	LONGITUDE:	-90.21882
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	06/24/22	END DATE:	06/24/22
SURFACE ELEVATION:	604.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
603.0		TOPSOIL, 12 inches					
1.0 / 601.0		CLAYEY SAND (SC), fine-grained, brown, moist, loose (EOLIAN)		2-2-2 (4) 6"			
3.0 / 597.0		LEAN CLAY (CL), brown, moist, medium (LOESS)		TW 2"		17	
5				1-2-4 (6) 5"			
7.0 / 592.0		LEAN CLAY (CL), trace Sand, and Gravel, tan, moist, medium (RESIDUUM)		4-4-11 (15) 7"		27	LL=38, PL=17, PI=21
10							
12.0 / 589.0		LIMESTONE, highly weathered, hard		6-50/2" (REF) 1"			
15							
15.0		END OF BORING					Water not observed while drilling. Boring patched with Asphalt.
20							
25							
30							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-07**

LOCATION: See attached sketch

LATITUDE:	41.83652	LONGITUDE:	-90.21781
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	06/30/22	END DATE:	06/30/22
SURFACE ELEVATION:	606.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
~~605.7~~		ASPHALT PAVEMENT, 4 inches					
~~0.3~~		BRICK, 3.5 inches					
605.3		FILL: CLAYEY SAND (SC), fine to coarse-grained, dark brown		3-4-4 (8) 8"		6	
0.7		FILL: POORLY GRADED SAND (SP), fine-grained, trace Gravel, brown, moist		3-3-3 (6) 8"			
605.1							
0.9							
601.0							
5.0		POORLY GRADED SAND (SP), fine-grained, brown, moist, loose (EOLIAN)	5	2-3-4 (7) 10"			
597.0							
9.0		LEAN CLAY (CL), reddish brown and brown, moist, medium to soft (RESIDUUM)	10	2-3-3 (6) 12"		23	LL=22, PL=14, PI=8
591.0	▽		15	1-2-2 (4) 13"			
15.0		END OF BORING					Water observed at 14.5 feet while drilling. Boring patched with Asphalt.
			20				
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-08**

LOCATION: See attached sketch

LATITUDE:	41.83704	LONGITUDE:	-90.21686
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	06/30/22	END DATE:	06/30/22
SURFACE ELEVATION:	607.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
606.5		ASPHALT PAVEMENT, 5 inches					
0.5		BRICK, 3.5 inches					
606.3		POORLY GRADED SAND (SP), fine to coarse-grained, trace Gravel, brown, moist, medium dense (RESIDUUM)		3-13-17 (30)			
0.7				2"			
604.0		LIMESTONE, highly weathered, hard		50/1" (REF)			AUGER REFUSAL AT 3.6 FEET.
3.0				0"			
603.4		END OF BORING					Water not observed while drilling.
3.6							Boring patched with Asphalt.
			5				
			10				
			15				
			20				
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-09**

LOCATION: See attached sketch

LATITUDE:	41.83767	LONGITUDE:	-90.21575
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	06/30/22	END DATE:	06/30/22
SURFACE ELEVATION:	607.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
606.5		ASPHALT PAVEMENT, 5.5 inches					
0.5		BRICK, 3.5 inches					
606.2		POORLY GRADED SAND (SP), fine to coarse-grained, trace Gravel, brown, moist, medium dense (RESIDUUM)		6-7-5 (12) 6"			
0.8							
603.5				2-2-16 (18) 10"			
3.5		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, very stiff (RESIDUUM)				20	LL=29, PL=19, PI=10
601.5							
5.5		LIMESTONE, highly weathered, hard		50/1" (REF) 0"			AUGER REFUSAL AT 6.1 FEET. Water not observed while drilling.
600.9		END OF BORING					
6.1							Boring patched with Asphalt.

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-10**

LOCATION: See attached sketch

LATITUDE:	41.83836	LONGITUDE:	-90.21458
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	06/30/22	END DATE:	06/30/22
SURFACE ELEVATION:	607.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
~~606.6~~		ASPHALT PAVEMENT, 4 inches					
0.4		BRICK, 4 inches					
606.3		SILTY SAND (SM), fine to coarse-grained,		1-2-3			
0.7		trace Gravel, tan, moist, loose to very dense		(5)			
		(RESIDUUM)		0"			
				7-36-50/2"			
602.5				(REF)			
4.5		LIMESTONE, highly weathered, hard		7"			
601.0							
6.0		END OF BORING					AUGER REFUSAL AT 6 FEET. Water not observed while drilling. Boring patched with Asphalt.

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-11**

LOCATION: See attached sketch

LATITUDE:	41.83909	LONGITUDE:	-90.21331
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	07/01/22	END DATE:	07/01/22
SURFACE ELEVATION:	609.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
~~608.7~~		ASPHALT PAVEMENT, 4 inches					
0.3		BRICK, 3.5 inches					
608.4		FILL: LEAN CLAY (CL), trace Sand, dark brown, moist		1-2-3 (5) 9"			
0.6							
~~606.0~~		LEAN CLAY (CL), brown, moist, soft (LOESS)		TW 12"	0.25	26	DD=97 pcf q_u=0.68 tsf
3.0							
603.0		SANDY LEAN CLAY (CL), gray and brown, moist, medium (GLACIAL TILL)		3-2-3 (5) 9"		22	LL=26, PL=20, PI=6
6.0				3-2-3 (5) 9"			
599.5		LIMESTONE, highly weathered, hard					
9.5							
597.0		END OF BORING					AUGER REFUSAL AT 12 FEET. Water not observed while drilling. Boring patched with Asphalt.
12.0							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-12**

LOCATION: See attached sketch

LATITUDE:	41.84000	LONGITUDE:	-90.21196
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	07/01/22	END DATE:	07/01/22
SURFACE ELEVATION:	612.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
611.7 0.3		ASPHALT PAVEMENT, 3.5 inches					
611.1 0.9		CONCRETE, 8 inches					
610.0 2.0		LIMESTONE, highly weathered, hard		50/2" (REF) 8"			Boring patched with Asphalt. Water not observed while drilling.
		END OF BORING					Boring patched with Asphalt.

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-13**

LOCATION: See attached sketch

LATITUDE:	41.84055	LONGITUDE:	-90.21091
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	07/01/22	END DATE:	07/01/22
SURFACE ELEVATION:	610.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
~~609.6~~		ASPHALT PAVEMENT, 4.5 inches					
0.4		FILL: POORLY GRADED GRAVEL (GP)					
~~609.3~~		LIMESTONE, highly weathered, hard		50/0" (REF) 0"			AUGER REFUSAL AT 1.5 FEET. Water not observed while drilling.
0.7		END OF BORING					
608.5							Boring patched with Asphalt.
1.5							
			5				
			10				
			15				
			20				
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-14**

LOCATION: See attached sketch

LATITUDE:	41.84142	LONGITUDE:	-90.20967
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	07/01/22	END DATE:	07/01/22
SURFACE ELEVATION:	607.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
~~606.7~~ 0.3		ASPHALT PAVEMENT, 3 inches					
		CONCRETE, 7 inches					
606.1 0.9		SILTY SAND (SM), fine to medium-grained, tan, moist, loose (RESIDUUM)		5-6-4 (10)		9	
		becoming fine to coarse grained, trace Gravel, dense at 4 feet.		7-18-27 (45)			
601.0 6.0		LIMESTONE, highly weathered, hard		50/1" (REF) 0"			AUGER REFUSAL AT 6.5 FEET. Water not observed while drilling. Boring patched with Asphalt.
600.5 6.5		END OF BORING					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-15**

LOCATION: See attached sketch

LATITUDE:	41.84228	LONGITUDE:	-90.20865
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	07/01/22	END DATE:	07/01/22
SURFACE ELEVATION:	608.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
607.2		ASPHALT PAVEMENT, 9 inches					
0.8		CONCRETE, 6.5 inches					
606.7		POORLY GRADED GRAVEL (GP), with Sand, brown, moist, loose (RESIDUUM)		2-3-4 (7) 12"			
1.3				6-10-50/2" (REF) 2"			
603.5							
4.5		LIMESTONE, highly weathered, hard					
603.0		END OF BORING					AUGER REFUSAL AT 5 FEET. Water not observed while drilling. Boring patched with Asphalt.
5.0							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-16**

LOCATION: See attached sketch

LATITUDE:	41.84255	LONGITUDE:	-90.20815
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	07/01/22	END DATE:	07/01/22
SURFACE ELEVATION:	606.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
~~605.7~~		ASPHALT PAVEMENT, 3.5 inches					
~~0.3~~		CONCRETE, 6.5 inches					
~~605.1~~		FILL: CLAYEY SAND (SC), brown, moist		12-50/2" (REF) 2"			
~~0.9~~		LIMESTONE, highly weathered, hard					
604.5		END OF BORING					AUGER REFUSAL AT 2.5 FEET. Water not observed while drilling. Boring patched with Asphalt.
1.5							
603.5							
2.5							
		5					
		10					
		15					
		20					
		25					
		30					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-17**

LOCATION: See attached sketch

LATITUDE:	41.84396	LONGITUDE:	-90.20624
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	07/01/22	END DATE:	07/01/22
SURFACE ELEVATION:	602.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
601.2		ASPHALT PAVEMENT, 9 inches					
0.8		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, soft to medium (GLACIAL TILL)		1-2-2 (4) 5"			
				3-3-4 (7) 10"		14	LL=23, PL=17, PI=6
597.0			5				
5.0		CLAYEY SAND with GRAVEL (SC), brown, moist, stiff (GLACIAL TILL)		2-3-7 (10) 6"		13	
594.0							
8.0		POORLY GRADED SAND (SP), fine to coarse-grained, trace Gravel, tan, moist, very loose (RESIDUUM)		2-2-2 (4) 3"			
			10				
589.0							
13.0		LIMESTONE, highly weathered, hard		50/1" (REF) 0"			AUGER REFUSAL AT 13.6 FEET. Water not observed while drilling. Boring patched with Asphalt.
588.4		END OF BORING					
13.6			15				
			20				
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-18**

LOCATION: See attached sketch

LATITUDE:	41.84471	LONGITUDE:	-90.20517
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	07/01/22	END DATE:	07/01/22
SURFACE ELEVATION:	608.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
607.3		ASPHALT PAVEMENT, 8 inches					
0.7		FILL: CLAYEY SAND (SC), fine to medium-grained, brown					
607.2		LIMESTONE, highly weathered, hard		50/1" (REF) 0"			AUGER REFUSAL AT 2 FEET. Water not observed while drilling.
0.8		END OF BORING					
606.0							Boring patched with Asphalt.
2.0							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-19**

LOCATION: See attached sketch

LATITUDE:	41.84579	LONGITUDE:	-90.20376
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	06/30/22	END DATE:	06/30/22
SURFACE ELEVATION:	610.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
609.4		ASPHALT PAVEMENT, 5 inches					
0.6		POORLY GRADED SAND (SP), fine to coarse-grained, trace Gravel, brown and gray, moist, medium dense (RESIDUUM)		6-50/2" (REF) 6"			Water not observed while drilling.
608.0		LIMESTONE, highly weathered, hard					
2.0		END OF BORING					AUGER REFUSAL AT 2.2 FEET.
607.8							Boring patched with Asphalt.
2.2							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-20**

LOCATION: See attached sketch

LATITUDE:	41.84639	LONGITUDE:	-90.20287
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	07/01/22	END DATE:	07/01/22
SURFACE ELEVATION:	612.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
611.4		ASPHALT PAVEMENT, 7.5 inches					
0.6		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, stiff (GLACIAL TILL)					
610.0				20-50/2" (REF) 8"			
2.0		LIMESTONE, highly weathered, hard					
609.5		END OF BORING					AUGER REFUSAL AT 2.5 FEET. Water not observed while drilling. Boring patched with Asphalt.
2.5							

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BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-21**

LOCATION: See attached sketch

LATITUDE:	41.84702	LONGITUDE:	-90.20162
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	07/01/22	END DATE:	07/01/22
SURFACE ELEVATION:	611.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
610.4		ASPHALT PAVEMENT, 7 inches					
0.6		LIMESTONE, highly weathered, hard					
609.2				50/1" (REF) 0"			AUGER REFUSAL AT 1.75 FEET. Water not observed while drilling.
1.8		END OF BORING					Boring patched with Asphalt.

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BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-22**

LOCATION: See attached sketch

LATITUDE:	41.84779	LONGITUDE:	-90.20054
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	07/01/22	END DATE:	07/01/22
SURFACE ELEVATION:	610.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
609.3		ASPHALT PAVEMENT, 8.5 inches					
0.7		FILL: LEAN CLAY with GRAVEL (CL)					
608.5		LEAN CLAY (CL), brown, moist, medium (LOESS)		3-3-3 (6) 8"			
1.5							
607.0		SILTY SAND (SM), fine-grained, brown, moist, loose (EOLIAN)		1-2-3 (5) 8"		12	
3.0			5				
604.0		SANDY LEAN CLAY (CL), brown, moist, medium (GLACIAL TILL)		1-3-3 (6) 9"			
6.0							
602.0		POORLY GRADED SAND with GRAVEL (SP), fine to coarse-grained, tan, moist, medium dense (RESIDUUM)		23-9-8 (17) 7"			
8.0			10				
597.0							
13.0		LIMESTONE, highly weathered, hard		50/1" (REF) 0"			AUGER REFUSAL AT 13.8 FEET. Water not observed while drilling. Boring patched with Asphalt.
596.2		END OF BORING					
13.8			15				
			20				
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-23**

LOCATION: See attached sketch

LATITUDE:	41.84846	LONGITUDE:	-90.19930
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	07/01/22	END DATE:	07/01/22
SURFACE ELEVATION:	610.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
609.3		ASPHALT PAVEMENT, 8.5 inches					
0.7		LIMESTONE, highly weathered, hard					
608.0			1	50/1" (REF) 0"			AUGER REFUSAL AT 2 FEET. Water not observed while drilling. Boring patched with Asphalt.
2.0		END OF BORING					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-24**

LOCATION: See attached sketch

LATITUDE:	41.84978	LONGITUDE:	-90.19817
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	06/30/22	END DATE:	06/30/22
SURFACE ELEVATION:	611.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
609.5		TOPSOIL, 18 inches					
1.5		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, very stiff (RESIDUUM)		6-10-50/2" (REF) 8"			
608.5		LIMESTONE, highly weathered, hard					AUGER REFUSAL AT 2.7 FEET. Water not observed while drilling.
2.5		END OF BORING					
608.3							Boring patched with Asphalt.
2.7							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-25**

LOCATION: See attached sketch

LATITUDE:	41.85075	LONGITUDE:	-90.19716
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	07/01/22	END DATE:	07/01/22
SURFACE ELEVATION:	604.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
603.1		ASPHALT PAVEMENT, 9.5 inches					
0.9		SANDY LEAN CLAY (CL), brown, moist, medium (GLACIAL TILL)		2-3-3 (6) 6"			
		becoming tan at 3 feet		TW 8"		13	
598.0							
6.0		LIMESTONE, highly weathered, hard		50/5" (REF) 3"			AUGER REFUSAL AT 6.5 FEET. Water not observed while drilling. Boring patched with Asphalt.
597.5		END OF BORING					
6.5							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2204326
Geotechnical Evaluation
Bluff Blvd. Reconstruction
Clinton, Iowa

