Consulting Geotechnical Engineers
Environmental Science
Construction Management & Inspection
Construction Materials Testing
Hydrogeology/Groundwater Monitoring
Earth Instrumentation Services

CCG

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August 20, 2018
Project Number: 4976.001.18

Kaizen Collaborative
2390 Main Street
Tucker, Georgia 30084

Attention: Ms. Greta G. deMayo, PLA

RE: Subsurface Exploration
North Druid Hills Road Trailhead
Dekalb County, Georgia

Ladies & Gentlemen:

We have completed our subsurface exploration and are providing our recommendations, together with the results of our field testing and our conclusions based on them. This work was authorized by Ms. Greta G. deMayo, PLA.

If you should have any questions concerning this information, please feel free to call. It has been a pleasure working with you and we look forward to being of continued service to Kaizen Collaborative.

Sincerely,

CHATTAHOOCHEE CONSULTING GROUP, INC.

William T. Sheppard
Project Engineer

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REPORT OF SUBSURFACE EXPLORATION

NORTH DRUID HILLS ROAD TRAILHEAD RETAINING WALL

Dekalb County, Georgia

Prepared for:

KAIZEN COLLABORATIVE
2390 Main Street
Tucker, Georgia 30084

August 2018

Prepared by:

Chattahoochee Consulting Group, Inc.

Project No. 4976.001.18

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REPORT OF
SUBSURFACE EXPLORATION

NORTH DRUID HILLS ROAD TRAILHEAD
RETAINING WALL

Dekalb County, Georgia

The findings of this exploration are presented below, together with the analyses and conclusions based on them. The field and exploratory procedures are discussed in the Appendix.

PROJECT CONSIDERATIONS

1. Scope of Work - The purpose of this exploration was to determine the subsurface conditions in the area of the proposed retaining walls which will be constructed in conjunction with the North Druid Hill Road Trailhead of the Peachtree Creek Greenway. The composition and consistencies of the existing overburden soils were explored, as well as the depth to rock and groundwater at each of these areas. Appropriate recommendations are made in this report for the foundation designs.

2. Description of Project - Information for this project was provided by Ms. Greta de Mayo of Kaizen Collaborative and Mr. Jonathan McCaig of the Path Foundation. We understand that the North Druid Hill Trailhead will be located along the north side of North Druid Hills Road along the east side of Peachtree Creek The trailhead will consist of parking lot near the existing creek. In conjunction with the construction, retaining wall are proposed to transition the elevations from the adjacent Salvation Army Entrance Road to the proposed parking lot and trailhead elevation. We anticipate that the retaining walls will be cast-in-place concrete cantilevered walls, which will vary in height from less than 2 feet to approximately 16 vertical feet. The retaining walls are anticipated to be supported on shallow foundations, where the soil conditions allow and on deep foundations where the soils are unsuitable.

3. Limitations - The analyses and recommendations presented in this report are based on the preceding project information, as well as on the result of the exploration. While it is not likely that conditions will differ greatly from those observed in the boring, it is always possible that variations can occur between or away from the borehole locations. If it becomes apparent during construction that soil conditions differing significantly from those discussed in Paragraph (5) are being encountered, this office should be notified at once so that their effects can be determined and any remedial measures necessary be prescribed. Also, should the nature of the project change to a major degree, these recommendations may have to be re-evaluated. All testing was

performed in general compliance with ASTM guidelines. This report has been prepared for the exclusive use of Kaizen Collaborative and their consultants. No other third party beneficiaries may rely on this report without express written approval by CCG, Inc.

SITE CONDITIONS

4. Site Description - The project site is the proposed trailhead for the Peachtree Creek Greenway, located along the north side of North Druid Hills Road adjacent to the east side of the creek. At the time of this evaluation, the proposed trailhead property contained a brick building with an adjacent a parking area comprised of GAB. Retaining walls are currently proposed to transition the elevation from the Salvation Army entrance road, which will be configured in conjunction with the new trailhead to the lower elevation of the proposed trailhead parking lot.

