GEOTECHNICAL ENGINEERING REPORT

KCNA – Whittier Field
726 Kaighn Avenue
Block 405, Lot 1
Camden, NJ

Submitted To:

KIPP Team and Family Schools, Inc.
525 Clinton Street
Camden, NJ 08103

Murat Arkan, PE
Geotechnical Senior Engineer

Tristan Hall, EIT
Geotechnical Graduate Engineer

KCNAX23001
June 19, 2024

Pennoni

June 19, 2024

KCNAX23001

KIPP Team and Family Schools, Inc.
Attn: Mr. Douglas Chu
Director of Facilities and Real Estate
525 Clinton Street
Camden, NJ 08103

RE: Geotechnical Engineering Services
KCNA – Whittier Field
726 Kaighn Avenue
Block 405, Lot 1
Camden, NJ

Dear Mr. Chu:

We are pleased to submit our geotechnical engineering report for the proposed turf field and improvements to be constructed at 726 Kaighn Avenue located in Camden, NJ. Work was initiated in general accordance with the Scope of Services presented in our proposal dated November 10, 2023, revised December 11, 2023, and your subsequent authorization to proceed.

We trust that the information presented in this report is what you require at this time, and we thank you for the opportunity to assist you with this project. If you have any questions, or if you need any further assistance with this project, please contact this office at your earliest convenience.

Respectfully,

PENNONI ASSOCIATES INC.

Tristan Hall, EIT
Geotechnical Graduate Engineer

Murat Arkan, PE
Geotechnical Senior Engineer

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APPENDICES

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1.0 Executive Summary

The results of our geotechnical study are summarized below. The executive summary should be used in conjunction with the body of the report as it details our recommendations.

PROPOSED CONSTRUCTION AND SITE CONDITIONS		*SECTION(S)*
Proposed Construction	Proposed new 87,000 sf turf field, various improvements including bleachers, a scoreboard, asphalt paved parking lot with 60 spaces, toilet room facility, paved pedestrian paths, site lighting, and a perimeter fence. Proposed grading to vary between Elev. 10.0 and Elev. 15.0. Column and continuous wall loading assumed on the order of 25 kips and 0.5 to 2 kips/lf, respectively.	2.1
Surface Materials	Approximately 2 in. thick topsoil layer, with recycled concrete/construction debris in areas. Site is an existing open grassy lot, tree coverage along I-676, and monitoring wells throughout the site. Patches of gravel/recycled concrete throughout.	4.1, 4.3
Subsoils	*Stratum F* – Fill: Sand, varying amounts of Silt, Rock, Brick, Concrete, Glass, Metal Fragments, and Cinders (4 to 8 ft thick) *Stratum 1* – Sand, Clayey Silt lenses interbedded (all borings terminated in this stratum)	4.3
Field Work	Six SPT borings advanced to 10 to 30 ft below the ground surface.	3.1
Cuts/Fills	Shallow cuts and fills (less than 3 ft) are anticipated to achieve proposed grading.	5.1

RECOMMENDATIONS		*SECTION(S)*
Seismic Site Class	D – Stiff soil profile in accordance with IBC 2018.	5.5
Lift Thickness and Compaction Requirements	Fine Grained Soil – 8 to 10 in. thick layers loose measure; Granular Soil – 10 to 12 in. thick layers loose measure; Foundations/floor slab 98% (standard Proctor) or 95% (modified Proctor), depending on compaction equipment used. Pavements 95% (standard Proctor) or 93% (modified Proctor) depending on compaction equipment used.	5.1
Foundations	Shallow spread/strip footings or turned-down mat foundations, bearing on new fill or densified on-site soils, sized using a net allowable soil bearing capacity of up to 2,000 psf. Drilled pier/Sonotube foundations bearing in medium dense portions of Stratum 1 soils, with an allowable bearing capacity of 2,000 psf.	5.2
Settlement	Total and differential settlements anticipated to be less than 1.0 in. and ½ in., respectively.	5.4
Frost Depth	3 ft below finished exterior grades.	5.2
Groundwater (GW)	Encountered at depths of 5 to 20 ft (Elev. -7.0 to Elev. 7.5). Not anticipated to be encountered in shallow excavations for foundation construction. Sumps and pumps should be adequate to maintain stable conditions.	4.4, 5.7
Floor Slabs	Slab-on-grade above compacted fill or densified existing on-site soils.	5.3

2.0 Introduction

2.1 Proposed Construction

We understand that the proposed construction will consist of a turf field (approximately 87,000 sf) and various improvements, including bleachers, a scoreboard, an asphalt paved parking lot with approximately 60 spaces, toilet room facility, paved pedestrian paths, site lighting, and a perimeter fence. Proposed grading for the site will vary between Elev. 10.0 and Elev. 15.0.

The project is at the early stages of design and planning and specific details, such as foundation loads, are not yet available. However, for analysis purposes, we have assumed column and continuous wall loads for the facilities to be on the order of 25 kips and 0.5 to 2 kips/lf, respectively. Design loads (shear force, moment, axial compression, and axial uplift) for the scoreboard will need to be eventually provided to properly evaluate the foundations for this structure. Should the structural loading information differ in the future, Pennoni should evaluate the data with respect to the subsurface conditions at the project site to refine recommendations presented herein, if necessary.

2.2 Objectives

The objectives of this geotechnical study were to determine subsurface conditions at the project site, evaluate these conditions with respect to the proposed construction, and present our conclusions and recommendations. Our geotechnical engineering report includes the following:

- recommendations for foundation design, including discussion of alternate solutions if applicable, allowable bearing capacity and anticipated total and differential settlement amounts;
- design frost depth;
- feasibility of slab-on-grade;
- Soil Site Class for “general procedure” seismic analysis in accordance with IBC requirements;
- evaluation and determination of the earthwork requirements for use in preparation of the structures and paved areas, including material selection and placement operations;
- suitability of on-site material for re-use as fill as part of the site work for the project;
- removal or treatment of objectionable material;
- lateral earth pressure design parameters;
- groundwater conditions; and
- quality assurance, field-testing and observation during construction.

3.0 Field and Laboratory Work

3.1 Field Work

On May 15, 2024, six Standard Penetration Test (SPT) borings were drilled by F. M. & W. Drilling, Inc. at the approximate locations presented on the Test Location Plan, drawing TL-1. Samples were obtained in general accordance with ASTM D 1586 methods. Termination depths varied between 10 ft and 30 ft below current grades. Upon completion of the field program, the test borings were backfilled with a mixture of grout (cement) and soil cuttings in accordance with NJDEP requirements. Boring locations were selected and established in the field by Pennoni personnel. Appendix A includes the boring logs and the Test Location Plan (drawing TL-1).

