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SOILS AND FOUNDATION INVESTIGATIO
PROPOSED FIELD HOUSE ADDITION
Wayne, Passaic County, New Jersey
William Paterson University

October 3, 2022
File No. 26.0092769.00

PREPARED FOR:
Settembrino Architects
37 East Washington Avenue
Atlantic Highlands, New Jersey 07716

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October 3, 2022
File No. 26.0092769.00

Settembrino Architects
37 East Washington Avenue
Atlantic Highlands, New Jersey 07716

Attention: Mr. Kevin Settembrino, AIA, LEED AP
Principal

Report
Soils and Foundation Investigation
Proposed Field House Addition
Wayne, Passaic County, New Jersey
William Paterson University

Introduction

This report presents the results of a soils and foundation investigation performed by GZA GeoEnvironmental, Inc. (GZA) for a proposed field house building addition which may be constructed for William Paterson University. The University has an address of 300 Pompton Road in Wayne, Passaic County, New Jersey as shown on the Site Location Map, Plate 1. Our work was performed in general accordance with our proposal dated May 6, 2022, executed on August 29, 2022.

Proposed Construction

Conceptual plans provided to us indicate that the existing Wightman field house building would be retrofitted and include a new addition located along the western side of the building. The field house is located at the southern end of Wightman Stadium and track. The new addition would be approximately 4,000 square feet in

plan area containing fitness and training areas. It is anticipated that the floor level would match the existing building's floor level.

Background

An investigation was performed by Melick-Tully and Associates, P.C. (MTA) in 1992 for the addition to the original field house building in which six supervised test pits was performed. The test pits encountered fill materials extending to approximately 3 to 5 feet below the ground surface (bgs) followed by buried topsoil in several of the test pits which was further underlain by native clayey silts and sands and gravels. Copies of the MTA test pit logs are provided as Appendix I to this report.

Purpose and Scope of Work

The purpose of our services was to:

1) explore the subsurface soil, rock and groundwater conditions within accessible areas of the proposed addition;

2) estimate the relevant geotechnical engineering properties of the encountered materials;

3) evaluate the site foundation requirements considering the anticipated structural loads and encountered subsurface conditions;

4) recommend an appropriate type of foundation for support of the proposed addition, and provide geotechnical-related foundation design and installation criteria, including an estimate of the Site Class as defined by the International Building Code 2018, New Jersey Edition, for seismic design purposes;

5) provide recommendations for the support and the need for subdrainage of the lowest level floor slab; and

6) discuss general earthwork operations or considerations consistent with the proposed construction and encountered subsurface conditions.

To accomplish these purposes, a subsurface exploration program consisting of five supervised test pits (TP-101 through TP-105) was performed. In addition, we reviewed the MTA test pit logs from 1992 that were performed for the field house. The test pits performed for this study were excavated using a John Deere 410 rubber tire backhoe and extended to depths ranging from approximately 7 to 12 feet bgs. The approximate locations of the explorations performed by GZA and explorations performed by MTA are presented on the Plot Plan, Plate 2.

All field work was performed under the direct technical observation of a representative from GZA. Our representative located the explorations in the field from existing site features, maintained continuous logs of the explorations as the work proceeded and obtained representative bulk samples for identification and testing purposes.

Detailed descriptions of the subsurface materials encountered in the explorations are presented on the Logs of Test Pits, Plates 3A through 3E. The soils encountered in the explorations were visually classified in general accordance with the Unified Soil Classification System described on Plate 4.

All soil samples obtained from the explorations were brought to our office for further examination in our soil mechanics laboratory. Selected soil samples were subjected to laboratory testing consisting of moisture content determinations and gradation analyses to aid in their identification and evaluation of engineering properties. The results of the moisture content tests are presented on the appropriate exploration logs, while the gradation tests are presented on Plate 5, Gradation Curves.

The results of our subsurface explorations and laboratory testing program have provided the basis for our engineering analyses and geotechnical design recommendations. The following discussions of our findings and recommendations are subject to the Limitations attached as Appendix II to this report.