BORING: **B-26**

LOCATION: See attached sketch

LATITUDE:	41.85226	LONGITUDE:	-90.19494
DRILLER:	AL/AC/BG	LOGGED BY:	A. Schweizer
START DATE:	07/01/22	END DATE:	07/01/22
SURFACE ELEVATION:	606.0 ft	RIG:	5501
METHOD:	3 1/4" HSA	SURFACING:	Pavement
WEATHER:	Sunny & 80-90		

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
605.4		ASPHALT PAVEMENT, 7.5 inches					
0.7		SILTY SAND with GRAVEL (SM), fine to coarse-grained, brown, moist, loose (RESIDUUM)		3-4-6 (10) 6"			
		becoming tan, dense at 4 feet.		20-20-13 (33) 12"		9	
600.0			5				
6.0		LIMESTONE, highly weathered, hard		50/1" (REF) 0"			AUGER REFUSAL AT 6.1 FEET.
599.9		END OF BORING					Water not observed while drilling.
6.1							
			10				
			15				
			20				
			25				
			30				

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Sieve Analysis Of Soil

ASTM D6913

07/29/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:
Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:
B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

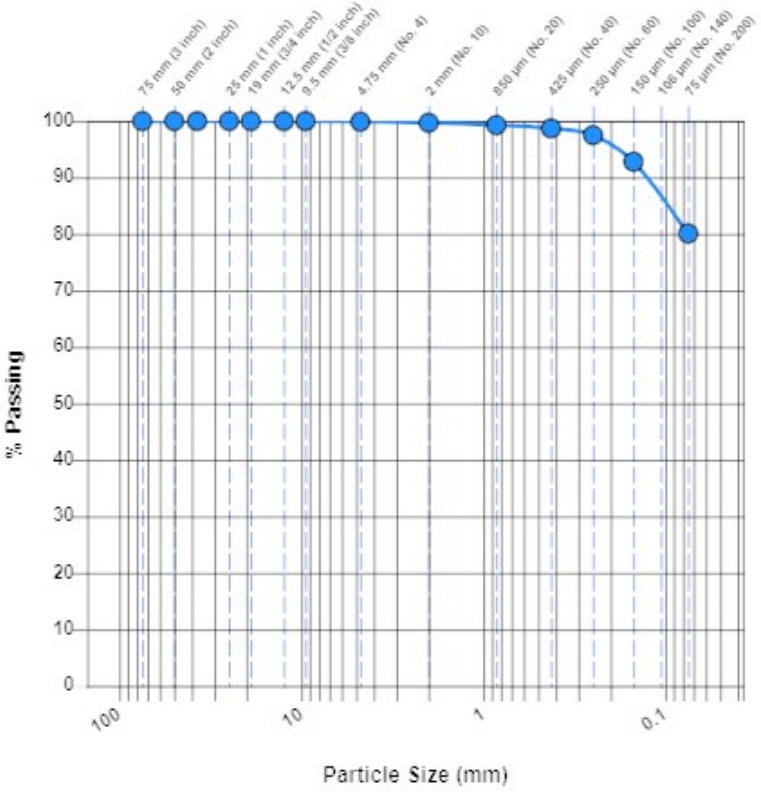
Sample Information

Sample Number:	463453	**Depth (ft):**	3-5
Boring Number:	B-1	**Sampled By:**	Drill Crew
Sample Date:	07/28/2022		
Received Date:	07/28/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/29/2022	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100.0	
4.75 mm (No. 4)	99.9	
2 mm (No. 10)	99.7	
850 µm (No. 20)	99.3	
425 µm (No. 40)	98.7	
250 µm (No. 60)	97.5	
150 µm (No. 100)	92.8	
75 µm (No. 200)	80.1	

Gravel (%)	Sand (%)	Silt & Clay (%)
0.1	19.8	80.1



Classification: CL Lean clay with sand

General

Results: The test is for informational purposes.

BRAUN INTERTEC
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Sieve Analysis Of Soil

ASTM D6913

07/29/2022

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Client:
Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:
B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

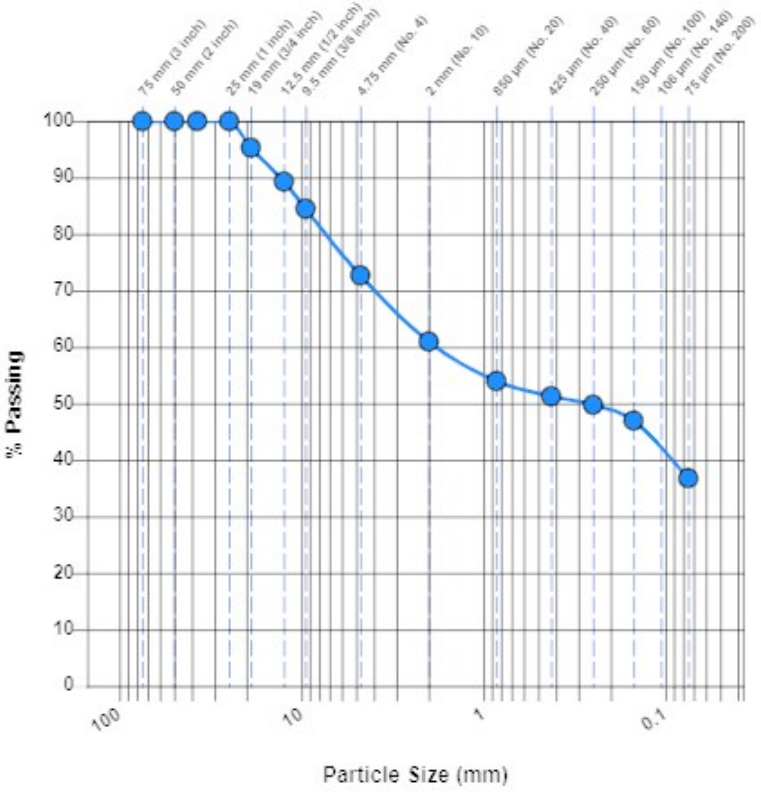
Sample Number:	463454	**Depth (ft):**	3.5-5
Boring Number:	B-2	**Sampled By:**	Drill Crew
Sample Date:	07/28/2022		
Received Date:	07/28/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/29/2022	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
25 mm (1 inch)	100.0	
19 mm (3/4 inch)	95.3	
12.5 mm (1/2 inch)	89.3	
9.5 mm (3/8 inch)	84.5	
4.75 mm (No. 4)	72.7	
2 mm (No. 10)	61.0	
850 µm (No. 20)	54.0	
425 µm (No. 40)	51.3	
250 µm (No. 60)	49.8	
150 µm (No. 100)	47.0	
75 µm (No. 200)	36.8	

Gravel (%)	Sand (%)	Silt & Clay (%)
27.3	35.9	36.8

D60
1.836



Classification: SM Silty sand with gravel

General

Results: The test is for informational purposes.

Sieve Analysis Of Soil

ASTM D6913

07/29/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number:	463455	**Depth (ft):**	13.5-15
Boring Number:	B-4	**Sampled By:**	Drill Crew
Sample Date:	07/28/2022		
Received Date:	07/28/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/29/2022	**Tested By:**	Streier, Jim

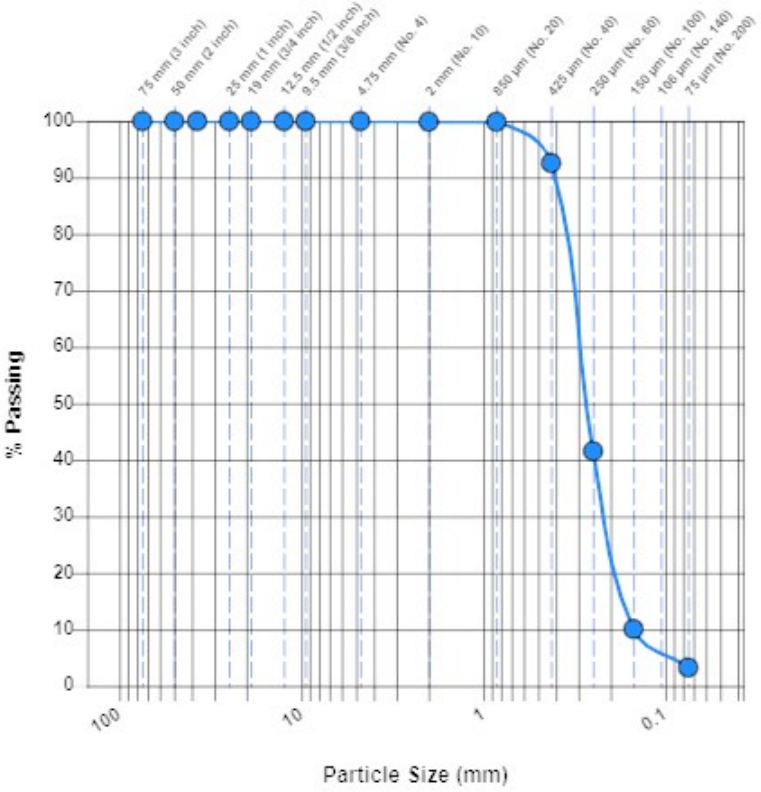
Laboratory Data

Sieve Size	Passing (%)	Specification
4.75 mm (No. 4)	100.0	
2 mm (No. 10)	99.9	
850 µm (No. 20)	99.9	
425 µm (No. 40)	92.6	
250 µm (No. 60)	41.6	
150 µm (No. 100)	10.1	
75 µm (No. 200)	3.3	

Sand (%)	Silt & Clay (%)
96.7	3.3

D10	D30	D60
0.106	0.213	0.313

C_U	C_C
2.95	1.37



Classification: SP Poorly graded sand

General

Results: The test is for informational purposes.

Sieve Analysis Of Soil

ASTM D6913

07/29/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:
Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:
B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

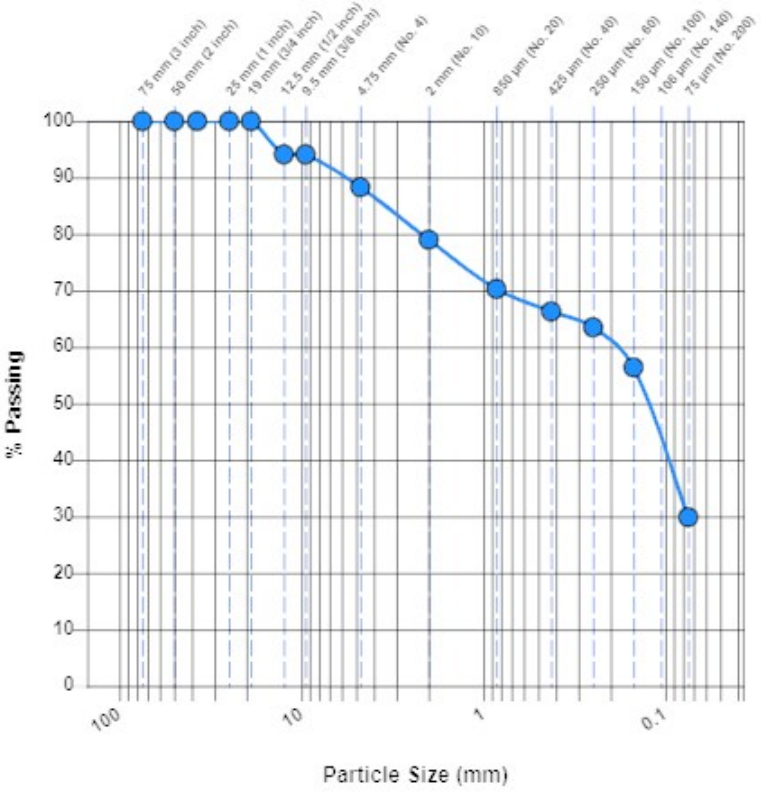
Sample Number:	463456	**Depth (ft):**	8-10
Boring Number:	B-5	**Sampled By:**	Drill Crew
Sample Date:	07/28/2022		
Received Date:	07/28/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/29/2022	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
19 mm (3/4 inch)	100.0	
12.5 mm (1/2 inch)	94.1	
9.5 mm (3/8 inch)	94.1	
4.75 mm (No. 4)	88.3	
2 mm (No. 10)	79.0	
850 µm (No. 20)	70.3	
425 µm (No. 40)	66.3	
250 µm (No. 60)	63.5	
150 µm (No. 100)	56.4	
75 µm (No. 200)	29.9	

Gravel (%)	Sand (%)	Silt & Clay (%)
11.7	58.4	29.9

D30	D60
0.075	0.201



Classification: SM Silty sand

General

Results: The test is for informational purposes.

Sieve Analysis Of Soil

ASTM D6913

07/29/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

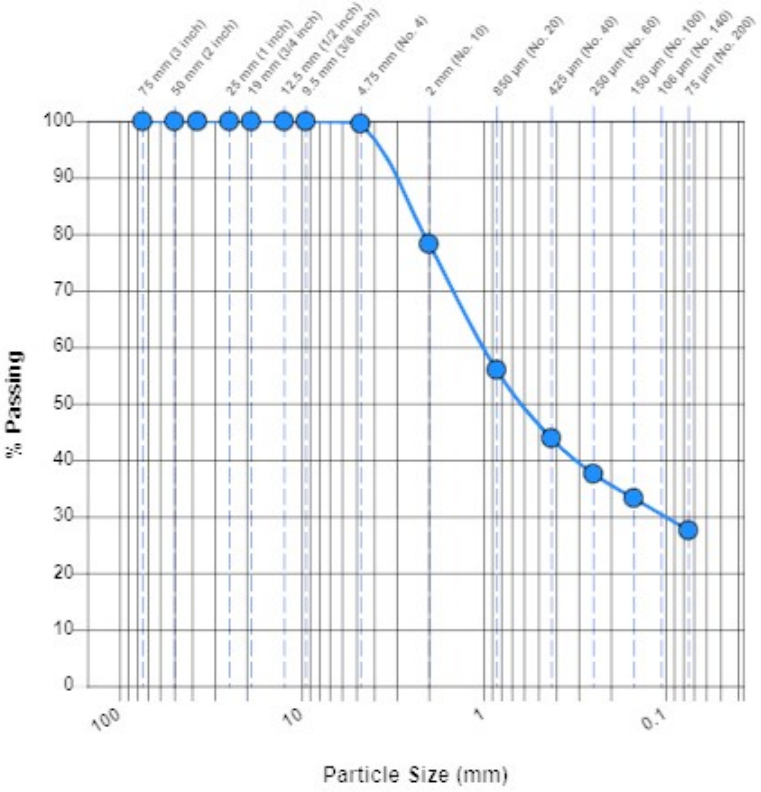
Sample Number:	463457	**Depth (ft):**	1.5-3
Boring Number:	B-14	**Sampled By:**	Drill Crew
Sample Date:	07/28/2022		
Received Date:	07/28/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/29/2022	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100.0	
4.75 mm (No. 4)	99.6	
2 mm (No. 10)	78.3	
850 µm (No. 20)	56.0	
425 µm (No. 40)	43.9	
250 µm (No. 60)	37.6	
150 µm (No. 100)	33.3	
75 µm (No. 200)	27.6	

Gravel (%)	Sand (%)	Silt & Clay (%)
0.4	72.0	27.6

D30	D60
0.088	1.056



Classification: SM Silty sand

General

Results: The test is for informational purposes.