Our M. Arkan, PE directed the field work; our T. Hall, EIT, provided full-time observations of the test borings.

3.2 Laboratory Work

The soil samples collected during our field study were delivered to our laboratory for testing. Table 1 below summarizes the geotechnical laboratory program.

Table 1: Geotechnical Laboratory Program

TEST	ASTM NO.	NUMBER OF TESTS
Moisture Content	D 2216	2
Sieve Analysis	D 422	2
Atterberg Limits	D 4318	1

Appendix B includes the laboratory testing results and a list of testing procedures.

4.0 Subsurface Characteristics

4.1 Location and Surface Features

The project site is located at 726 Kaighn Avenue in Camden, NJ. The site is bounded by Kaighn Avenue and one to three-story buildings to the north, by I-676 to the east, by Atlantic Avenue to the south, and by 7th Street to the west.

Figure 1: Site Location

Review of draft Preliminary Assessment / Site Investigation Report prepared by Langan Engineering & Environmental Services, dated February 15, 2024, disclosed that the project site was operated as a linoleum manufacturing plant, electric supplier, solar heating equipment production plant, and for electroplating operations between the late 1800s and 2004. Various buildings were constructed and demolished for these different operations. In 2004, tenant operations ceased and the final building present onsite was demolished in 2017, leaving an open, grassy field.

Currently, the ground cover within the site consists generally of an open, grassy field, with perimeter tree coverage along I-676 and monitoring wells spread throughout the site. Various patches of gravel/recycled concrete are present at the surface near the center and northwestern portions of the site. The topography of the site generally descends from the northwest corner to the east and to the south, with ground surface elevations varying approximately between Elev. 15.5 and Elev. 8.0. Evidence of overhead utilities traversing west to east at Liberty and 7th Streets were observed.

4.2 Geology

The project site is located within the Inner Coastal Plain Physiographic Province of New Jersey, which is characterized by relatively loose sedimentary materials, relatively flat terrain, underlain by sands and gravels of Cretaceous origin (about 100,000,000 years old) with meandering rivers which drain to Raritan or the Delaware River. The Inner Coastal Plain has been eroded down to older sediments richer and finer, such as clay and silts. The topography of this area can be characterized by rolling lowlands.

Available geological data indicate that the site is underlain by the Potomac Formation. The Potomac Formation consists of fine to coarse grained sand (locally gravelly) interbedded with white or variegated red and yellow, massive clay, and rarely dark-gray woody clay.

4.3 Subsoils

The borings generally disclosed an approximately 2 in. thick topsoil layer at the surface, with recycled concrete/construction debris mixed in various areas. The surficial topsoil layer was underlain by a manmade Fill layer, varying in thickness between 4 and 8 ft. The underlying subsoils, including the Fill, have been grouped into two principal strata based on their engineering properties and our interpretation of their origin. Brief strata descriptions are presented in Table 2 below.

Table 2: Strata Descriptions

STRATUM	THICKNESS (FT)	DESCRIPTION
F	4.0 – 8.0	FILL: Brown to black fine to medium to coarse SAND, with varying amounts of Silt, Rock, Brick, Concrete, Glass, and Metal Fragments, and Cinders; loose to very dense
1	--	Brown to gray fine to medium SAND, with Clayey Silt lenses interbedded; loose/medium stiff to medium denes/very stiff
Notes: All borings terminated in Stratum 1.		

4.4 Groundwater

Observations for groundwater were made in the borings during and shortly after drilling. Evidence of perched groundwater was encountered in borings B-1, B-4, and B-5 at depths of 7 to 9 ft below the ground surface (Elev. 3.5 to Elev. 7.5), possibly due to precipitation on the day of and prior to the field investigation. Evidence of the groundwater table was encountered in the borings at depths of 19 to 20 ft below the ground surface (Elev. -5.0 to Elev. -7.0). These observations are for the times and locations noted and may not be indicative of seasonal or daily fluctuations. Seasonal variations on the order of several feet should be anticipated.

Previous testing by Pennoni disclosed evidence of the groundwater table at depths of 12.5 to 13.0 ft (Elev. -1.8 to Elev. -0.2). Based on the Preliminary Assessment report, groundwater was encountered between 5 and 16 ft below the ground surface, with a localized high point in the northern central part of the site, beneath the former CWS building.

5.0 Analysis and Recommendations

5.1 Earthwork

Based on the proposed finish grades between Elev. 10.0 and Elev. 15.0, we anticipate shallow cuts and fills (less than 3 ft) will be required.

Prior to construction of new foundations, slabs-on-grade, and pavements, all existing topsoil/vegetation, concrete, construction debris, and existing pavements located within the proposed footprints should be removed. Any existing utilities located within the proposed construction area should be abandoned and relocated outside the proposed footprint. Any existing utility line abandoned in-place should be grouted, or the line should be removed and the trench appropriately backfilled.

Exposed subgrades should be thoroughly proof-rolled in the presence of a representative from Pennoni using a loaded dump truck or a minimum 10-ton vibratory roller. Where space is limited, subgrade soils should be manually probed in an attempt to disclose unstable surface areas. Any unstable surface areas (soft, yielding, etc.) found should be stabilized by excavating and replacing those soils with suitable soil that is adequately compacted. This can be accomplished by properly adjusting the moisture content of the subgrade soils and compacting them, or by other methods (placing a geotextile and stone layer, etc. or soil exchange).

Our experience indicates that the clean/inert and granular portions of the near surface soils can be reused for earthwork construction, provided it is free of deleterious material (i.e. organics, ash and cinders, etc.), debris larger than 3 in. in its greatest dimension, and there are no environmental concerns associated with the soils. Laboratory testing indicates that the near surface soils consist of up to 18% of fine-grained (silts/clays) material, with a moisture content of up to 8.8%, below the optimum moisture content normally associated with these types of soils to achieve the desired degree of compaction. These soils can be very moisture sensitive. Depending on the season that the earthwork operations are taking place, adjusting the moisture content of these on-site soils before use in any compacted fills and/or subgrade preparation may be required. Provisions for importing structural fill should be included in the contract documents. Proper compaction equipment and placing soil in thinner layers should be considered when preparing earthwork schedules.

Imported structural fill should be selected from suitable borrow sources and be approved by the Geotechnical Engineer well in advance of fill construction. Granular fill should ideally consist of well-graded material with not more than 20 percent passing the No. 200 sieve and have a plasticity index not greater than 8 percent; NJDOT I-5 or recycled concrete with a gradation similar to that described above with a maximum particle size of 3 in. can be considered and crushed aggregate such as AASHTO #57 stone should be considered for fill placement below groundwater levels. Other gradations can be considered based on laboratory testing and at the discretion of the Geotechnical Engineer.