The site is located in the Southern Piedmont Physiographic Province of Georgia. This Province is characterized as a broad, gently sloping plateau that decreases in total relief toward the Coastal Plain Province. The Piedmont is intricately dissected by a generally dendritic stream pattern. The topography is generally moderate, but commonly steeper near rivers and small creeks.

According to the mapping of the Georgia Geologic Survey, the rocks that occur in the general vicinity of the site belong to Clairmont Formation of the larger Atlanta Group and consist primarily of gneisses and amphibolites. This is generally consistent with the partially weathered rock materials encountered in the borings. Overlying these rocks are residual, or in-place, soils that have formed as a result of weathering. This weathering is a function of several factors such as mineral composition of the parent rock and degree of natural fracturing. As a result, these residual soils frequently are highly variable in consistency or relative density. Also, they often contain lenses of highly to partially weathered rock of variable sizes which occur at different depths. Residual soils that retain structural characteristics of the parent rocks, such as color and texture, are known as saprolites.

5. Soil Conditions - A total of six (6) hand auger borings were performed at the approximate locations requested as shown on the attached Boring Location Plan of Figure 1. The borings were located by our project engineer, who performed the hand auger borings and maintained logs of the borings. The boring logs indicate the depths, consistencies and field classification of the soils encountered during the drilling operations. Groundwater levels and any unusual subsurface conditions, if encountered during the drilling operations, are also described on the logs.

Dynamic Cone Penetrometer (DCP) tests were performed at appropriate intervals the borings, where rock fragments and weathered rock were not encountered.

Boring B-1 located in the northwest corner of the trailhead area, near the road encountered a surficial stratum of organic and rock ladened fill soils to a depth of approximately 2 feet below the existing grades. Underlying these surficial soils, a stratum of fill comprised of rocky Sands were present to a depth of approximately 3.4 feet below the existing grades where the boring refused on rock fragments in the fill. Several offset borings performed also refused on rock in the fill at depths of 1.5 to 3 feet below the existing grades. Borings B-2 and B-4, were both located in the area of the existing parking lot northwest of the existing building. These borings encountered similar soils generally consisting of a surficial stratum of graded aggregate base (GAB) to depths of 12 to 16 inches below the existing grades. The GAB was underlain by rock-ladened Sands to auger refusal on rock fragments at depths of 1.5 to 2 feet below existing grades. Boring B-3, located on the southeast side of the existing building encountered an upper stratum of fill soils comprised of loose, moist Silts and Sands with a trace to some topsoil and rock fragments to a depth of approximately 3 feet below the existing grades. These fill soils were underlain by residual soils comprised of firm to stiff, dry, brown Sandy Silts to the boring termination depth of 7 feet below existing grades. Borings B-5 and B-6 were also performed on the southeast side of the existing building, within the existing slope. These borings penetrated a surficial topsoil layer to a depth of approximately 6 inches, underlain by firm residual soils to a depth of 1.5 feet in boring B-5 and 2.5 feet in boring B-6, where hand auger refusal in hard partially weathered rock occurred.

For more precise details of the soil conditions encountered at each borehole, please refer to the individual boring logs in the Appendix.

6. Groundwater - The borings were dry augured their full depth in an attempt to locate groundwater levels. No groundwater was encountered in borings at the time of drilling. Groundwater levels are subject to seasonal and climatic fluctuations and can change significantly with time.

SEISMIC DESIGN PARAMETERS

7. Site Class - The project site is located in Brookhaven, Dekalb County, Georgia which employs the 2012 International Building Code® (IBC). As part of this Code, the design of structures must consider dynamic forces resulting from seismic events which are dependent upon the magnitude of the earthquake event, as well as the properties of the soils that underlie the site. As part of evaluating seismic forces, the Code requires the evaluation of the Seismic Site Class, which categorizes the site based upon the characteristics of the subsurface profile within the upper 100 feet of the ground surface.

To define the Site Class for this project, the results of soil test borings drilled for the project site and estimated appropriate soil properties below the base of the borings to a depth of 100 feet, were interpreted, as permitted by the Code. The estimated soil

properties were based upon our experience with subsurface conditions in the general site area.