BRAUN INTERTEC
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Sieve Analysis Of Soil

ASTM D6913

07/29/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
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Client:
Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:
B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

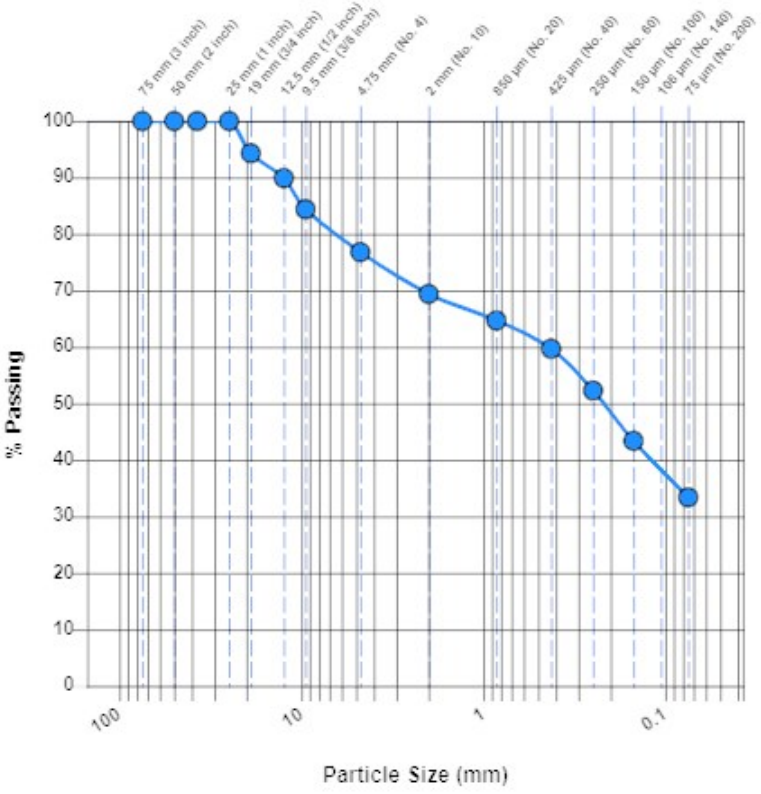
Sample Number:	463458	**Depth (ft):**	6-7.5
Boring Number:	B-17	**Sampled By:**	Drill Crew
Sample Date:	07/28/2022		
Received Date:	07/28/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/29/2022	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
25 mm (1 inch)	100.0	
19 mm (3/4 inch)	94.3	
12.5 mm (1/2 inch)	89.9	
9.5 mm (3/8 inch)	84.4	
4.75 mm (No. 4)	76.8	
2 mm (No. 10)	69.4	
850 µm (No. 20)	64.7	
425 µm (No. 40)	59.7	
250 µm (No. 60)	52.3	
150 µm (No. 100)	43.4	
75 µm (No. 200)	33.4	

Gravel (%)	Sand (%)	Silt & Clay (%)
23.2	43.4	33.4

D60
0.450



Classification: SC Clayey sand with gravel

General

Results: The test is for informational purposes.

Sieve Analysis Of Soil

ASTM D6913

07/29/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number:	463459	**Depth (ft):**	3.5-5
Boring Number:	B-22	**Sampled By:**	Drill Crew
Sample Date:	07/28/2022		
Received Date:	07/28/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/29/2022	**Tested By:**	Streier, Jim

Laboratory Data

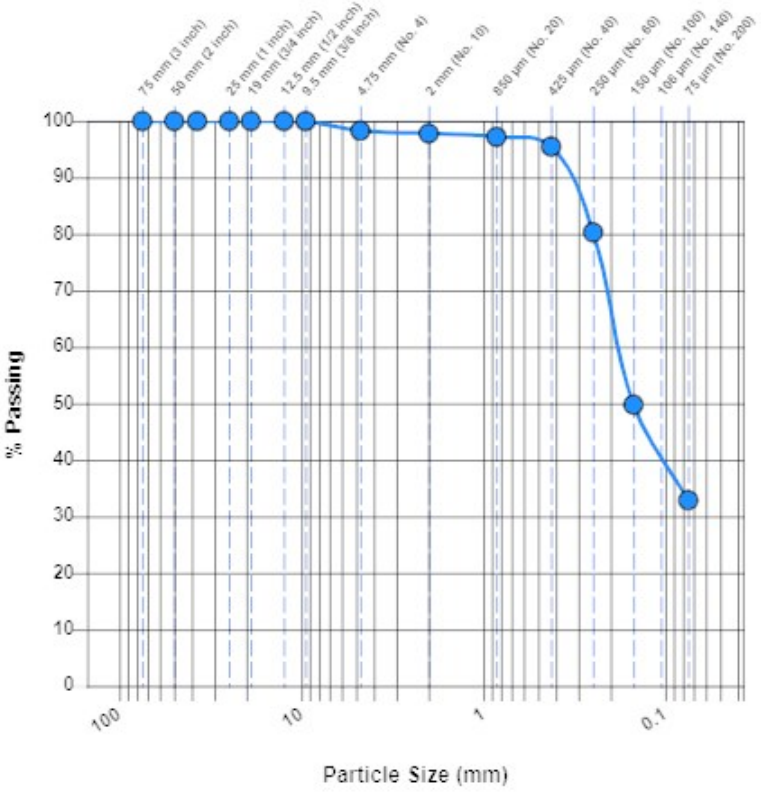
Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100.0	
4.75 mm (No. 4)	98.3	
2 mm (No. 10)	97.8	
850 µm (No. 20)	97.2	
425 µm (No. 40)	95.5	
250 µm (No. 60)	80.3	
150 µm (No. 100)	49.8	
75 µm (No. 200)	32.9	

Gravel (%)
1.7

Sand (%)
65.4

Silt & Clay (%)
32.9

D60
0.183



Classification: SM Silty sand

General

Results: The test is for informational purposes.

BRAUN INTERTEC
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Sieve Analysis Of Soil

ASTM D6913

07/29/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
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Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

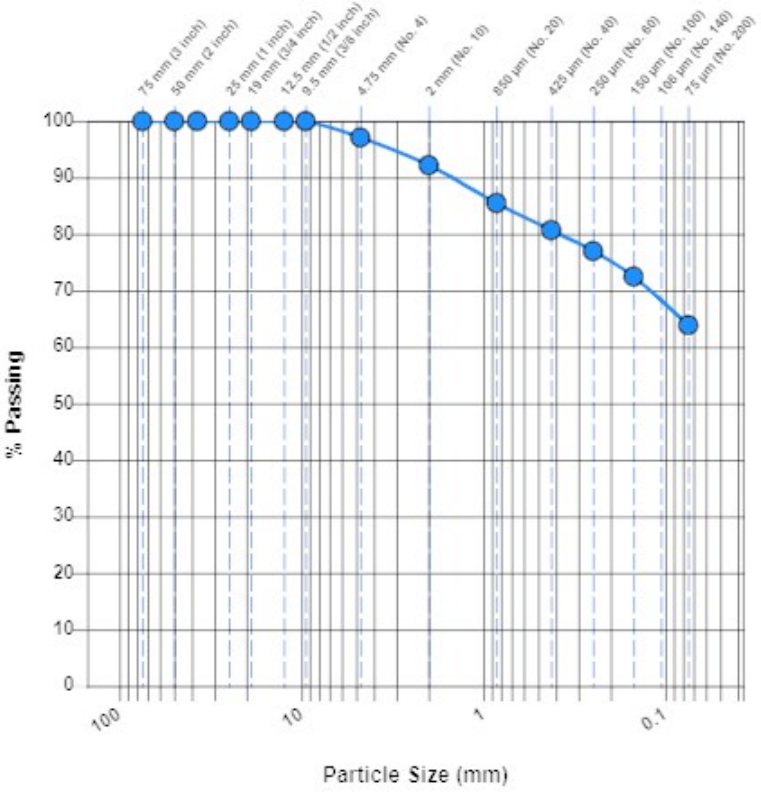
Sample Information

Sample Number:	463461	**Depth (ft):**	3-5
Boring Number:	B-25	**Sampled By:**	Drill Crew
Sample Date:	07/28/2022		
Received Date:	07/28/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/29/2022	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
9.5 mm (3/8 inch)	100.0	
4.75 mm (No. 4)	97.1	
2 mm (No. 10)	92.2	
850 µm (No. 20)	85.5	
425 µm (No. 40)	80.7	
250 µm (No. 60)	77.0	
150 µm (No. 100)	72.5	
75 µm (No. 200)	63.9	

Gravel (%)	Sand (%)	Silt & Clay (%)
2.9	33.2	63.9



Classification: CL Sandy lean clay

General

Results: The test is for informational purposes.

Sieve Analysis Of Soil

ASTM D6913

07/29/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:
Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:
B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

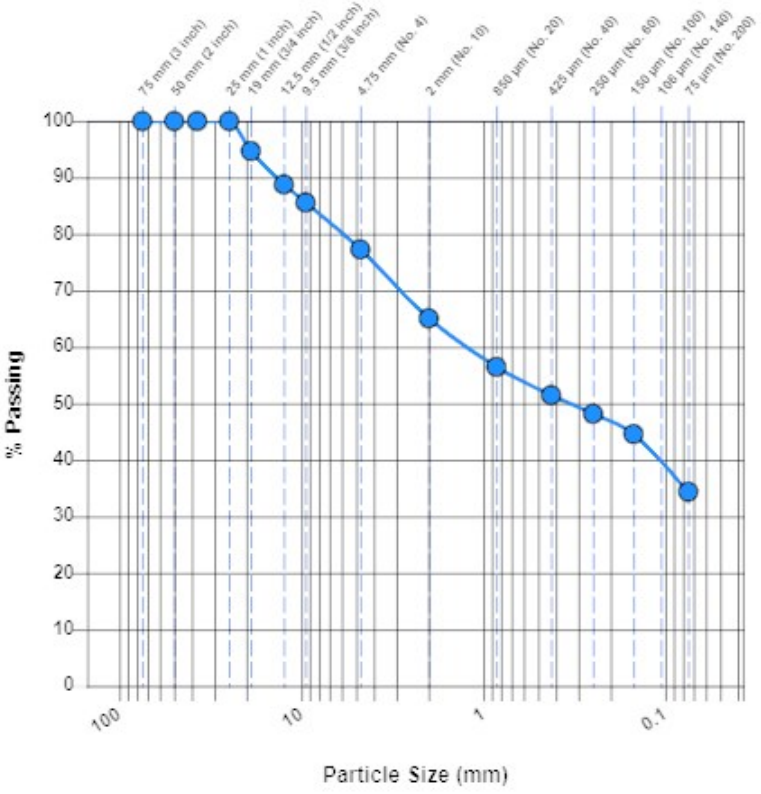
Sample Number:	463462	**Depth (ft):**	3.5-5
Boring Number:	B-26	**Sampled By:**	Drill Crew
Sample Date:	07/28/2022		
Received Date:	07/28/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/29/2022	**Tested By:**	Streier, Jim

Laboratory Data

Sieve Size	Passing (%)	Specification
25 mm (1 inch)	100.0	
19 mm (3/4 inch)	94.7	
12.5 mm (1/2 inch)	88.8	
9.5 mm (3/8 inch)	85.6	
4.75 mm (No. 4)	77.3	
2 mm (No. 10)	65.1	
850 µm (No. 20)	56.5	
425 µm (No. 40)	51.5	
250 µm (No. 60)	48.2	
150 µm (No. 100)	44.6	
75 µm (No. 200)	34.4	

Gravel (%)	Sand (%)	Silt & Clay (%)
22.7	42.9	34.4

D60
1.318



Classification: SM Silty sand with gravel

General

Results: The test is for informational purposes.

BRAUN INTERTEC
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California Bearing Ratio

AASHTO T193

07/27/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number: 459995
Depth (ft): 4-8
Boring Number: B-1
Sampled By: Drill Crew
Sample Date: 07/11/2022
Received Date: 07/18/2022
Lab: 11001 Hampshire Ave S, Bloomington, MN
Tested Date: 07/27/2022
Tested By: Vang, Yang

Laboratory Data

Soaked Or Unsoaked	Soaked
Method Of Preparation	Other
Number Of Blows Per Lift	20
Surcharge (kg / lbs)	4.54 / 10
Average Molding Moisture Content (%)	13.7
Dry Density Molded (kg/m^3 / pcf)	1740 / 108.6
Percent Of Maximum Density	95.3
Swell (%)	0.2
Moisture Content Of Whole Specimen (%)	15.1
Moisture Content Of Top Inch (%)	
Corrected Bearing Ratio At 0.1 inch	5.0
Corrected Bearing Ratio At 0.2 inch	4.6
Corrected Bearing Ratio At 0.3 inch	
Corrected Bearing Ratio At 0.4 inch	
Corrected Bearing Ratio At 0.5 inch	

Final Bearing Ratio (%): 4.6

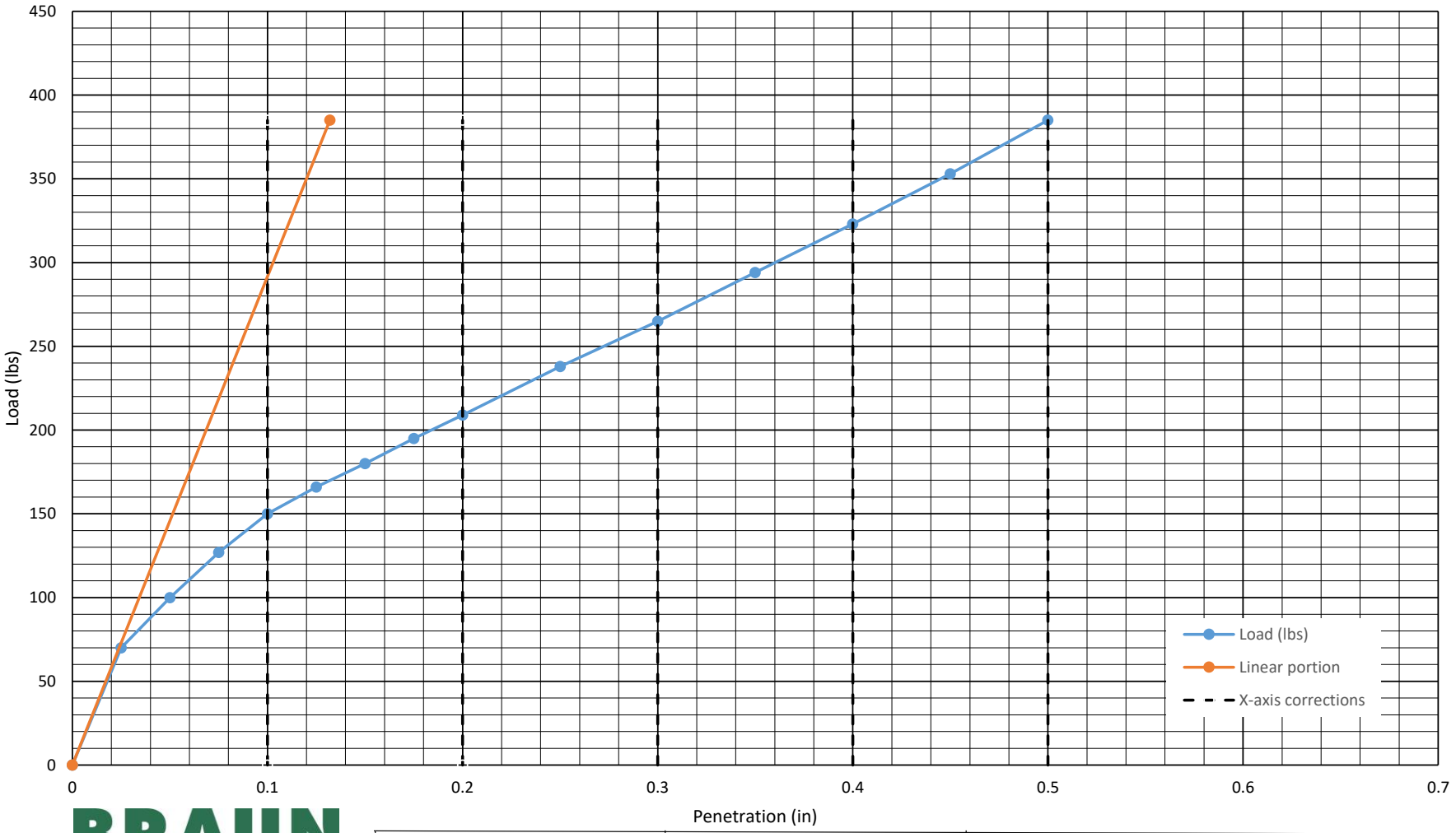
Soil Classification: CL Lean clay with sand

General

Results: The test is for informational purposes.