Fine grained and granular fills should be placed in layers not exceeding 8 to 10 in. and 10 to 12 in. loose thickness, respectively. This criterion might be adjusted by the geotechnical engineer in the field depending on the conditions present at the time of construction, on the compaction equipment used, and on the fill materials selected. Table 3 presents the compaction requirements.

Table 3: Compaction Requirements

FILLS SUPPORTING	STANDARD PROCTOR (ASTM D698)	MODIFIED PROCTOR (ASTM D1557)
Foundations	98%	95%
Slab-on-Grade	98%	95%
Pavements	95%	93%

Fills should be compacted to ASTM D 1557 percentages of the laboratory determined maximum dry density, when self-propelled, heavy-duty construction equipment is used. Fills should extend a minimum of 5 ft beyond the exterior edge of a loaded area and have side slopes not steeper than 2 horizontal to 1 vertical.

Specifications for the frequency of compaction testing should meet the following criteria:

1. Paved Areas: Each compacted fill and backfill layer, at least one test for every 2,500 sq. ft. or less of paved area, but in no case fewer than three tests.
2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 ft or less of wall length, but no fewer than two tests.
3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 100 ft or less of trench length, but no fewer than two tests.

Specifications should indicate that the percentage of maximum dry density attained in the field is not the only criteria to be used for assessing fill compaction. Observation of the behavior of the fill under the loads of construction equipment should also be used. If the test results indicate that the percentage of compaction is being achieved, but the soil mass is moving under the equipment, placement of additional fill should not be continued until the movement is stabilized. Otherwise, settlement of the fill may occur.

5.2 Foundations

5.2.1 Bleachers / Restroom Building

Based on the results of our field exploration, laboratory testing, and our evaluations, it is our professional opinion that shallow spread/strip footing foundations or shallow turned-down mat foundations will be feasible to support the proposed bleachers and restroom building. Footings/mats can be designed to bear on newly compacted load bearing fill or densified site soils. All exposed foundation subgrades must be densified and checked by a qualified representative of the geotechnical engineer prior to placement of foundation reinforcing steel and concrete. Where soft, unstable, or unsuitable soils are encountered at the foundation subgrade levels, localized soil exchanges should be performed (discussed below).

Provided that the recommendations presented herein and in ***Section 5.1 Earthwork*** are followed, foundations that bear on new fill or densified on-site soils can be sized using a net allowable soil bearing capacity of up to 2,000 psf. Mat foundations can be designed with a modulus of subgrade reaction of 125 pci (based on a 1 ft square plate at the surface).

Isolated soil exchanges may be necessary if soft/loose areas are encountered. The unstable soils should be excavated and removed to a depth defined based on conditions encountered. The width of the excavation at the bottom should be equal to the footing width plus 1 ft for every 1 ft of depth excavated below the footing bottom. All exposed subgrades should be thoroughly densified using vibratory compaction equipment. The excavated fill should be replaced with suitable load-bearing structural fill (NJDOT I-5, recycled concrete, or similar) placed in layers and compacted as outlined in ***Section 5.1 Earthwork***. Prior to placement of new fills for any soil exchange, the exposed foundation subgrades should be densified and then checked by a qualified representative of the geotechnical engineer. Soft/loose or otherwise unstable areas should be further undercut as directed in the field.

Continuous and isolated footings should be at least 1.5 ft wide and 3 ft square, respectively, to prevent localized shear failure in soil. The subgrades of all exterior footings and any other foundation exposed to freezing temperatures during construction and/or the life of the structure should be established at least 3 ft below the adjacent exposed grades or otherwise protected against frost action.

Foundation subgrades should be examined by a representative of the Geotechnical Engineer to confirm conditions suitable for support of the design bearing pressure. Where an area is questionable, it should be further explored and/or remedied by removal and replacement of unsuitable material.

5.2.2 Scoreboard

Straight shaft drilled piers/Sonotube foundations terminating in medium dense portions of Stratum 1 may be used for the support of the proposed scoreboard. It is expected that the scoreboard will be subjected to significant overturning moments and lateral forces due to wind and potential earthquake loads. As of this writing, structural information regarding the wind loads and maximum moments are not available. The engineering soil properties recommended for use in the design of the scoreboard foundations are given in Table 4 (***Section 5.6 Lateral Earth Pressure Parameters***). An allowable end bearing pressure of 2,000 psf may be used in design.

We recommend that a temporary steel casing be provided in the upper approximately 4 to 6 ft of the pier excavation to prevent cave-in of the surface materials during construction, or as otherwise necessary.

Encountering seepage/groundwater during construction of the piers should be expected. Experience with pier construction and the test borings results indicate that water inflows should generally be adequately controlled by normal drilled pier construction techniques. The bottom of the drilled pier must be cleaned of all loose soil. Temporary surface casing should be extracted as concrete is placed, leaving an uncased shaft below grade. In addition, if slurry drilling is used, the “tremie” method of concrete placement under the slurry will have to be employed by an experienced drilled pier contractor to ensure satisfactory construction of the drilled pier. The concreting of the drilled pier should be done on the same day that it is drilled.

The drilled pier excavation should be carried out in the full-time presence of a qualified representative of the Geotechnical Engineer.

5.3 Floor Slab

Proposed new floor slabs can be constructed on-grade on the densified existing on-site soils and/or compacted new fill. Prior to placing the new fill and construction of the slab-on-grade, exposed subgrades should be adequately densified according to the recommendations presented in ***Section 5.1 Earthwork*** of this report. Isolated soil exchanges may be necessary if soft/loose areas are encountered. The unstable soils should be removed to a depth defined based on conditions encountered. Existing soils found to be unsuitable (wet, soft, unstable) should be removed.

The concrete slab-on-grade should be isolated from other structural elements to allow for independent movement or the slab should otherwise be designed accordingly. In addition, we recommend that the slab be provided with suitable keyed-control and/or construction joints at suitable spacings to ease out any tendency of cracking due to differential settlements arising from uneven loading conditions. In the design of the concrete slab-on-grade, a subgrade modulus (K_s) of 125 pci (based on a 1 ft square plate at the surface) may be used as representative of the new compacted fill or the densified on-site soils.

We recommend a free-draining granular base course layer (i.e., AASHTO No. 57 or NJDOT I-5) below the slab, as it will allow for the proper curing of the concrete slab and prevent curling, and to provide a stable subgrade that can be easily graded. A distance of at least 6 in. should be maintained between the bottom of the slab and the foundation tops to reduce the tendency for slab cracking at the foundation edges.