Based upon the DCP N-values recorded during the field exploration, the subsurface conditions within the site are consistent with the characteristics of a **Site Class "D"** as defined in Table 1613.5.2 of the Code. The associated IBC (2012) probabilistic ground acceleration values and site coefficients for the general site area were obtained from the USGS U.S. Seismic Design Maps Web Application and are presented in the table below:

N. Druid Hills Road Trailhead Ground Motion Values *

Period (sec)	Mapped MCE Spectral Response Acceleration** (g)	Site Coefficients	Adjusted MCE Spectral Response Acceleration (g)	Design Spectral Response Acceleration (g)
0.25	S_S 0.190	F_a 1.6	SM_S 0.305	SD_S 0.203
1.0	S_1 0.091	F_v 2.4	SM_1 0.218	SD_1 0.145

**2% Probability of Exceedence in 50 years for Latitude 33.83316°N and Longitude 84.33384°W*
***At top of bedrock*
MCE = Maximum Considered Earthquake

The Site Coefficients, Fa and Fv presented in the above table were also obtained from the noted USGS webpage, as a function of the site classification and mapped spectral response acceleration at the short (Ss) and 1-second (S1) periods.

Based on Spectral Response Coefficients *SDs* and *SD1* above, the Seismic Design Category for this site is **Category C** for Occupancy Categories I, II and III as prescribed by IBC 2012, Tables 1613.3.5(1) and 1613.3.5(2).

RETAINING WALL FOUNDATION RECOMMENDATIONS

8. General – We understand that a retaining wall is proposed along the southeast side of the trail adjacent to North Druid Hills Road and two additional retaining walls will be constructed on either side of the proposed access road to transition the grades from the entrance drive to the Salvation Army property. The retaining walls are proposed to be up to 16 feet in height and are anticipated to be cast in-place concrete walls. The proposed retaining wall are anticipated to bear 1 to 2 feet below the existing grades. Shallow foundations should adequately support the retaining wall foundations in these areas. These soils exhibited allowable soil bearing pressures of 2500 pounds-per-square foot (psf).

9. Shallow Foundations - Based on the boring data, shallow foundations may be utilized to support the proposed retaining wall foundations. We anticipate that shallow

foundation bearing depths will bear approximately 2 feet below the proposed final grades. It should be noted that the fill and underlying rocky alluvial Sands encountered in borings B-1 and B-2 have the potential for difficult excavation, as well as areas of soft or unsuitable soils to be present away from the boring locations or below the refusal depths. It soft or unsuitable soils are encountered, these materials should be excavated to suitable bearing soils and the undercut areas backfilled with crushed stone. Due to the limited boring data, we recommend that test pits be performed to verify the depth to suitable soils in these areas. The proposed retaining wall located along the existing Salvation Army entrance drive will bear in firm residual soils comprising the existing slope. Where fill soils are present near the area of boring B-3, the foundations should be excavated to expose the underlying firm residual soils at depths of approximately 3 feet below existing grades. Where the retaining walls transition in height from the area of boring B-5 to B-4, we recommend that the foundations be over-excavated to expose the underlying hard partially weathered rock, for retaining walls between 8 and 16 vertical feet in height to help limit settlement. Retaining wall sections with wall heights between 4 and 8 vertical feet should be excavated through any alluvial soils present to bear in underlying firm residual soils. The over-excavated foundations may be backfilled with #57 stone to the proposed foundation bearing elevation. Expansion joints are recommended between the wall sections for foundations bearing on the stone backfill and partially weathered rock materials to help tolerate potential differential settlement.

10. Bearing Capacity - Shallow foundations supporting the proposed retaining walls are anticipated to bear in the firm to dense saprolitic soils. Maximum allowable bearing pressures of 2500 pounds per square foot are recommended to be used in the design of the proposed wall foundations.