See 459995.pdf in the documents section at the end of this report.

CBR Load Graph



BRAUN INTERTEC
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Project Number	B2204326	% of Maximum	95.3	Classification	
Sample Number	459995	Molding Moisture (%)	13.7	CL Lean clay with sand, dark brown	

BRAUN INTERTEC
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California Bearing Ratio

AASHTO T193

07/25/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number: 459996
Depth (ft): 1-6
Boring Number: B-4
Sampled By: Drill Crew
Sample Date: 07/11/2022
Received Date: 07/18/2022
Lab: 11001 Hampshire Ave S, Bloomington, MN
Tested Date: 07/25/2022
Tested By: Vang, Yang

Laboratory Data

Soaked Or Unsoaked	Soaked
Method Of Preparation	Other
Number Of Blows Per Lift	10
Surcharge (kg / lbs)	4.54 / 10
Average Molding Moisture Content (%)	11.3
Dry Density Molded (kg/m^3 / pcf)	1724 / 107.6
Percent Of Maximum Density	95.3
Swell (%)	0.0
Moisture Content Of Whole Specimen (%)	13.4
Moisture Content Of Top Inch (%)	13.6
Corrected Bearing Ratio At 0.1 inch	5.9
Corrected Bearing Ratio At 0.2 inch	5.6
Corrected Bearing Ratio At 0.3 inch	
Corrected Bearing Ratio At 0.4 inch	
Corrected Bearing Ratio At 0.5 inch	

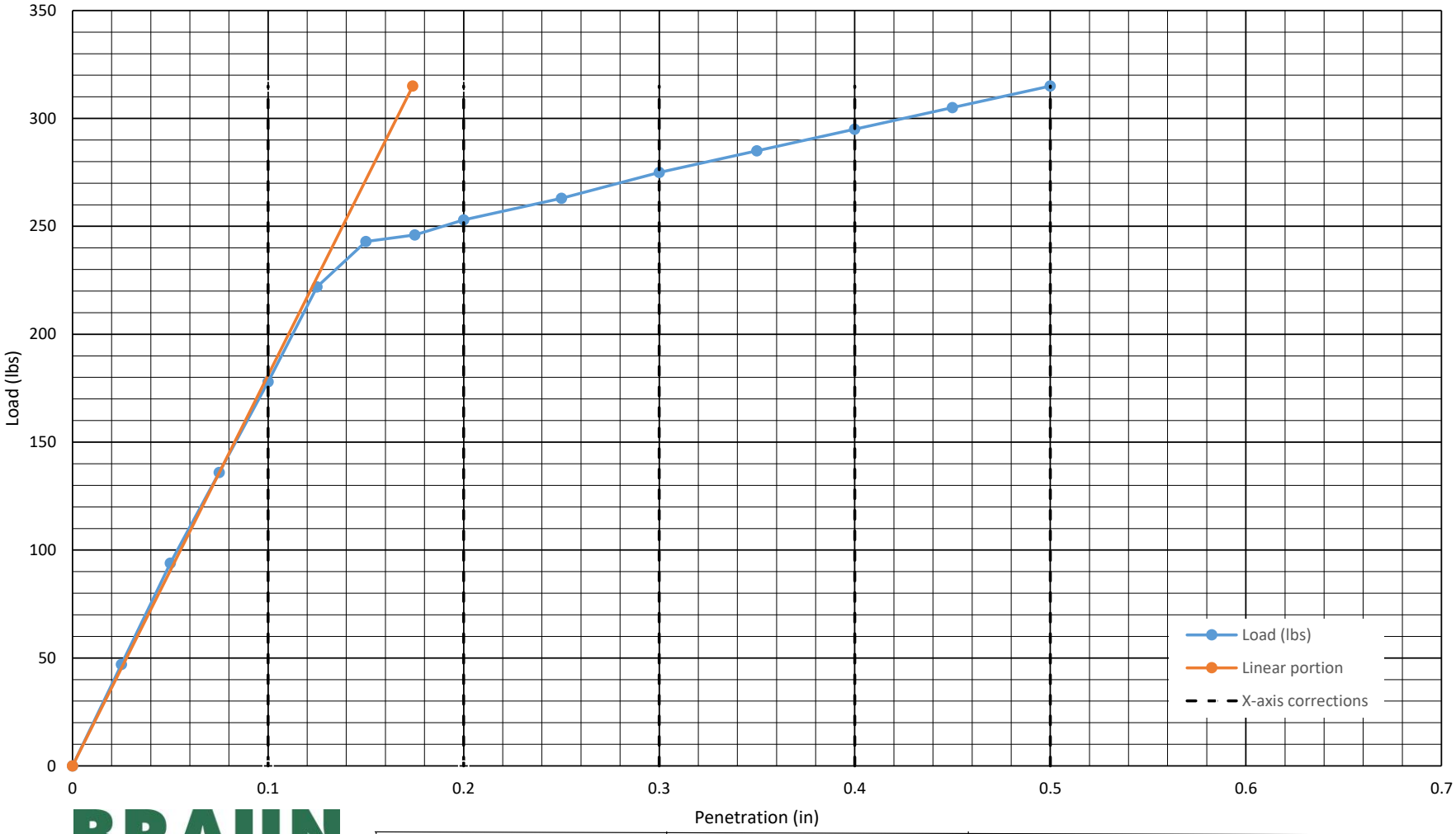
Final Bearing Ratio (%): 5.6
Soil Classification: SM Silty sand

General

Results: The test is for informational purposes.

See 459996.pdf in the documents section at the end of this report.

CBR Load Graph



BRAUN INTERTEC
The Science You Build On.

Project Number	B2204326	% of Maximum	95.3	Classification	SM Silty sand, fine grained, dark brown
Sample Number	459996	Molding Moisture (%)	11.3		

BRAUN INTERTEC
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California Bearing Ratio

AASHTO T193

07/26/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number: 459998
Depth (ft): 1-5
Boring Number: B-5
Sampled By: Drill Crew
Sample Date: 07/11/2022
Received Date: 07/18/2022
Lab: 11001 Hampshire Ave S, Bloomington, MN
Tested Date: 07/26/2022
Tested By: Vang, Yang

Laboratory Data

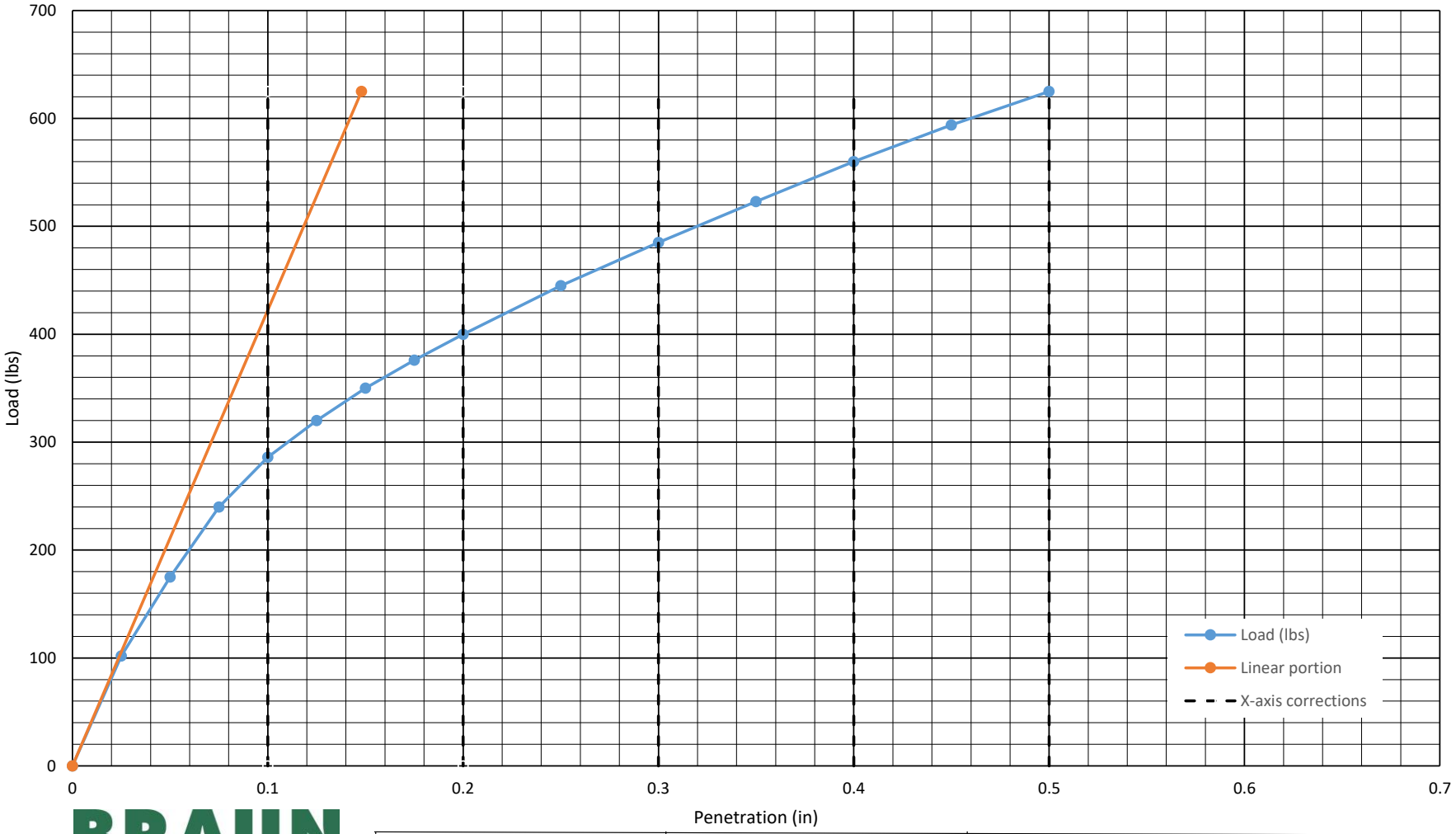
Soaked Or Unsoaked	Soaked
Method Of Preparation	Other
Number Of Blows Per Lift	10
Surcharge (kg / lbs)	4.54 / 10
Average Molding Moisture Content (%)	12.5
Dry Density Molded (kg/m^3 / pcf)	1808 / 112.9
Percent Of Maximum Density	95.3
Swell (%)	0.0
Moisture Content Of Whole Specimen (%)	13.9
Moisture Content Of Top Inch (%)	16.0
Corrected Bearing Ratio At 0.1 inch	9.5
Corrected Bearing Ratio At 0.2 inch	8.9
Corrected Bearing Ratio At 0.3 inch	
Corrected Bearing Ratio At 0.4 inch	
Corrected Bearing Ratio At 0.5 inch	

Final Bearing Ratio (%): 8.9
Soil Classification: SM Silty sand

General

See 459998.pdf in the documents section at the end of this report.

CBR Load Graph



BRAUN INTERTEC
The Science You Build On.

Project Number	B2204326	% of Maximum	95.3	Classification	SM Silty sand, fine to medium grained, dark brown
Sample Number	459998	Molding Moisture (%)	12.5		

BRAUN INTERTEC
The Science You Build On.

California Bearing Ratio

AASHTO T193

07/30/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number:	459999	**Depth (ft):**	1-6
Boring Number:	B-6	**Sampled By:**	Drill Crew
Sample Date:	07/11/2022		
Received Date:	07/18/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/30/2022	**Tested By:**	Vang, Yang

Laboratory Data

Soaked Or Unsoaked	Soaked
Method Of Preparation	Other
Number Of Blows Per Lift	16
Surcharge (kg / lbs)	4.54 / 10
Average Molding Moisture Content (%)	13.3
Dry Density Molded (kg/m^3 / pcf)	1791 / 111.8
Percent Of Maximum Density	95.0
Swell (%)	0.1
Moisture Content Of Whole Specimen (%)	13.8
Moisture Content Of Top Inch (%)	17.7
Corrected Bearing Ratio At 0.1 inch	6.0
Corrected Bearing Ratio At 0.2 inch	6.0
Corrected Bearing Ratio At 0.3 inch	
Corrected Bearing Ratio At 0.4 inch	
Corrected Bearing Ratio At 0.5 inch	

Final Bearing Ratio (%): 6.0

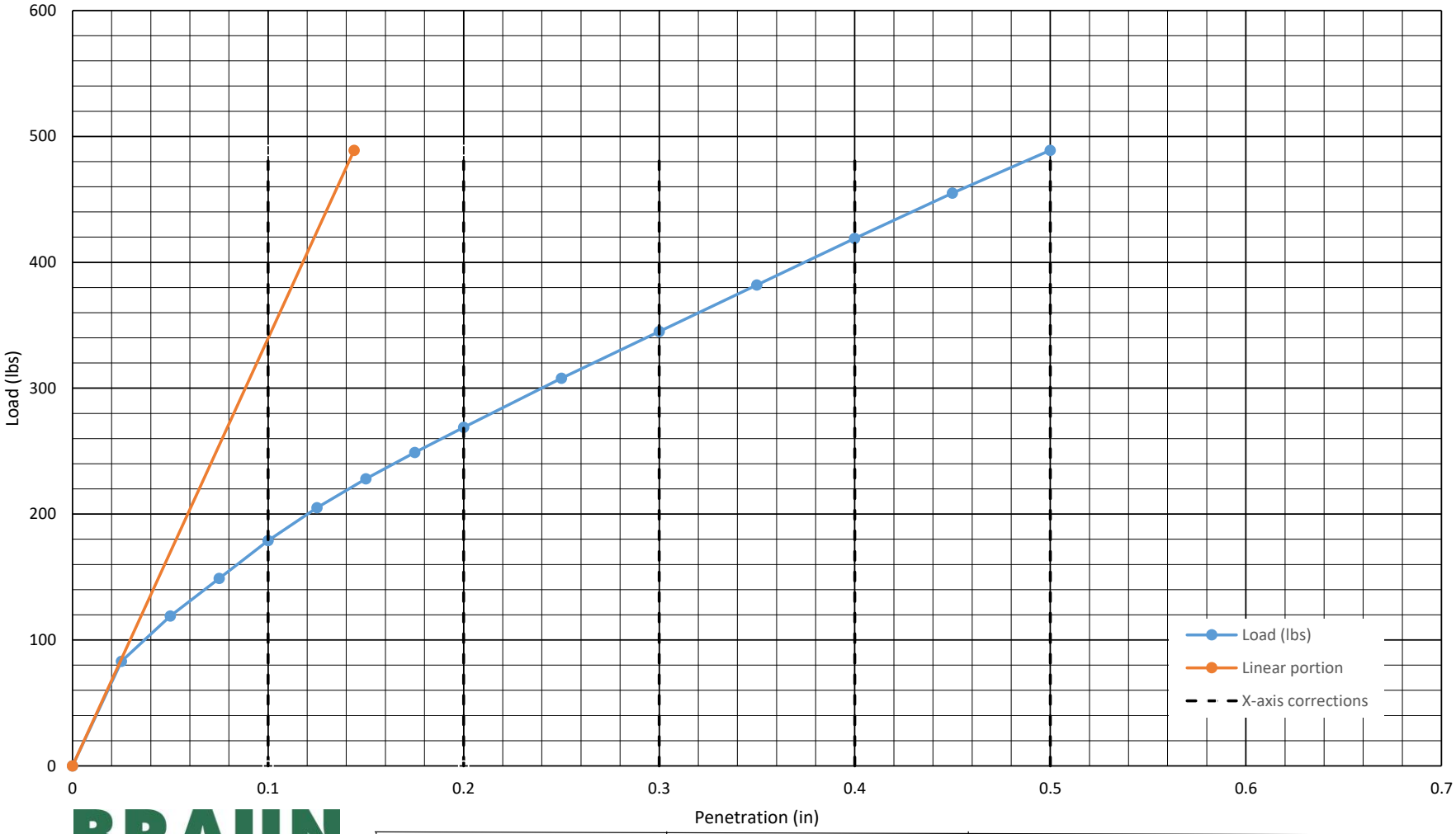
Soil Classification: CL Sandy lean clay

General

Results: The test is for informational purposes.