5.4 Settlement

Settlement of a soil mass is a function of the characteristics of the supporting soils (type of soil, void ratio, pre-consolidation, etc.), the thickness of the layer(s), and the stresses imposed on the soils by an applied load (fill, shallow foundations, floor slab, etc.). The stresses affecting subsoils generally decrease with increasing depth and are variable based on the magnitude and area of applied loading.

Provided that the recommendations discussed herein are followed, immediate and differential settlements are expected to be less than 1.0 in. and ½ in., respectively. Detrimental post-construction settlements are not expected if the recommendations presented herein are followed.

5.5 Seismic Site Classification

The borings disclosed subsurface conditions generally described according to the 2018 International Building Code (IBC), New Jersey Edition, Section 1613.3 referencing ASCE 7, Chapter 20, as having a soil-profile corresponding to Site Class D – Stiff soil profile. Site Class determination is based on the properties in the upper 100 feet of the ground surface. The borings performed herein were advanced to a maximum depth of 30 feet. Values beyond 30 feet were estimated based on our local experience in this area.

5.6 Lateral Earth Pressure Parameters

The soil parameters presented in Table 4 can be used to estimate lateral earth pressures on below grade structures and temporary shoring. If the top of the structure is restrained from movement, thereby preventing the mobilization of active soil pressures, the structure should be designed using the at-rest pressure coefficient, k_o.

The earth pressure coefficients are based on the assumption of vertical walls, horizontal backfill, no surcharges, no wall friction, and a safety factor of 1.0. Hydrostatic pressures associated with seepage must also be considered in the design. Depending on the type of retention system selected, active or at-rest coefficients should be used in the earth retention system design.

Table 4: Lateral Earth Pressure Parameters

PARAMETER	STRATUM F	STRATUM 1	ENGINEERED FILL (NJDOT I-5, or similar)
Unit Weight, pcf	120	125	135
Angle of Internal Friction, degrees	28	30	38
Cohesion, psf	---	---	--
Friction Factor (concrete)	0.34	0.36	0.47
k_a	0.36	0.33	0.24
k_o	0.53	0.50	0.38
k_p	2.77	3.00	4.20

If the contractor is responsible for the design of temporary or permanent retaining structures, then the contract documents should clearly require that a competent registered engineer perform the design and that satisfactory earth support is solely the contractor's responsibility. Furthermore, the contract documents should require the contractor to notify the engineer immediately if differing or unforeseen subsurface conditions are encountered during construction.

5.7 Groundwater and Surface Water Management

The groundwater observations made in the borings and from previous studies onsite indicate that free-standing water should not be encountered in shallow excavations anticipated for foundation construction. However, depending on the weather conditions during construction, wet conditions and/or seepage may be present. In the event that wet conditions and/or seepage are encountered due to perched water, sumps and pumps should be adequate to maintain stable conditions during foundation construction.

Foundations should be concreted the same day the excavation is made. Excavations for utilities should be backfilled as rapidly as possible after excavation. The foundation excavations should not be used as a detention basin or sump. During construction, surface runoff should be prevented from entering the excavations by creating soil berms or diversion swales along the perimeter if the excavation is expected to be open for a long period of time. Where ponding does occur, the water should be pumped immediately, and grades should then be established to prevent further ponding.

The subsurface material is considered susceptible to loss of strength and instability from excess moisture and construction traffic. Precipitation and surface water flows should not be permitted to accumulate on the exposed subgrades and construction traffic should be minimized over exposed subgrades.

5.8 Existing and Proposed Utilities

Any existing utilities located within the proposed construction areas should be abandoned and relocated outside the proposed building footprint. Any existing utility line abandoned in-place should be grouted or the line should be removed from the trench and appropriately backfilled.

5.9 Construction Difficulties

Experience has shown that remnant construction and obstructions are often encountered when building within previously developed sites. Encountering remnants of previous foundations should be expected during site excavation and foundation installation. If remnant foundations are still present, they should be totally removed below the bottom of the new foundations and slab-on-grade.

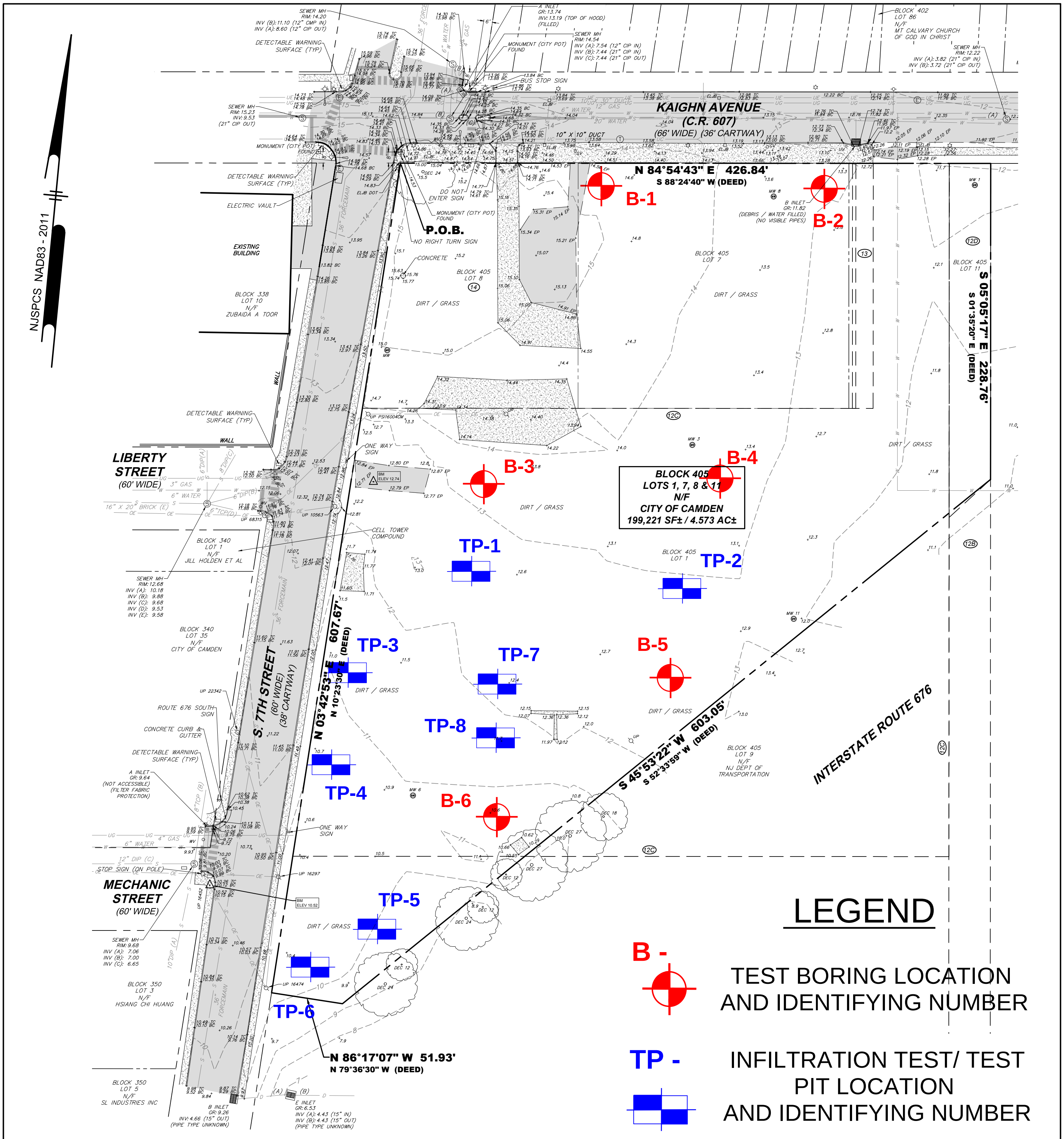
6.0 Recommendations for Further Geotechnical Services