MISCELLANEOUS

11 Settlement - We estimate total settlements for shallow foundations for the retaining wall foundations along North Druid Hills Road will be in the range of 1 inch. The settlement for the retaining wall along the entrance drive to the Salvation Army development that is anticipated to bear in firm residual soils and partially weathered rock will be in the range of 0.5 inch. The estimated settlement for the walls along the proposed access road will vary significantly as the grades transition from 2 to 16 vertical feet. The retaining walls supported on hard partially weathered (and stone backfill overlying partially weathered rock) for wall heights of 8 vertical feet and higher are anticipated to be less than 1 inch. Settlements of up to 1.25 inch are estimated for wall heights up to 8 vertical feet and bearing in firm residual soils. The majority of the estimated settlement should develop during construction and initial loading. The majority of settlement is anticipated to develop within approximately 60 to 90 days.

12. Retaining Wall Design Parameters - The proposed retaining walls can be categorized as free standing walls which can withstand slight lateral displacement. The

free standing walls should be designed for "active" lateral earth pressures. The earth pressure parameters outlined below are based on a wet soil density of 120 pounds per cubic foot (pcf) and an internal soil friction angle Ø of 30°.

Equivalent Fluid Pressure (Active) soil	40 psf per foot of wall height
Equivalent Fluid Pressure (Passive) soil	270 psf per foot of wall height
Coefficient of Friction (Sands)	0.35
Soil Angle of Internal Friction (Ø)	30°
Soil Cohesion (c)	0

An equivalent surcharge loading should be applied behind the wall where sloping backfill conditions exist. An appropriate factor of safety should be applied to the above parameters. Proper design and performance of retaining walls depend on properly compacted backfill soils and adequate drainage. The proposed retaining walls are anticipated to be backfilled. Where backfill soils are required we recommend that backfill soils be compacted to a minimum of 95% of the maximum Standard Proctor dry density (ASTM D 698) with a wet density in the range of 110 to 120 pcf. Also, footing drains with proper filtration should be installed.

13. Geotechnical Quality Control - We recommend that the following quality control measures be implemented in an effort to avoid unforeseen project costs or delays:

1. Chattahoochee Consulting Group should review all final construction plans to ensure that the geotechnical recommendations are properly implemented.

2. Evaluation of test pits prior to foundation excavations to verify the depth to suitable bearing materials and the allowable soil bearing pressures.

3. Evaluation of shallow foundation excavations immediately prior backfilling with stone and/or prior to foundation concrete placement to verify allowable soil bearing pressures.

4. Permanent fill slopes should not exceed 2(H):1(V).

5. Embankment fill should be placed in 6 to 8 inch thick loose lifts and compacted to a minimum of 95% of the appropriate maximum Standard Proctor dry density (ASTM D 698).

14. Consultation - Often, during the final design and/or construction, questions can arise which are not small specifically in the report. These can normally be handled by a brief call or conference with the designers; please feel free to call