See 459999.pdf in the documents section at the end of this report.

CBR Load Graph



BRAUN INTERTEC
The Science You Build On.

Project Number	B2204326	% of Maximum	95.0	Classification	
Sample Number	459999	Molding Moisture (%)	13.3	CL Sandy lean clay, dark brown	

BRAUN INTERTEC
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California Bearing Ratio

AASHTO T193

07/25/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number:	460002	**Depth (ft):**	3-7
Boring Number:	B-11	**Sampled By:**	Drill Crew
Sample Date:	07/11/2022		
Received Date:	07/18/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/25/2022	**Tested By:**	Vang, Yang

Laboratory Data

Soaked Or Unsoaked	Soaked
Method Of Preparation	Other
Number Of Blows Per Lift	28
Surcharge (kg / lbs)	4.54 / 10
Average Molding Moisture Content (%)	15.7
Dry Density Molded (kg/m^3 / pcf)	1701 / 106.2
Percent Of Maximum Density	94.7
Swell (%)	1.2
Moisture Content Of Whole Specimen (%)	16.3
Moisture Content Of Top Inch (%)	25.1
Corrected Bearing Ratio At 0.1 inch	2.5
Corrected Bearing Ratio At 0.2 inch	2.2
Corrected Bearing Ratio At 0.3 inch	
Corrected Bearing Ratio At 0.4 inch	
Corrected Bearing Ratio At 0.5 inch	

Final Bearing Ratio (%): 2.2

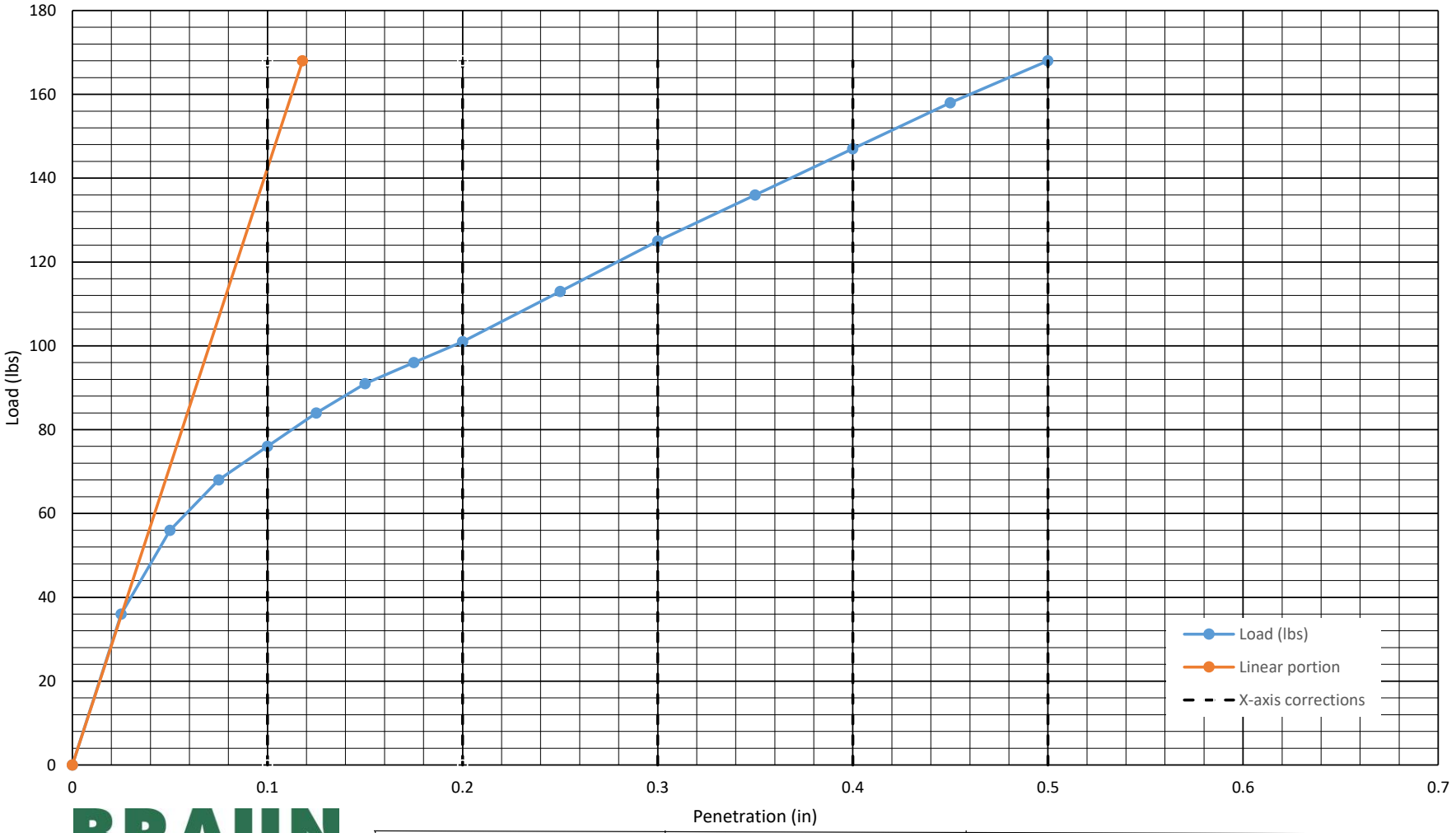
Soil Classification: CL Lean clay with sand

General

Results: The test is for informational purposes.

See 460002.pdf in the documents section at the end of this report.

CBR Load Graph



BRAUN INTERTEC
The Science You Build On.

Project Number	B2204326	% of Maximum	94.7	Classification	CL Lean clay with sand, dark brown
Sample Number	460002	Molding Moisture (%)	15.7		

BRAUN INTERTEC
The Science You Build On.

California Bearing Ratio

AASHTO T193

07/27/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number: 460004
Depth (ft): 1-7
Boring Number: B-17
Sampled By: Drill Crew
Sample Date: 07/11/2022
Received Date: 07/18/2022
Lab: 11001 Hampshire Ave S, Bloomington, MN
Tested Date: 07/27/2022
Tested By: Vang, Yang

Laboratory Data

Soaked Or Unsoaked	Soaked
Method Of Preparation	Other
Number Of Blows Per Lift	10
Surcharge (kg / lbs)	4.54 / 10
Average Molding Moisture Content (%)	10.8
Dry Density Molded (kg/m^3 / pcf)	1871 / 116.8
Percent Of Maximum Density	95.0
Swell (%)	0.0
Moisture Content Of Whole Specimen (%)	12.6
Moisture Content Of Top Inch (%)	12.8
Corrected Bearing Ratio At 0.1 inch	5.9
Corrected Bearing Ratio At 0.2 inch	5.6
Corrected Bearing Ratio At 0.3 inch	
Corrected Bearing Ratio At 0.4 inch	
Corrected Bearing Ratio At 0.5 inch	

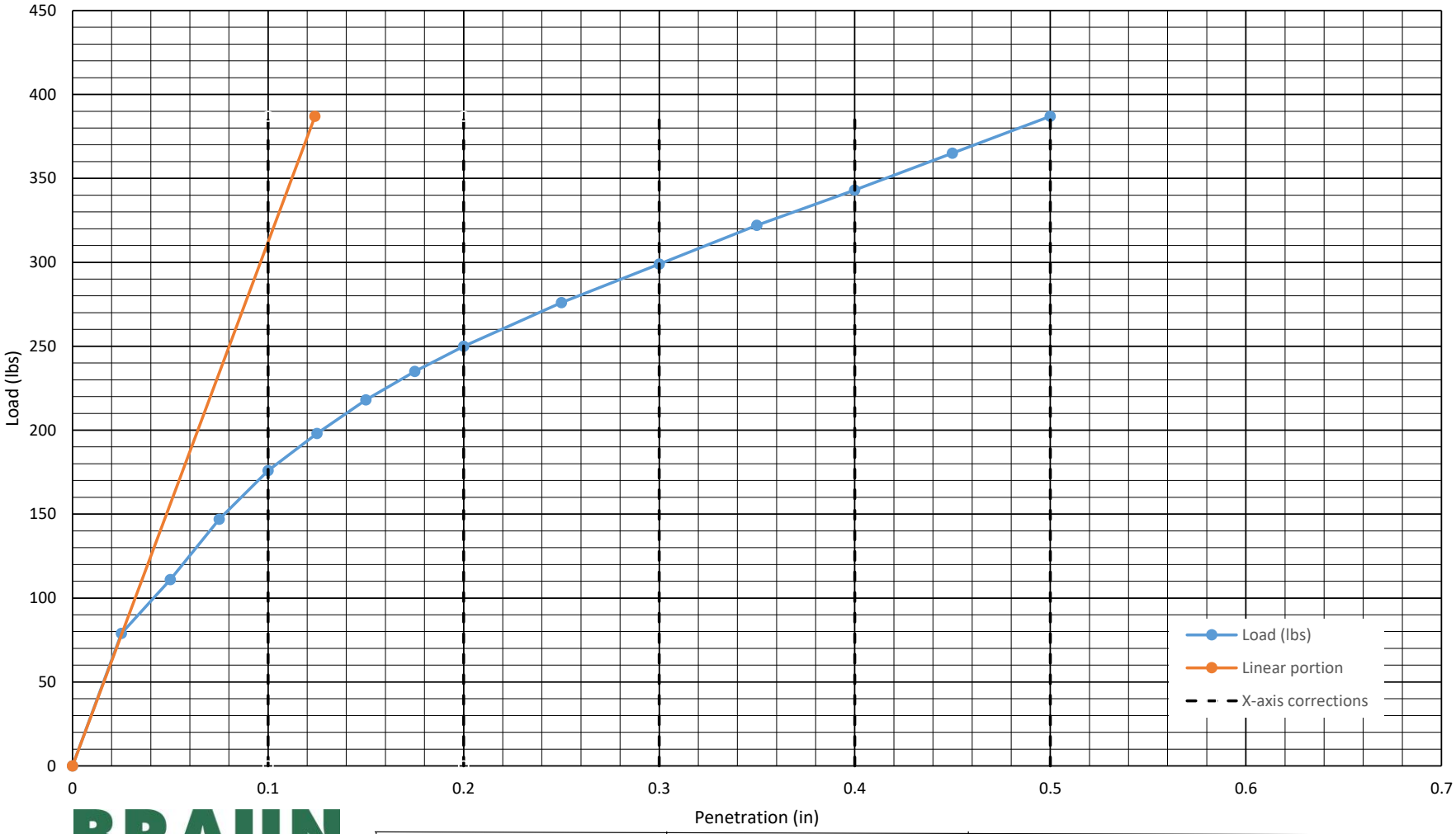
Final Bearing Ratio (%): 5.6
Soil Classification: SC Clayey sand

General

Results: The test is for informational purposes.

See 460004.pdf in the documents section at the end of this report.

CBR Load Graph



BRAUN INTERTEC
The Science You Build On.

Project Number	B2204326	% of Maximum	95.0	Classification	SC Clayey sand, fine to medium grained, brown
Sample Number	460004	Molding Moisture (%)	10.8		

BRAUN INTERTEC
The Science You Build On.