Our experience on numerous construction projects is that the interests of the project team are best served by retaining the Geotechnical Engineer to provide construction observations during earthwork and foundation construction operations. To determine if soils, other materials, and groundwater conditions encountered during construction are similar to those encountered in the borings, and that they have comparable engineering properties or influences on the design of the structure, we recommend that Pennoni should provide field observation services during excavation; preparation of foundation subgrades; and installation/construction of foundations. Pennoni's Geotechnical Technology should review specifications for earthwork and foundation design/construction when they are prepared.

7.0 Limitations

This work has been done in accordance with our authorized scope of work and in accordance with generally accepted professional practice in the fields of geotechnical and foundation engineering. This warranty is in lieu of all other warranties either expressed or implied. Our conclusions and recommendations are based on the data revealed by this exploration. We are not responsible for any conclusions or opinions drawn from the data included herein, other than those specifically stated, nor are the recommendations presented in this report intended for direct use as construction specifications. This report is intended for use with regard to the specific project described herein; any changes in loads, structures, or locations should be brought to our attention so that we may determine how they may affect our conclusions. An attempt has been made to provide for normal contingencies, but the possibility remains that unexpected conditions may be encountered during construction. If this should occur, or if additional or contradictory data are revealed in the future, we should be notified so that modifications to this report can be made, if necessary. If we do not review relevant construction documents and witness the relevant construction operations, then we cannot be responsible for any problems that may result from misinterpretation or misunderstanding of this report or failure to comply with our recommendations. our virtual executive summary should be used for informational purposes only and should not be used for construction related purposes.

Appendix A:
Field Data



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KCNA - Whittier Field
726 Kaighn Avenue
Camden, NJ

Test Location Plan

KIPP Team and Family Schools, Inc.
525 Clinton Street
Camden, NJ 08103

PROJECT	KCNAX23001
DATE	5 JUNE 2024
DRAWING SCALE	NTS
DRAWN BY	TH
APPROVED BY	MA

TL - 1

SHEET 1 OF 1

TEST BORING LOG

TEST BORING B-1

CLIENT KIPP Team and Family Schools, Inc.
PROJECT NAME KCNA - Whittier Field
PROJECT NUMBER KCNAX23001
PROJECT LOCATION 726 Kaighn Ave, Camden, NJ
DATE STARTED 5/15/24 **COMPLETED** 5/15/24
GROUND ELEVATION 14.5' NAVD1988
DRILLING CONTRACTOR F.M. & W. Drilling Inc.
WATER ENCOUNTERED:
DRILLING METHOD Hollow Stem Auger
DURING DRILLING 7.0' / Elev 7.5' Perched
DRILLER / HELPER N. Sulmone/P. Helms/Z. Helms
AT END OF DRILLING --
LOGGED BY T. Hall **CHECKED BY** M. Arkan
AFTER DRILLING --

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS	STRATA	Depth	DESCRIPTION	Elev.	REMARKS
0	S-1	5	5-4-3-3	T	0.2	2" TOPSOIL	14.3	
	S-2	6	2-2-2-2	F	4.0	FILL: Brown to black F/M/C SAND, little Silt, trace Brick and Concrete Fragments	10.5	
5	S-3	15	4-5-6-4	1		Gray fine SAND and SILT		Moist
	S-4	18	3-2-3-3	1		Gray to brown fine SAND and CLAYEY SILT		Wet
10	S-5	18	3-3-3-4	1				
15	S-6	14	8-7-8-11	1		Light gray F/M SAND, little Silt		
20	S-7	16	6-5-6-8	1		Gray F/M SAND, little Silt		
25	S-8	20	5-7-7-7	1	25.0		-10.5	

Borehole terminated at 25.0 feet.

NOTES:

TEST BORING LOG

TEST BORING B-2

CLIENT KIPP Team and Family Schools, Inc.
PROJECT NAME KCNA - Whittier Field
PROJECT NUMBER KCNAX23001
PROJECT LOCATION 726 Kaighn Ave, Camden, NJ
DATE STARTED 5/15/24 **COMPLETED** 5/15/24
GROUND ELEVATION 13.0' NAVD1988
DRILLING CONTRACTOR F.M. & W. Drilling Inc.
WATER ENCOUNTERED:
DRILLING METHOD Hollow Stem Auger
∇ **DURING DRILLING** 20.0' / Elev -7.0'
DRILLER / HELPER N. Sulmone/P. Helms/Z. Helms
AT END OF DRILLING --
LOGGED BY T. Hall **CHECKED BY** M. Arkan
AFTER DRILLING --

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS	GRAPHIC LOG	STRATA	DESCRIPTION (Depth / Elev.)	REMARKS
0	S-1	22	6-9-9-9		T	0.2 — 2" TOPSOIL — 12.8	
					F	FILL: Brown F/M/C SAND, some Silt, trace Asphalt and Brick Fragments	
	S-2	20	6-5-6-5				
5	S-3	18	2-1-3-5			FILL: Brown to gray F/M/C SAND, little Clayey Silt (6.0 / 7.0)	Moist
	S-4	18	2-1-4-5		1	Gray to brown F/M SAND, some Clayey Silt	
	S-5	16	5-3-4-5			Gray fine SAND and SILTY CLAY	
10 (C)							
15	S-6	20	2-2-4-5			Dark brown CLAYEY SILT, litle fine Sand	Trace Oganic Odor
20 ∇	S-7	18	5-5-7-6			Gray F/M SAND, little Silt	Wet
25	S-8	24	4-4-6-6				Add mud
30	S-9	20	7-9-10-13			Brown to gray M/F/C SAND, little F/C Gravel, trace Silt (30.0 / -17.0)	

Borehole terminated at 30.0 feet.