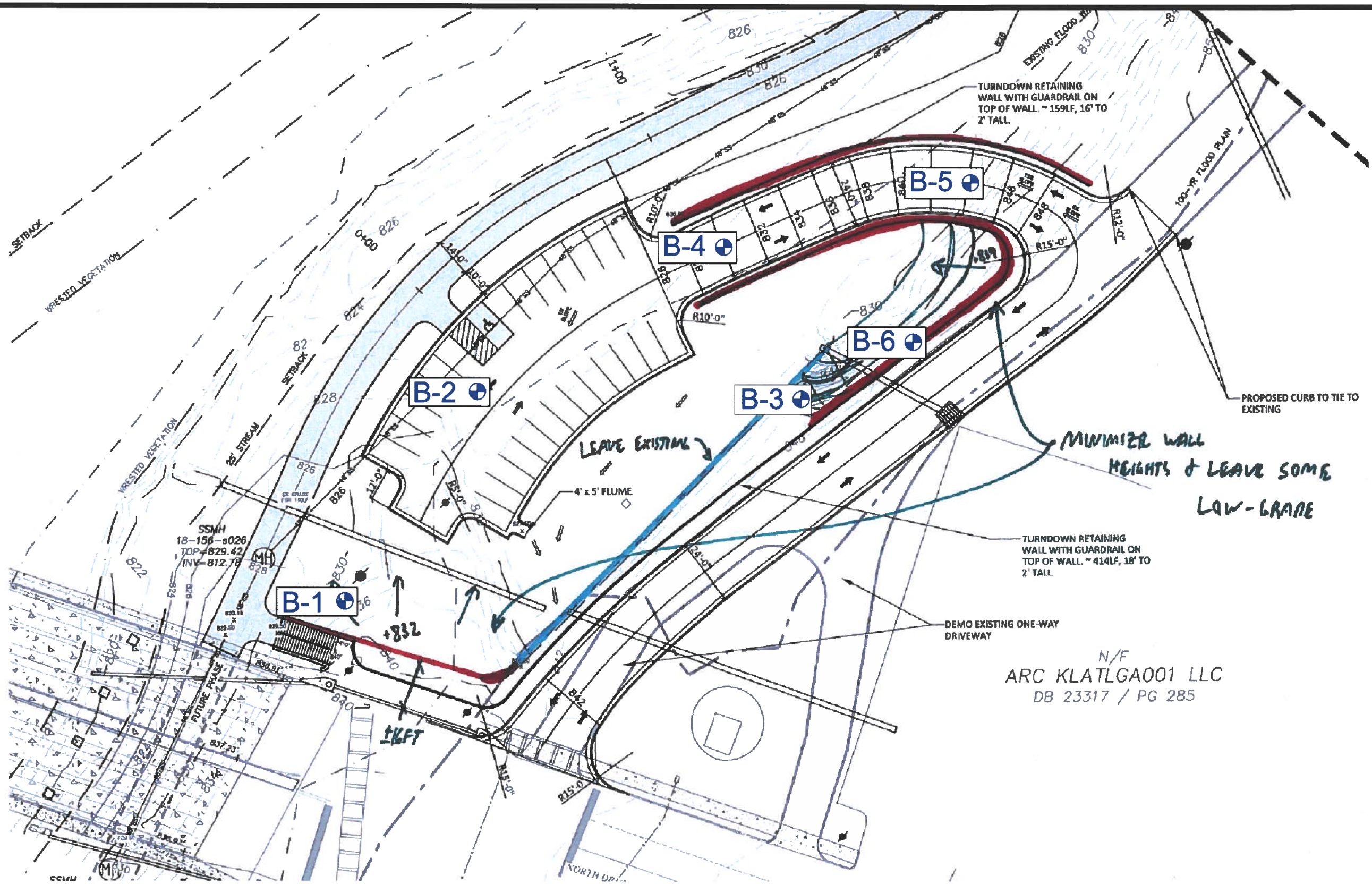
APPENDIX A

FIELD PROCEDURES

FIELD EXPLORATION

General. The Boring Plan of Figure 1 indicates the approximate location of the borings performed on the subject site. The borings were made with hand auger equipment on August 3rd and 15th, 2018. The exploration program consisted of approximately 25 linear feet of hand auger borings. Detailed logs of the boring are attached.

Sampling Procedures. In these soil materials, Dynamic Cone Penetrometer tests were performed in general accordance with ASTM Special Technical Publication No. 399. These tests provide a measure of the in-situ characteristics of the soils similar to the Standard Penetration Test. In this test, a 1.5 inch diameter cone on a 1-3/8 inch diameter "E" rod is driven into the undisturbed soil at the bottom of the borehole with a drop hammer weighing 15 pounds and having a fall of 20 inches. It is first seated 2 inches, then driven an additional 1.75 inch increment. The "Penetration Resistance", called N, is the number of such blows required to drive the cone the final 1.75 inches.



LEGEND

B-8 BORING LOCATION

CCG

NOT-TO-SCALE

DATE:	8/10/18
DWN.:	WTS
APPR.:	
REVIS.:	
PROJECT NO.:	4976.001.18

FIGURE NO. 1

KAIZEN COLLABORATIVE

NORTH DRUID HILL ROAD TRAILHEAD

BORING LOCATION PLAN