California Bearing Ratio

AASHTO T193

07/30/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number:	460005	**Depth (ft):**	3-8
Boring Number:	B-22	**Sampled By:**	Drill Crew
Sample Date:	07/11/2022		
Received Date:	07/18/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/30/2022	**Tested By:**	Vang, Yang

Laboratory Data

Soaked Or Unsoaked	Soaked
Method Of Preparation	Other
Number Of Blows Per Lift	16
Surcharge (kg / lbs)	4.54 / 10
Average Molding Moisture Content (%)	12.5
Dry Density Molded (kg/m^3 / pcf)	1736 / 108.4
Percent Of Maximum Density	95.0
Swell (%)	0.2
Moisture Content Of Whole Specimen (%)	14.3
Moisture Content Of Top Inch (%)	17.8
Corrected Bearing Ratio At 0.1 inch	9.0
Corrected Bearing Ratio At 0.2 inch	8.7
Corrected Bearing Ratio At 0.3 inch	
Corrected Bearing Ratio At 0.4 inch	
Corrected Bearing Ratio At 0.5 inch	

Final Bearing Ratio (%): 8.7

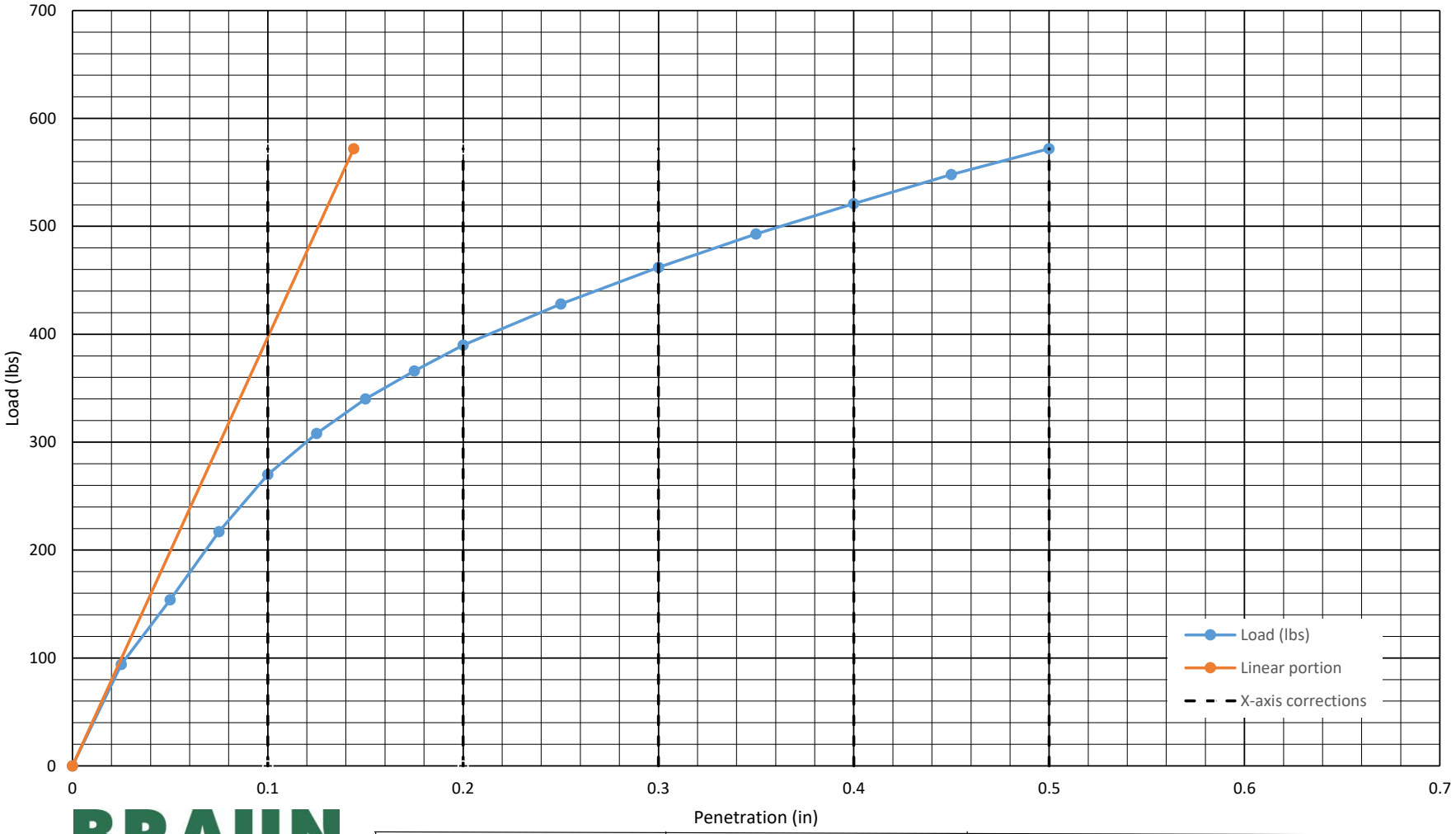
Soil Classification: CL Lean clay with sand

General

Results: The test is for informational purposes.

See 460005.pdf in the documents section at the end of this report.

CBR Load Graph



BRAUN INTERTEC
The Science You Build On.

Project Number	B2204326	% of Maximum	95.0	Classification	
Sample Number	460005	Molding Moisture (%)	12.5	CL Lean clay with sand, dark brown	

BRAUN INTERTEC
The Science You Build On.

California Bearing Ratio

AASHTO T193

07/25/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number: 460006
Depth (ft): 1.5-4
Boring Number: B-25
Sampled By: Drill Crew
Sample Date: 07/11/2022
Received Date: 07/18/2022
Lab: 11001 Hampshire Ave S, Bloomington, MN
Tested Date: 07/25/2022
Tested By: Limley, Jason

Laboratory Data

Soaked Or Unsoaked	Soaked
Method Of Preparation	Other
Number Of Blows Per Lift	16
Surcharge (kg / lbs)	4.54 / 10
Average Molding Moisture Content (%)	13.3
Dry Density Molded (kg/m^3 / pcf)	1749 / 109.2
Percent Of Maximum Density	95.0
Swell (%)	0.2
Moisture Content Of Whole Specimen (%)	14.6
Moisture Content Of Top Inch (%)	17.1
Corrected Bearing Ratio At 0.1 inch	7.0
Corrected Bearing Ratio At 0.2 inch	6.5
Corrected Bearing Ratio At 0.3 inch	
Corrected Bearing Ratio At 0.4 inch	
Corrected Bearing Ratio At 0.5 inch	

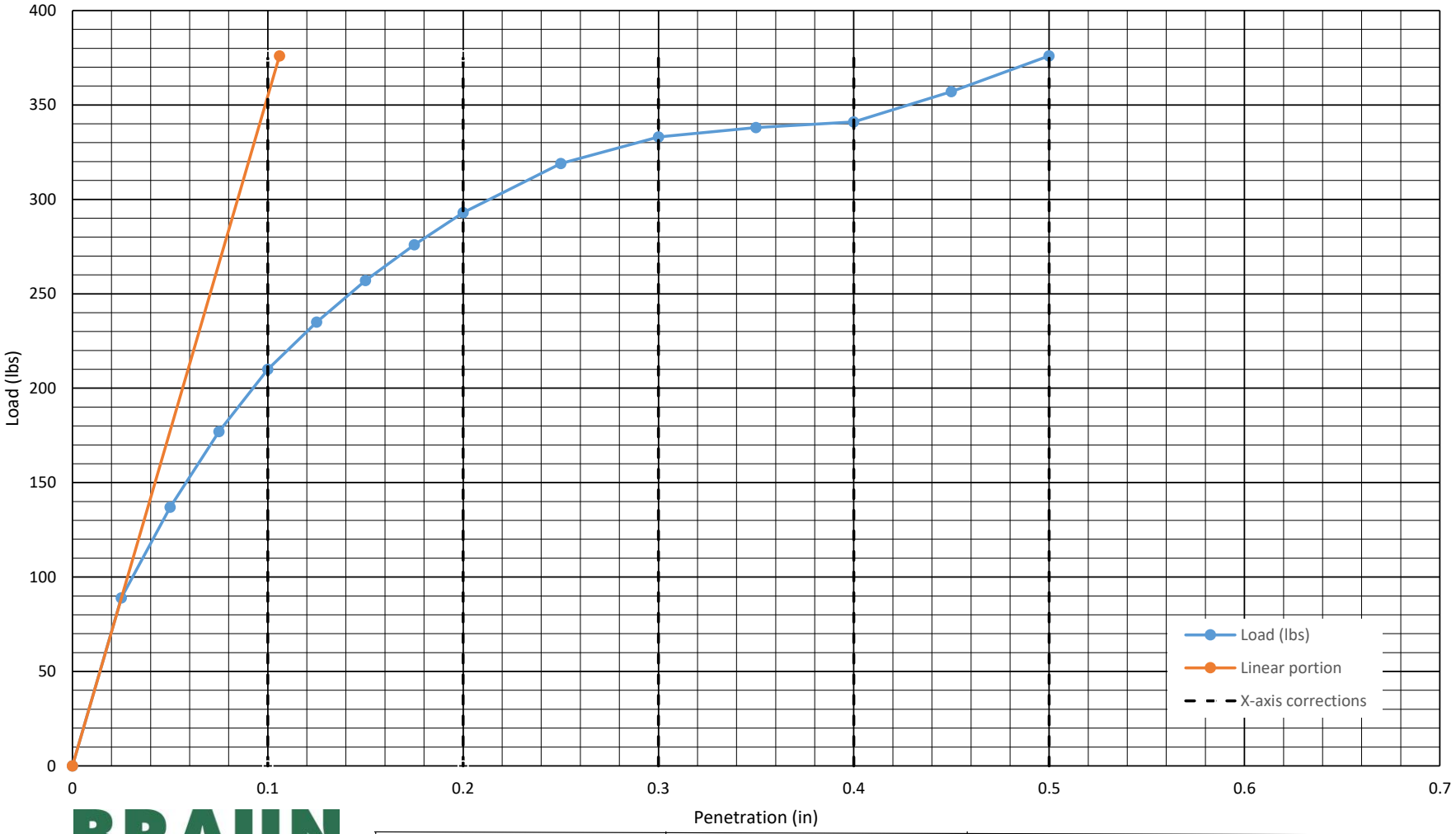
Final Bearing Ratio (%): 6.5
Soil Classification: CL Sandy lean clay

General

Results: The test is for informational purposes.

See 460006.pdf in the documents section at the end of this report.

CBR Load Graph



BRAUN INTERTEC
The Science You Build On.

Project Number	B2204326	% of Maximum	95.0	Classification	
Sample Number	460006	Molding Moisture (%)	13.3	CL Sandy Lean Clay, dark brown	

BRAUN INTERTEC
The Science You Build On.

California Bearing Ratio

AASHTO T193

07/26/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number:	460007	**Depth (ft):**	1-4
Boring Number:	B-26	**Sampled By:**	Drill Crew
Sample Date:	07/11/2022		
Received Date:	07/18/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/26/2022	**Tested By:**	Vang, Yang

Laboratory Data

Soaked Or Unsoaked	Soaked
Method Of Preparation	Other
Number Of Blows Per Lift	14
Surcharge (kg / lbs)	4.54 / 10
Average Molding Moisture Content (%)	12.1
Dry Density Molded (kg/m^3 / pcf)	1839 / 114.8
Percent Of Maximum Density	95.3
Swell (%)	0.0
Moisture Content Of Whole Specimen (%)	12.7
Moisture Content Of Top Inch (%)	14.0
Corrected Bearing Ratio At 0.1 inch	4.5
Corrected Bearing Ratio At 0.2 inch	5.3
Corrected Bearing Ratio At 0.3 inch	
Corrected Bearing Ratio At 0.4 inch	
Corrected Bearing Ratio At 0.5 inch	

Final Bearing Ratio (%): 4.5

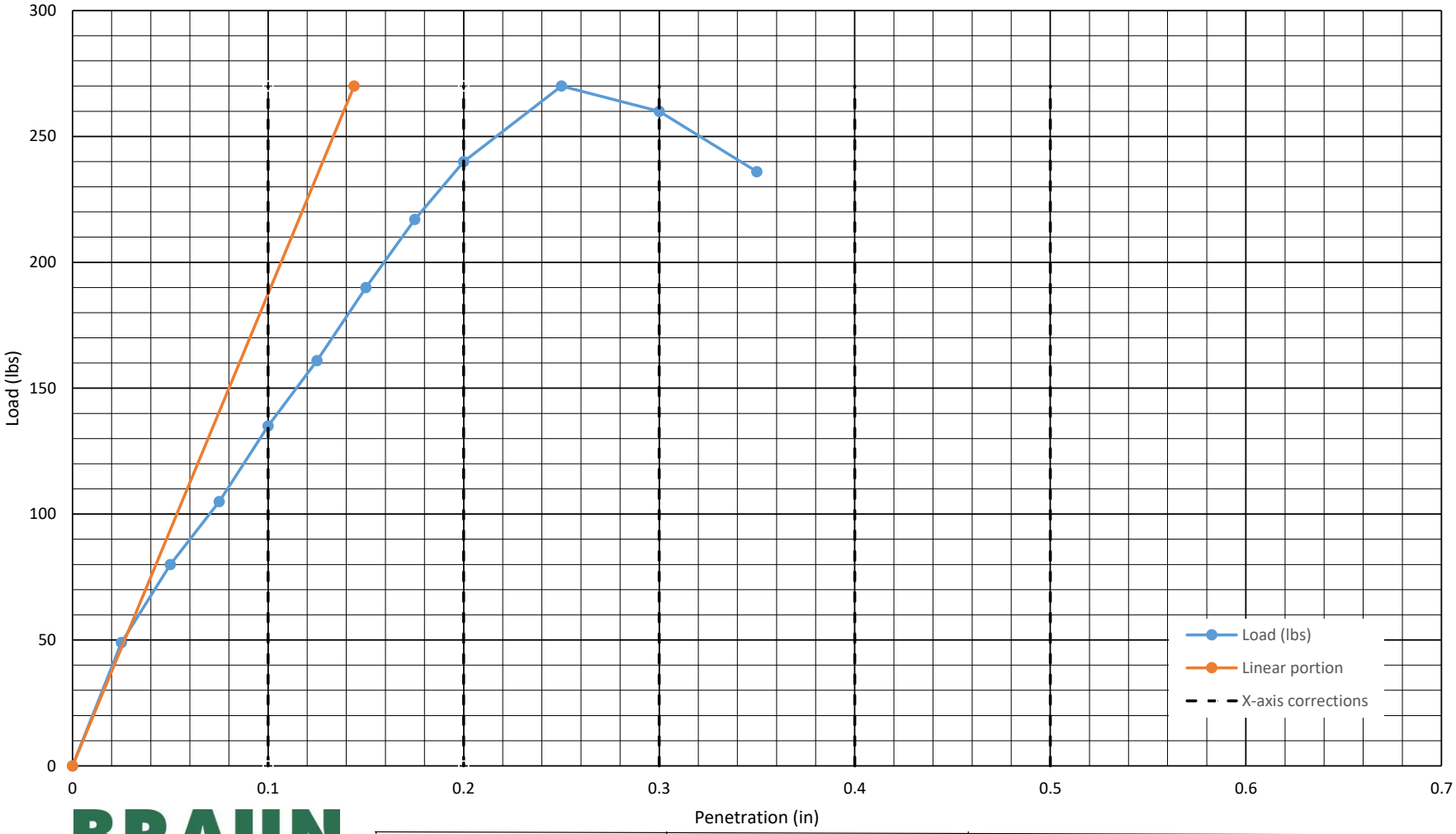
Soil Classification: SC Clayey sand

General

Results: The test is for informational purposes.

See 460007.pdf in the documents section at the end of this report.

CBR Load Graph



BRAUN INTERTEC
The Science You Build On.

Project Number	B2204326	% of Maximum	95.3	Classification	SC Clayey sand, fine to medium grained, brown
Sample Number	460007	Molding Moisture (%)	12.1		

BRAUN INTERTEC
The Science You Build On.

Standrd Proctor M-D Relationship

AASHTO T99

07/18/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

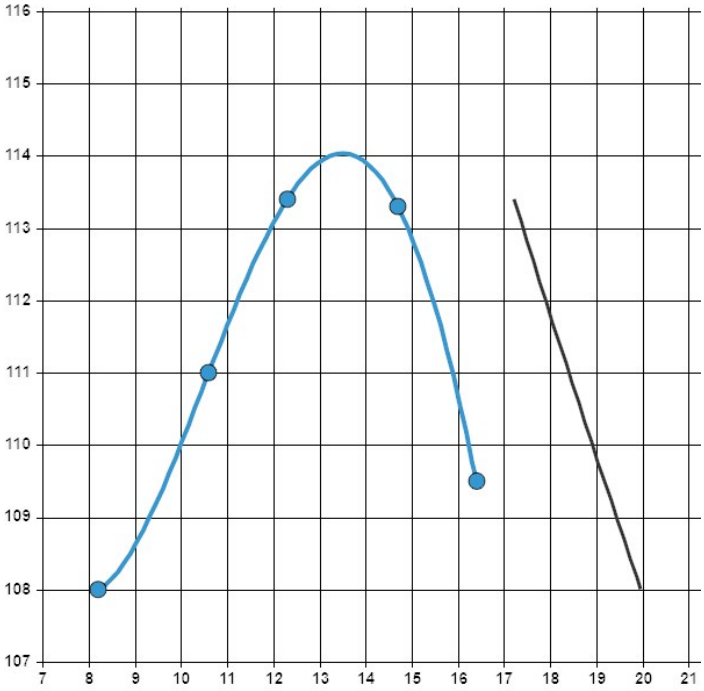
Client:
Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

Project:
B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number:	459995	**Depth (ft):**	4-8
Boring Number:	B-1	**Sampled By:**	Drill Crew
Sample Date:	07/11/2022		
Received Date:	07/18/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/18/2022	**Tested By:**	Caamano, Lenit

Laboratory Data



Proctor ID:	P-01-std
Maximum Dry Density (pcf):	114.0
Optimum Moisture (%):	13.5
Method:	Method A
Preparation Method:	Moist
Rammer Type:	Manual Round
Specific Gravity:	2.65
Specific Gravity Source:	Assumed

Passes #200 (%):	79.0	**Retained #200 (%):**	21.0
Retained On 3/4 (%):	0	**Retained On 3/8 (%):**	0
Retained On #4 (%):	0	**Passing #4 (%):**	100

Classification: CL Lean clay with sand, dark brown

General

Results: The % passing the #200 is for informational purposes only.