NOTES:

TEST BORING LOG

TEST BORING B-3
PAGE 1 OF 1

CLIENT KIPP Team and Family Schools, Inc.
PROJECT NAME KCNA - Whittier Field
PROJECT NUMBER KCNAX23001
PROJECT LOCATION 726 Kaighn Ave, Camden, NJ
DATE STARTED 5/15/24 **COMPLETED** 5/15/24
GROUND ELEVATION 14.0' NAVD1988
DRILLING CONTRACTOR F.M. & W. Drilling Inc.
WATER ENCOUNTERED:
DRILLING METHOD Hollow Stem Auger
DURING DRILLING 19.0' / Elev -5.0'
DRILLER / HELPER N. Sulmone/P. Helms/Z. Helms
AT END OF DRILLING --
LOGGED BY T. Hall **CHECKED BY** M. Arkan
AFTER DRILLING --

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS	STRATA	Depth	DESCRIPTION	Elev.	REMARKS
0	S-1	8	10-30-50/5	T	0.2	2" TOPSOIL; RECYCLED CONCRETE	13.8	
	S-2	3	27-50/2	F		FILL: Brown to black to gray C/M/F SAND, some gravel size Rock Fragments, little Silt, trace Brick and Concrete Fragments		
5	S-3	6	14-7-4-4					
	S-4	0	3-2-3-4		8.0		6.0	
	S-5	8	6-8-7-8	1		Dark gray F/M SAND, little to some Silt		
10								
15	S-6	18	6-8-9-9			Gray to brown F/M SAND, little Silt, trace fine Gravel		Moist
20	S-7	22	8-10-11-14			Brown to gray F/M SAND, trace Silt		Wet
25	S-8	18	7-6-9-10		25.0		-11.0	

Borehole terminated at 25.0 feet.

NOTES:
Auger grinding and Obstructions in upper 4 ft encountered, offset location 3 times.

TEST BORING LOG

TEST BORING B-4

CLIENT KIPP Team and Family Schools, Inc.
PROJECT NAME KCNA - Whittier Field
PROJECT NUMBER KCNAX23001
PROJECT LOCATION 726 Kaighn Ave, Camden, NJ
DATE STARTED 5/15/24 **COMPLETED** 5/15/24
GROUND ELEVATION 13.0' NAVD1988
DRILLING CONTRACTOR F.M. & W. Drilling Inc.
WATER ENCOUNTERED:
DRILLING METHOD Hollow Stem Auger
▽ **DURING DRILLING** 7.0' / Elev 6.0' Perched
DRILLER / HELPER N. Sulmone/P. Helms/Z. Helms
▼ **AT END OF DRILLING** 20.0' / Elev -7.0'
LOGGED BY T. Hall **CHECKED BY** M. Arkan
AFTER DRILLING

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS	STRATA	Depth	DESCRIPTION	Elev.	REMARKS
0	S-1	3	6-6-7-5	T	0.2	2" TOPSOIL	12.8	
	S-2	4	7-11-8-8	F		FILL: Brown to gray to black F/M/C SAND, some gravel size Rock and Brick Fragments, little Silt		
5	S-3	2	5-5-4-3					
▽	S-4	6	2-2-3-4		8.0	FILL: Black C/M/F SAND and gravel size ROCK and CONCRETE FRAGMENTS, little Silty Clay	5.0	Wet
10	S-5	18	8-7-10-12	1		Dark gray brown F/M SAND, little Silt		Wet
15	S-6	20	8-7-8-9			Gray to brown F/M SAND, some Clayey Silt		
20 ▼	S-7	22	7-9-9-10			Gray to brown F/M SAND, trace Silt		Wet
25	S-8	24	10-13-15-17					
30	S-9	22	8-8-9-10		30.0	Brown to gray F/M SAND, trace Silt	-17.0	

Borehole terminated at 30.0 feet.

NOTES:

TEST BORING LOG

TEST BORING B-5

CLIENT KIPP Team and Family Schools, Inc.
PROJECT NAME KCNA - Whittier Field
PROJECT NUMBER KCNAX23001
PROJECT LOCATION 726 Kaighn Ave, Camden, NJ
DATE STARTED 5/15/24 **COMPLETED** 5/15/24
GROUND ELEVATION 12.5' NAVD1988
DRILLING CONTRACTOR F.M. & W. Drilling Inc.
WATER ENCOUNTERED:
DRILLING METHOD Hollow Stem Auger
∇ **DURING DRILLING** 9.0' / Elev 3.5'
DRILLER / HELPER N. Sulmone/P. Helms/Z. Helms
AT END OF DRILLING --
LOGGED BY T. Hall **CHECKED BY** M. Arkan
AFTER DRILLING --

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS	GRAPHIC LOG	STRATA	Depth	DESCRIPTION	Elev.	REMARKS
0	S-1	10	3-15-11-18		T	0.2	2" TOPSOIL	12.3	
	S-2	15	10-8-8-8		F	4.0	FILL: Black C/M/F SAND, some Glass, Brick, and Cinders, little Silt FILL: Brown to black F/M/C SAND, some Silt	8.5	
5	S-3	18	5-3-3-3		1		Brown F/M SAND, some Clayey Silt		
	S-4	20	5-5-6-6				Brown F/M SAND, some Silt		Moist
∇ 10	S-5	18	4-5-6-7			10.0		2.5	Wet

Borehole terminated at 10.0 feet.

NOTES:

TEST BORING LOG

TEST BORING B-6

CLIENT KIPP Team and Family Schools, Inc.
PROJECT NAME KCNA - Whittier Field
PROJECT NUMBER KCNAX23001
PROJECT LOCATION 726 Kaighn Ave, Camden, NJ
DATE STARTED 5/15/24 **COMPLETED** 5/15/24
GROUND ELEVATION 11.0' NAVD1988
DRILLING CONTRACTOR F.M. & W. Drilling Inc.
WATER ENCOUNTERED:
DRILLING METHOD Hollow Stem Auger
DURING DRILLING Not Encountered
DRILLER / HELPER N. Sulmone/P. Helms/Z. Helms
AT END OF DRILLING Not Encountered
LOGGED BY T. Hall **CHECKED BY** M. Arkan
AFTER DRILLING Not Encountered

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in.)	BLOW COUNTS	GRAPHIC LOG	STRATA	Depth	DESCRIPTION	Elev.	REMARKS
0					T	0.2	2" TOPSOIL	10.8	
	S-1	12	2-9-12-20		F		FILL: Brown to black F/M/C SAND, little F/C Concrete and Brick Fragments, little Silt		
	S-2	16	15-11-10-6			4.0		7.0	
5	S-3	18	4-4-3-4		1		Brown F/M SAND, little Silt		
	S-4	15	4-6-7-5						
10	S-5	18	5-8-8-6			10.0		1.0	

Borehole terminated at 10.0 feet.

NOTES:

Appendix B:
Laboratory Data

SUMMARY OF LABORATORY DATA

BORING NUMBER	SAMPLE NUMBER	DEPTH (ft)	SOIL GROUP SYMBOL	GRAIN SIZE DISTRIBUTION			PLASTICITY				MOISTURE CONTENT w %	VOLUMETRIC				COMPACTION DATA						SHEAR STRENGTH		
				GRAVEL %	SAND %	SILT/CLAY %	LIQUID LIMIT w_l	PLASTIC LIMIT wp	PLASTICITY INDEX I_P	LIQUIDITY INDEX I_L		SPECIFIC GRAVITY (G) (*) ASSUMED	DRY UNIT WEIGHT (pcf)	VOID RATIO (e)	DEGREE OF SATURATION %	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE CONTENT %	STANDARD/MODIFIED				UNCONFINED COMPRESSIVE STRENGTH (tsf)	COHESION (tsf)	AXIAL STRAIN (%)
B-2	S-6	14-16	ML	0	15	85	49	42	7	0.1	42.8													
B-6	S-1	0-4		19	63	18					5.7													
	S-2										8.8													

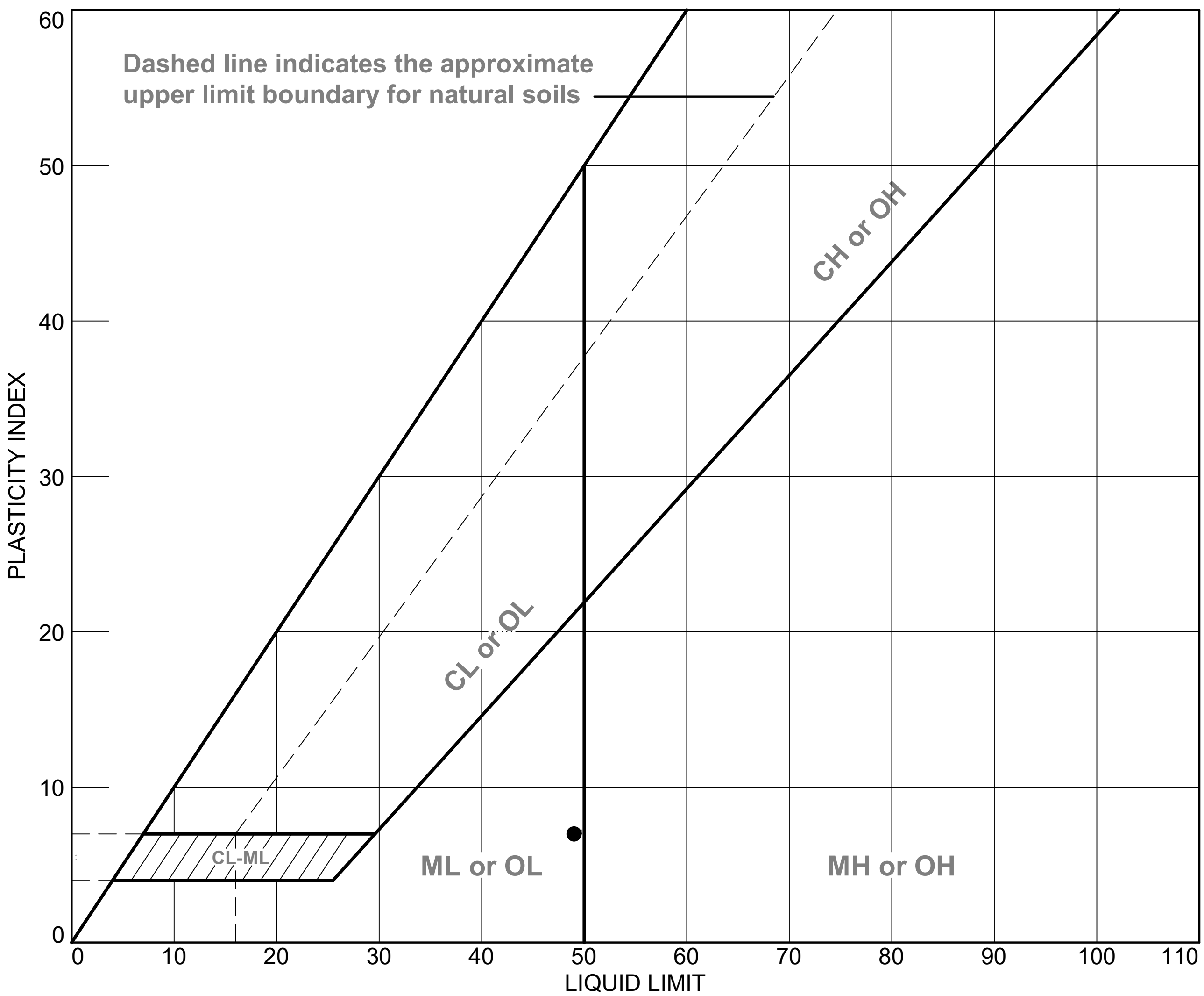
PENNONI ASSOCIATES INC.

DRAWN BY: MB DATE: 6/7/2024
CHECKED BY: MAP DATE: 6/7/2024

PROJECT: **KCNA - Whittier Field**
LOCATION: **726 Kaighn Avenue, Camden, NJ**

JOB No.: **KCNAX23001-02**
TABLE No.: **L-1**

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B-2	S-6	14-16'	42.8	42	49	7	ML

PENNONI ASSOCIATES INC.

Client: KIPP Team and Family Schools, Inc
Project: KCNA - Whittier Field

Project No.: KCNAX-23001.02 **Figure** A-1

Tested By: ADS **Checked By:** JTR

Particle Size Distribution Report

	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0	0	0	0	0	15	85	
□	0	3	16	5	13	45	18	

SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	B-2	S-6	14-16'	SILT LITTLE FINE SAND	ML
□	B-6	S-1 + S-2	0-4'	F/M/C SAND, LITTLE F/C GRAVEL, LITTLE SILT/CLAY	

PENNONI ASSOCIATES INC.