BRAUN INTERTEC
The Science You Build On.

Standrd Proctor M-D Relationship

AASHTO T99

07/18/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

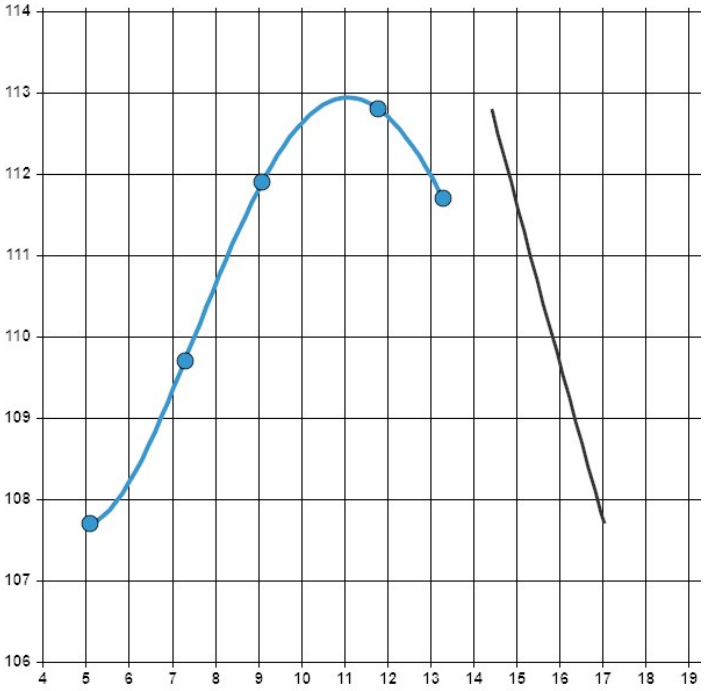
Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number:	459996	**Depth (ft):**	1-6
Boring Number:	B-4	**Sampled By:**	Drill Crew
Sample Date:	07/11/2022		
Received Date:	07/18/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/18/2022	**Tested By:**	Caamano, Lenit

Laboratory Data



Proctor ID:	P-02-std
Maximum Dry Density (pcf):	112.9
Optimum Moisture (%):	11.1
Method:	Method A
Preparation Method:	Moist
Rammer Type:	Manual Round
Specific Gravity:	2.45
Specific Gravity Source:	Assumed

Passes #200 (%):	15.0	**Retained #200 (%):**	85.0
Retained On 3/4 (%):	1	**Retained On 3/8 (%):**	2
Retained On #4 (%):	4	**Passing #4 (%):**	96

Classification: SM Silty sand, fine grained, dark brown

General

Results: The % passing the #200 is for informational purposes only.

BRAUN INTERTEC
The Science You Build On.

Standrd Proctor M-D Relationship

AASHTO T99

07/18/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

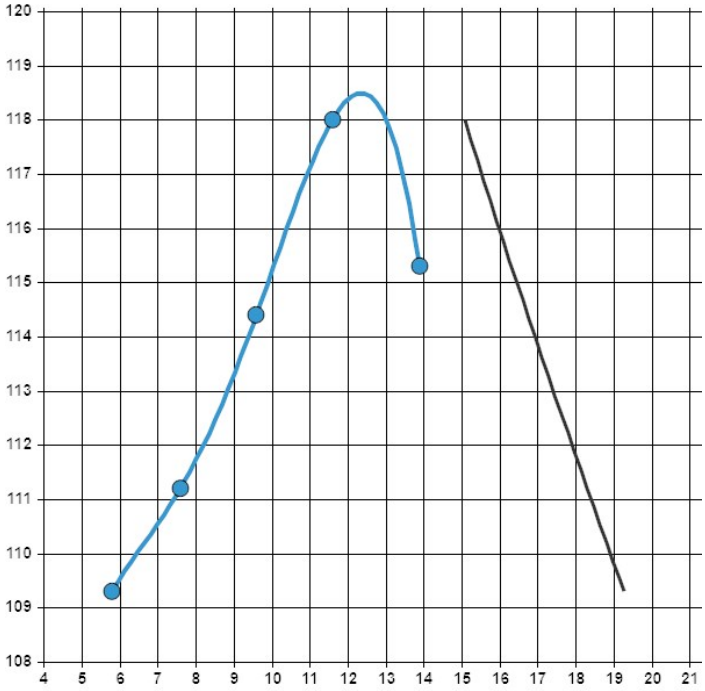
Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number:	459998	**Depth (ft):**	1-5
Boring Number:	B-5	**Sampled By:**	Drill Crew
Sample Date:	07/11/2022		
Received Date:	07/18/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/18/2022	**Tested By:**	Caamano, Lenit

Laboratory Data



Proctor ID:	P-03-std
Maximum Dry Density (pcf):	118.5
Optimum Moisture (%):	12.4
Method:	Method A
Preparation Method:	Moist
Rammer Type:	Manual Round
Specific Gravity:	2.65
Specific Gravity Source:	Assumed

Passes #200 (%):	44.0	**Retained #200 (%):**	56.0
Retained On 3/4 (%):	1	**Retained On 3/8 (%):**	5
Retained On #4 (%):	9	**Passing #4 (%):**	91

Classification: SM Silty sand, fine to medium grained, dark brown

General

Results: The % passing the #200 is for informational purposes only.

BRAUN INTERTEC
The Science You Build On.

Standrd Proctor M-D Relationship

AASHTO T99

07/18/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

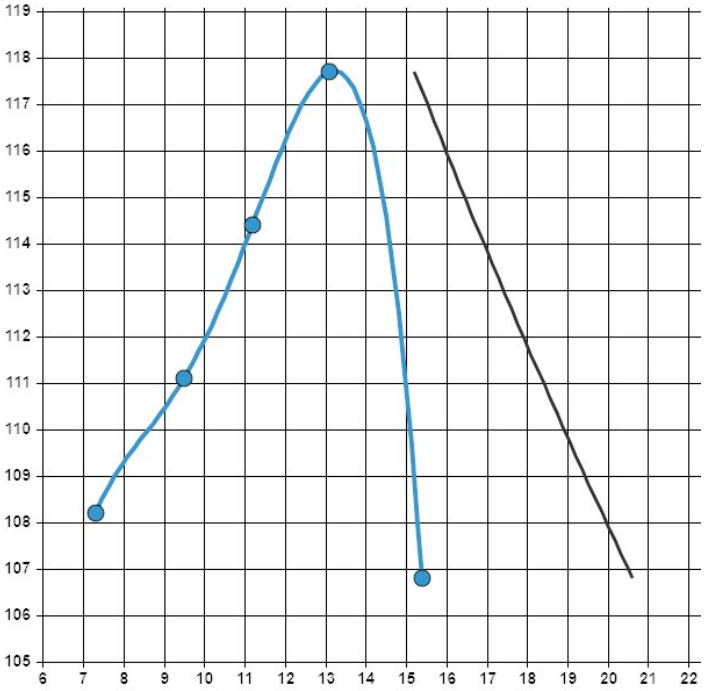
Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number:	459999	**Depth (ft):**	1-6
Boring Number:	B-6	**Sampled By:**	Drill Crew
Sample Date:	07/11/2022		
Received Date:	07/18/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/18/2022	**Tested By:**	Caamano, Lenit

Laboratory Data



Proctor ID:	P-04-std
Maximum Dry Density (pcf):	117.7
Optimum Moisture (%):	13.2
Method:	Method A
Preparation Method:	Moist
Rammer Type:	Manual Round
Specific Gravity:	2.65
Specific Gravity Source:	Assumed

Passes #200 (%):	51.0	**Retained #200 (%):**	49.0
Retained On 3/4 (%):	0	**Retained On 3/8 (%):**	0
Retained On #4 (%):	1	**Passing #4 (%):**	99

Classification: CL Sandy lean clay, dark brown

General

Results: The % passing the #200 is for informational purposes only.

BRAUN INTERTEC
The Science You Build On.

Standrd Proctor M-D Relationship

AASHTO T99

07/18/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

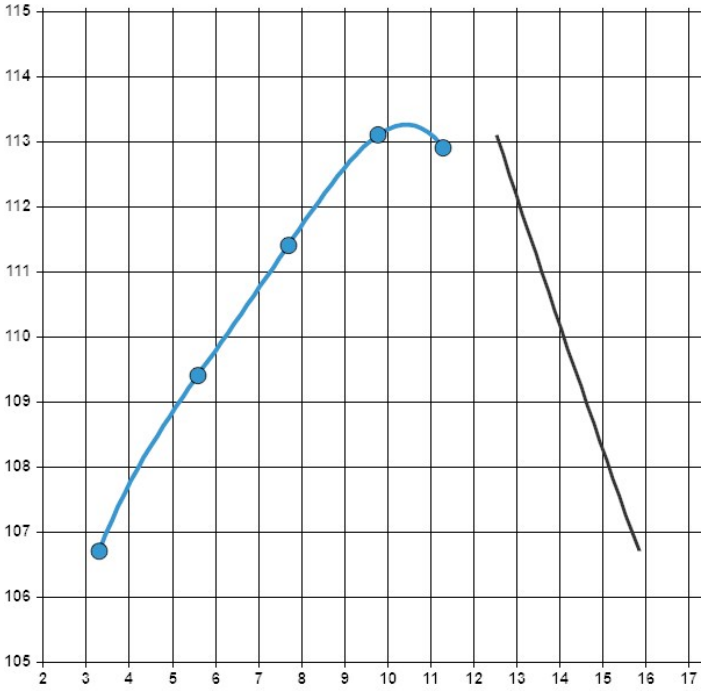
Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number:	460001	**Depth (ft):**	2-12
Boring Number:	B-7	**Sampled By:**	Drill Crew
Sample Date:	07/11/2022		
Received Date:	07/18/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/18/2022	**Tested By:**	Caamano, Lenit

Laboratory Data



Proctor ID:	P-05-std
Maximum Dry Density (pcf):	113.3
Optimum Moisture (%):	10.4
Method:	Method A
Preparation Method:	Moist
Rammer Type:	Manual Round
Specific Gravity:	2.35
Specific Gravity Source:	Assumed

Passes #200 (%):	12.0	**Retained #200 (%):**	88.0
Retained On 3/4 (%):	3	**Retained On 3/8 (%):**	11
Retained On #4 (%):	19	**Passing #4 (%):**	81

Classification: SM Silty sand with gravel, fine to medium grained, brown

General

Results: The % passing the #200 is for informational purposes only.

BRAUN INTERTEC
The Science You Build On.

Standrd Proctor M-D Relationship

AASHTO T99

07/18/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
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Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

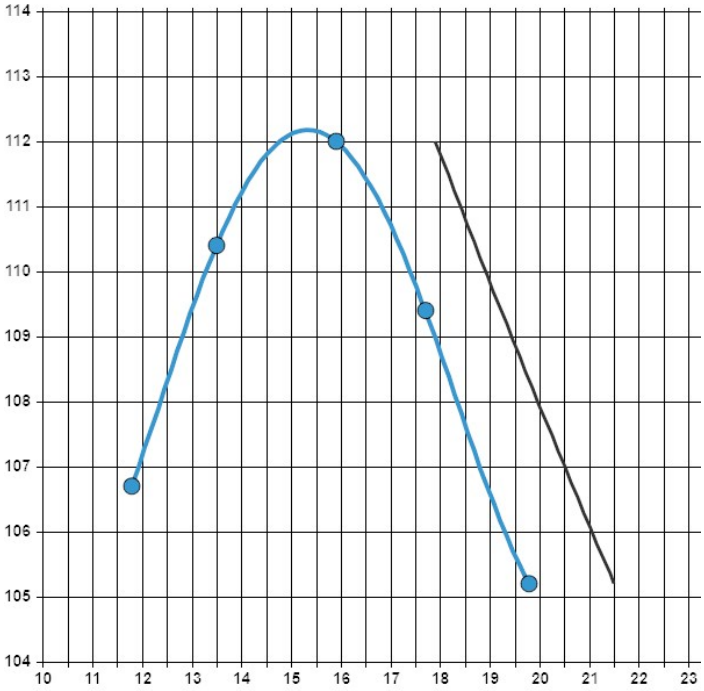
Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number:	460002	**Depth (ft):**	3-7
Boring Number:	B-11	**Sampled By:**	Drill Crew
Sample Date:	07/11/2022		
Received Date:	07/18/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/18/2022	**Tested By:**	Caamano, Lenit

Laboratory Data



Proctor ID:	P-06-std
Maximum Dry Density (pcf):	112.2
Optimum Moisture (%):	15.3
Method:	Method A
Preparation Method:	Moist
Rammer Type:	Manual Round
Specific Gravity:	2.65
Specific Gravity Source:	Assumed

Passes #200 (%):	82.0	**Retained #200 (%):**	18.0
Retained On 3/4 (%):	0	**Retained On 3/8 (%):**	0
Retained On #4 (%):	0	**Passing #4 (%):**	100

Classification: CL Lean clay with sand, dark brown

General

Results: The % passing the #200 is for informational purposes only.

BRAUN INTERTEC
The Science You Build On.