Client: KIPP Team and Family Schools, Inc
Project: KCNA - Whittier Field
Project No.: KCNAX-23001.02 **Figure** S-1

Tested By: BC **Checked By:** MAP

Appendix C:
Standard Symbols

TEST BORING/TEST PIT/AUGER PROBE LOG KEY SHEET

COLUMN	DESCRIPTION
Depth	Depth in feet below ground surface
Description	Description of sample including color, texture, and classification of subsurface material as applicable. Estimated depths to bottom of strata as interpolated from the boring are also shown.
Stratum	Strata numbers as assigned by the geotechnical engineer
Sample No.	Split barrel sample and sample number (S-x) Undisturbed Tube sample and sample number (U-x) Rock core run and core number (R-x) NR indicates no recovery
Blow Counts	For soils sample (ASTM D 1586): indicates number of blows obtained for each 6 inches penetration of the standard split-barrel sampler. For rock coring (ASTM D 2113): indicates percent recovery (REC) per run and rock quality designation (RQD). RQD is the sum of rock pieces that are 4 inches or longer in length in one core run divided by the total core run.
Recovery	For soil samples indicates the length of recovery in the sample spoon
Remarks	Special conditions or test data as noted during drilling

Ground Water: Free water level as shown ( )*; * Free water level as noted may not be indicative of daily, seasonal, or long term fluctuations.

DESCRIPTIVE TERMS

RELATIVE PROPORTIONS

Descriptive Term	Symbol	Estimated Percentages
Trace	tr	1 to 10
Little	l	10 to 20
Some	sm	20 to 35
And	and	35 to 50

GRADATION OF COARSE GRAINED COMPONENTS

Soil Component	Size Range	Particle Size Maximum	Particle Size Minimum
Boulders		-	12"
Cobbles		12"	3"
Gravel	Coarse	3"	¾"
	Fine	¾"	#4 Sieve
Sand	Coarse	#4 Sieve	#10 Sieve
	Medium	#10 Sieve	#40 Sieve
	Fine	#40 Sieve	#200 Sieve
Silt		#200 Sieve	.005 mm
Clay		.005 mm	-

COMPOSITION OF COARSE-GRAINED COMPONENTS

Gradation Designation	Symbol	Defining Proportions
Coarse to Fine	CF	All fractions greater than 10% of the component
Coarse to Medium	CM	Less than 10% Fine
Medium to Fine	MF	Less than 10% Coarse
Coarse	C	Less than 10% Fine and Medium
Medium	M	Less than 10% Coarse and Fine
Fine	F	Less than 10% Coarse and Medium

LABORATORY TESTING PROCEDURES

All testing is either done in accordance with the indicated ASTM Designation-latest edition, or with other standard or generally accepted engineering practice as described:

1. Consolidation Test of Soils
   Preparation of samples and testing procedures generally follow the methods described in Lambe, op. Cit. In addition, the time of loading may be selected on the basis of:

   a. Controlled rate of percent of consolidation
   b. Controlled pore pressure gradient
   c. Controlled strain

   The method of test is selected to suit the soil type in question and the test is conducted in accordance with generally accepted engineering practice.

2. Atterberg Limits – Plasticity Indices
   a. Liquid limit of soils, ASTM D 4318
   b. Plastic limit and plasticity index of soils, ASTM D 4318
   c. Shrinkage factors of soils, ASTM D 427

   (Moisture content is also determined with the Atterberg Limit test, and liquidity index is also computed)

3. Moisture Content of Soil
   ASTM D 2216

4. Particle Size Analysis of Soils
   ASTM D 421, Dry preparation of soil samples; ASTM D 422, Sieve and/or hydrometer analysis.

5. Triaxial Compression Test of Soils
   Sample preparation, apparatus, and testing generally follow the procedures outlined in Soil Testing for Engineers, T.W. Lambe, John Wiley & Sons, Inc., New York, 1951 and in The Measurement of Soil Properties in the Triaxial Test, Alan W. Bishop & D.J. Henkel, 2nd Edition, St. Martin's Press, New York, 1962

6. Unconfined Compression Strength of Cohesive Soil
   ASTM D 2166

7. Specific Gravity of Soils
   ASTM D 854

8. Unit Weight Determination of Soils
   See ASTM D 2166 for preparation of specimen except that sample size may differ. For moisture content see ASTM D 2216.

9. Visual Identification of Soil Samples
   All soil samples are visually identified and/or classified. The classification system used is shown in Table L-1.

10. Identification of Rock
    Rock core samples are identified by the character and appearance of newly fractured surfaces of unweathered pieces, by core conditions and characteristics, and by the determination of simple physical and chemical properties.

11. Compaction Test of Soils
    a. Moisture-density relations of soils using 5.5 lb. hammer and 12 in. drop, ASTM D 698
    b. Moisture-density relations of soils using 10 lb. hammer and 18 in. drop, ASTM D 1557

12. Maximum and Minimum Densities of Granular Soils
    Testing procedures follow D.M. Burmeister, "Suggested Method of Test for Maximum and Minimum Densities of Granular Soils" cited in Proceedings for Testing Soils, Fourth Edition, ASTM, Philadelphia. 1964, pp 175-177.

13. Bearing Ratio of Laboratory Compacted Soils
    ASTM D 1883 (Sometimes called California Bearing Ratio or CBR)

14. Organic Content
    A modified dichromate oxidation method using ferrous ammonium sulfate is employed in determining the percent of organic matter in soil.

STANDARD SYMBOLS

B	Width of footing
c	cohesion
c_v	coefficient of consolidation
C_c	compression index
C	coefficient of secondary compression
C_3	swelling index
C_u	uniformity coefficient (D_{60}/D_{10})
CBR	California Bearing Ratio
D_f	depth of foundation
D_p	diameter of grain corresponding to percentage p on grain size curve
D_{10}	effective grain size
E	modulus of linear deformation
E_s	Young's Modulus
e	void ratio
F_s	factor of safety
G	specific gravity
h	hydraulic head
H	stratum thickness
i	hydraulic gradient
I_L	liquidity index
I_P	plasticity index
k	coefficient of permeability
k_h	coefficient of horizontal subgrade reaction
k_v	coefficient of vertical subgrade reaction
l	length of footing
n	porosity

P	deviator stress
P_c	estimated probable preconsolidation pressure
P_o	existing overburden pressure
q_a	allowable soil bearing pressure
Q	triaxial compression test unconsolidated and undrained
Q_c	triaxial compression test consolidated and undrained
S	triaxial compression test consolidated and drained
S_r	degree of saturation
υ	pore-water pressure
U	degree of consolidation
U_c	unconfined compression test
w_f	moisture content at end of test
w_l	liquid limit
w_n	natural moisture content
w_p	plastic limit
γ	unit weight
γ_d	dry unit weight
γ_b	submerged unit weight
ε	unit linear strain
ε_f	unit linear strain at failure
σ	normal stress
σ_1	major principal stress
σ_3	minor principal stress
τ	shear stress
ϕ	angle of internal friction
k_a	coefficient of active pressure
k_p	coefficient of passive pressure
δ	friction angle
$\tan \delta$	friction factor