Standrd Proctor M-D Relationship

AASHTO T99

07/18/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
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Client:
Shive-Hattery, Inc
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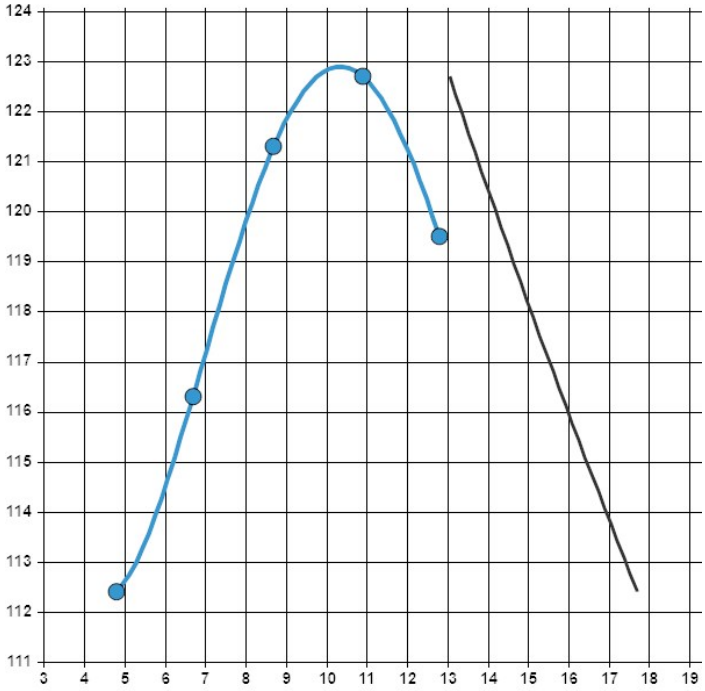
Cedar Rapids, IA 52406

Project:
B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number:	460004	**Depth (ft):**	1-7
Boring Number:	B-17	**Sampled By:**	Drill Crew
Sample Date:	07/11/2022		
Received Date:	07/18/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/18/2022	**Tested By:**	Caamano, Lenit

Laboratory Data



Proctor ID:	P-07-std
Maximum Dry Density (pcf):	122.9
Optimum Moisture (%):	10.3
Method:	Method A
Preparation Method:	Moist
Rammer Type:	Manual Round
Specific Gravity:	2.65
Specific Gravity Source:	Assumed

Passes #200 (%):	40.0	**Retained #200 (%):**	60.0
Retained On 3/4 (%):	0	**Retained On 3/8 (%):**	3
Retained On #4 (%):	12	**Passing #4 (%):**	88

Classification: SC Clayey sand, fine to medium grained, brown

General

Results: The % passing the #200 is for informational purposes only.

BRAUN INTERTEC
The Science You Build On.

Standrd Proctor M-D Relationship

AASHTO T99

07/18/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
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Client:

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222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

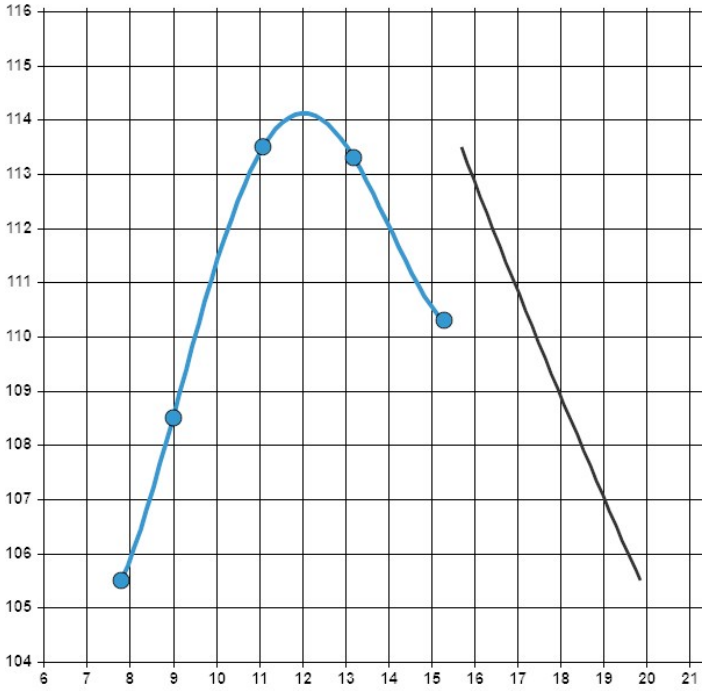
Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number:	460005	**Depth (ft):**	3-8
Boring Number:	B-22	**Sampled By:**	Drill Crew
Sample Date:	07/11/2022		
Received Date:	07/18/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/18/2022	**Tested By:**	Caamano, Lenit

Laboratory Data



Proctor ID:	P-08-std
Maximum Dry Density (pcf):	114.1
Optimum Moisture (%):	12.0
Method:	Method A
Preparation Method:	Moist
Rammer Type:	Manual Round
Specific Gravity:	2.55
Specific Gravity Source:	Assumed

Passes #200 (%):	73.0	**Retained #200 (%):**	27.0
Retained On 3/4 (%):	2	**Retained On 3/8 (%):**	2
Retained On #4 (%):	3	**Passing #4 (%):**	97

Classification: CL Lean clay with sand, dark brown

General

Results: The % passing the #200 is for informational purposes only.

BRAUN INTERTEC
The Science You Build On.

Standrd Proctor M-D Relationship

AASHTO T99

07/18/2022

Urbandale
10576 Justin Drive
Urbandale, IA 50322
Phone: (319) 423-0322

Client:

Shive-Hattery, Inc
222 3rd Avenue SE, Suite 300
Cedar Rapids, IA 52406

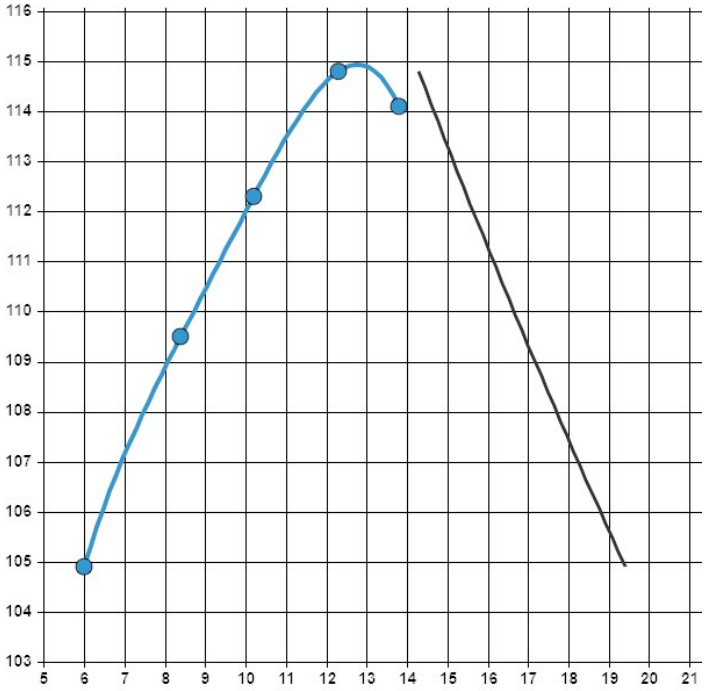
Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number:	460006	**Depth (ft):**	1.5-4
Boring Number:	B-25	**Sampled By:**	Drill Crew
Sample Date:	07/11/2022		
Received Date:	07/18/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/18/2022	**Tested By:**	Caamano, Lenit

Laboratory Data



Proctor ID:	P-09-std
Maximum Dry Density (pcf):	114.9
Optimum Moisture (%):	12.8
Method:	Method A
Preparation Method:	Moist
Rammer Type:	Manual Round
Specific Gravity:	2.50
Specific Gravity Source:	Assumed

Passes #200 (%):	67.0	**Retained #200 (%):**	33.0
Retained On 3/4 (%):	1	**Retained On 3/8 (%):**	2
Retained On #4 (%):	6	**Passing #4 (%):**	94

Classification: CL Sandy lean clay, dark brown

General

Results: The % passing the #200 is for informational purposes only.

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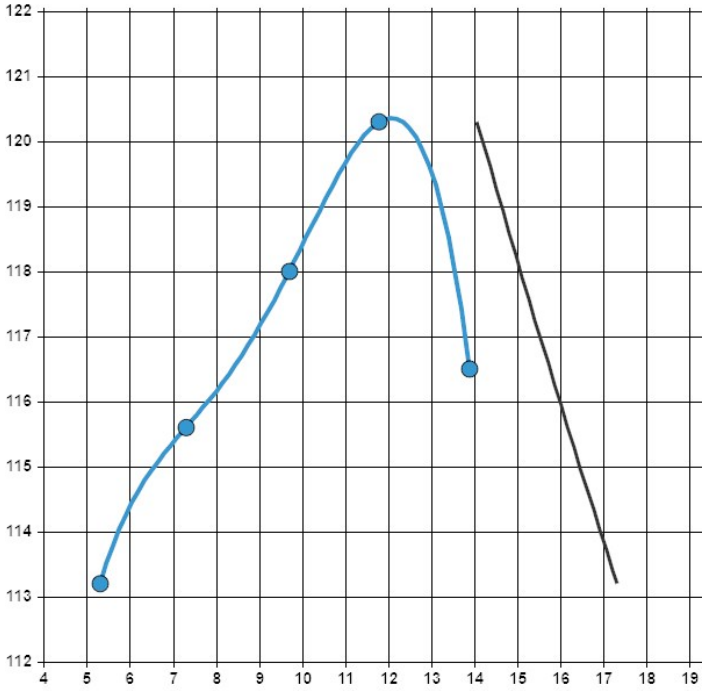
Project:

B2204326
HDP-1415(634)-71-23 Bluff Boulevard Reconstruction
Bluff Boulevard and College Avenue
Clinton, IA

Sample Information

Sample Number:	460007	**Depth (ft):**	1-4
Boring Number:	B-26	**Sampled By:**	Drill Crew
Sample Date:	07/11/2022		
Received Date:	07/18/2022	**Lab:**	11001 Hampshire Ave S, Bloomington, MN
Tested Date:	07/18/2022	**Tested By:**	Caamano, Lenit

Laboratory Data



Proctor ID:	P-10-std
Maximum Dry Density (pcf):	120.4
Optimum Moisture (%):	12.1
Method:	Method A
Preparation Method:	Moist
Rammer Type:	Manual Round
Specific Gravity:	2.65
Specific Gravity Source:	Assumed

Passes #200 (%):	40.0	**Retained #200 (%):**	60.0
Retained On 3/4 (%):	3	**Retained On 3/8 (%):**	5
Retained On #4 (%):	12	**Passing #4 (%):**	88

Classification: SC Clayey sand, fine to medium grained, brown

General

Results: The % passing the #200 is for informational purposes only.

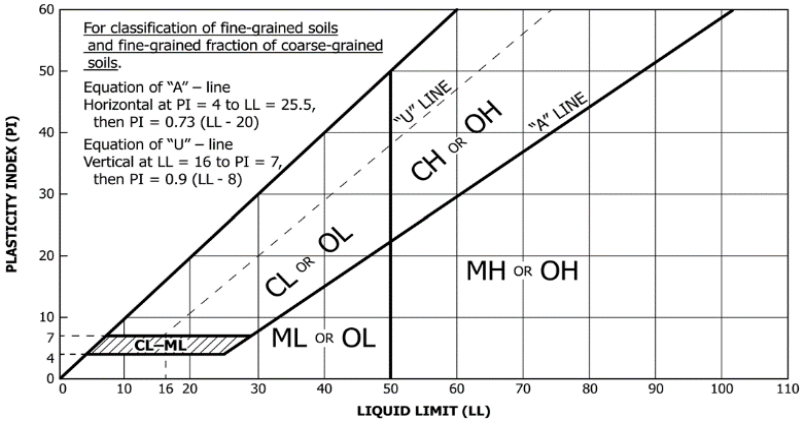
BRAUN INTERTEC
The Science You Build On.

Descriptive Terminology of Soil

Based on Standards ASTM D2487/2488
(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. 200 sieve)	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5% fines[C])	$C_u \geq 4$ and $1 \leq C_c \leq 3$[D]	GW	Well-graded gravel[E]
			$C_u < 4$ and/or ($C_c < 1$ or $C_c > 3$)[D]	GP	Poorly graded gravel[E]
		Gravels with Fines (More than 12% fines[C])	Fines classify as ML or MH	GM	Silty gravel[E F G]
			Fines Classify as CL or CH	GC	Clayey gravel[E F G]
	Sands (50% or more coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% fines[H])	$C_u \geq 6$ and $1 \leq C_c \leq 3$[D]	SW	Well-graded sand[I]
			$C_u < 6$ and/or ($C_c < 1$ or $C_c > 3$)[D]	SP	Poorly graded sand[I]
		Sands with Fines (More than 12% fines[H])	Fines classify as ML or MH	SM	Silty sand[F G I]
			Fines classify as CL or CH	SC	Clayey sand[F G 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 on or above "A" line[J]	CL	Lean clay[K L M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – 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	Liquid Limit – oven dried / Liquid Limit – 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. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
E. If soil contains ≥ 15% sand, add "with sand" to group name.
F. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
G. If fines are organic, add "with organic fines" to group name.
H. 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
I. If soil contains ≥ 15% gravel, add "with gravel" to group name.
J. If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
K. If soil contains 15 to < 30% 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.



Laboratory Tests

DD	Dry density, pcf	**q_p**	Pocket penetrometer strength, tsf
WD	Wet density, pcf	**q_U**	Unconfined compression test, tsf
P200	% Passing #200 sieve	**LL**	Liquid limit
MC	Moisture content, %	**PL**	Plastic limit
OC	Organic content, %	**PI**	Plasticity index

Particle Size Identification

Boulders..... over 12"
Cobbles..... 3" to 12"
Gravel
  Coarse..... 3/4" to 3" (19.00 mm to 75.00 mm)
  Fine..... No. 4 to 3/4" (4.75 mm to 19.00 mm)
Sand
  Coarse..... No. 10 to No. 4 (2.00 mm to 4.75 mm)
  Medium..... No. 40 to No. 10 (0.425 mm to 2.00 mm)
  Fine..... No. 200 to No. 40 (0.075 mm to 0.425 mm)
Silt..... No. 200 (0.075 mm) to .005 mm
Clay..... < .005 mm

Relative Proportions[L, M]

trace..... 0 to 5%
little..... 6 to 14%
with..... ≥ 15%

Inclusion Thicknesses

lens..... 0 to 1/8"
seam..... 1/8" to 1"
layer..... over 1"

Apparent Relative Density of Cohesionless Soils

Very loose ..... 0 to 4 BPF
Loose ..... 5 to 10 BPF
Medium dense..... 11 to 30 BPF
Dense..... 31 to 50 BPF
Very dense..... over 50 BPF

Consistency of Cohesive Soils	Blows Per Foot	Approximate Unconfined Compressive Strength
Very soft	0 to 1 BPF	< 0.25 tsf
Soft	2 to 4 BPF	0.25 to 0.5 tsf
Medium	5 to 8 BPF	0.5 to 1 tsf
Stiff	9 to 15 BPF	1 to 2 tsf
Very Stiff	16 to 30 BPF	2 to 4 tsf
Hard	over 30 BPF	> 4 tsf

Moisture Content:

Dry: Absence of moisture, dusty, dry to the touch.
Moist: Damp but no visible water.
Wet: Visible free water, usually soil is below water table.

Drilling Notes:

Blows/N-value: Blows indicate the driving resistance recorded for each 6-inch interval. The reported N-value is the blows per foot recorded by summing the second and third interval in accordance with the Standard Penetration Test, ASTM D1586.

Partial Penetration: If the sampler could not be driven through a full 6-inch interval, the number of blows for that partial penetration is shown as #/x" (i.e. 50/2"). The N-value is reported as "REF" indicating refusal.

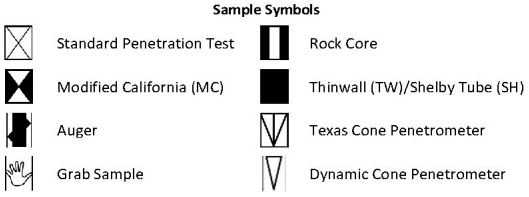
Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

WOH: Indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WOR: Indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

Water Level: Indicates the water level measured by the drillers either while drilling (▽), at the end of drilling (▼), or at some time after drilling (▼).

Sample Symbols



5/2021