Site Conditions

Surface Features: The existing Wightman field house building is located at the southern end of Wightman stadium, and north of the Ben Shahn Center for the Visual Arts. The field house building was originally constructed as a hexagon shaped building. Sometime between 1995 and 2002 a rectangular addition was constructed along the western edge of the hexagonal building. The new addition would be located west of the existing facilities (west of the prior addition) and would be located in existing lawn areas. Concrete sidewalks, and scattered trees are also present within the addition area. Numerous utilities are also present throughout the addition area, some evident from the surface. Generator equipment atop concrete equipment pads and a sidewalk are located along the western edge of the existing facility which prevent a test pit from being excavated adjacent to the building. The scoreboard for the stadium is also located at the northern end of the lawn area at the edge of a chain link fence.

Topographic information was not provided to us; however, the ground surface is relatively level with the floor level of the existing facilities. Grades slope upward several feet to the stadium track at the northern end of the lawn area, near the scoreboard and chain link fence.

Subsurface Conditions: The test pits were performed within the existing lawn area and encountered 10 to 12 inches of topsoil at the ground surface. Gravelly sand fill materials were encountered in each of the test pits and extended to depths of approximately 2 to 4 feet bgs, with the exception of Test Pit 104

in which the fill extended the full depth explored (7 feet) due to the test pit being performed within the backfill envelope of a utility crossing. The test pit was terminated atop a water main pipe at 7 feet. The fill materials were underlain by native medium dense to dense gravelly sands. The gravelly sands extended to depths of approximately 6 to 8 feet bgs. Stiff clayey silts were encountered below the sands and extended to the completion depths of Test Pits 101 and 102, approximately 12 feet bgs. The clayey silts were underlain by silty sands extended to the completion depths of those test pits.

Groundwater seepage in Test Pits 103 and 105 were approximately 1 to 3 feet thick and was only observed in Test Pit 101 at a depth of approximately 9 feet bgs. Groundwater seepage was not encountered in the remaining test pits performed for this study and the test pits performed for the 1992 Melick Tully study. Groundwater levels may vary based on seasonal changes.

Findings and Recommendations

General: Based on the results of the explorations performed for our study, it is our opinion that:

1) Fill materials were encountered in all five of our explorations performed for this study, consistent with our review of the MTA explorations performed in 1992 for the original addition. While not observed in any of the test pits performed for this study, buried topsoil was observed in the majority of the explorations performed prior and could be present between our recent explorations. The surface fill and underlying buried topsoil (if present) cannot be relied upon to provide adequate support for the foundations and ground level slab. In order to provide uniform support for the proposed addition, the fill and any buried topsoil should be removed for their full depths and the resultant excavation(s) backfilled with controlled compacted fill.

2) Following removal of the fill and any buried topsoil, if encountered, the proposed addition could be supported atop conventional shallow spread foundations deriving their support from the undisturbed natural medium dense to dense sandy soils, stiff sandy clayey silts, and/or controlled compacted fill materials installed atop the native soils. Foundations supported atop these materials may be designed for maximum net allowable bearing pressures of up to 2 tons per

square foot. The proposed building floor slab could also derive its support at-grade on controlled compacted fill installed to achieve the floor subgrade level.

3) Groundwater was not encountered in four of the five test pits and as such, groundwater is not expected to be a major construction issue for the anticipated shallow excavations. Seepage was observed in Test Pit 101 at approximately 9 feet bgs, and some perched or trapped water seepage as well as runoff accumulation could be encountered during construction. The contractor should be required to provide all dewatering as necessary to maintain relatively dry excavations during construction.

4) Excavated gravelly sands and silty sands free of larger cobbles/boulders would provide a good source of material for reuse as controlled compacted fill and backfill, provided they are moisture conditioned as necessary, and maintained at moisture contents needed to attain the required compaction. Excavated clayey silt soils would be less desirable for reuse as controlled fill.

Further discussions of these items and others considered relevant to the proposed construction are presented in subsequent sections of this report.

Site Preparation and Earthwork: The topsoil should be stripped and removed from below and at least five feet beyond the building addition area, and all surface improvements including concrete sidewalks, trees, and planting beds should be removed. Numerous subsurface utilities were observed at the ground surface and were encountered during the excavation of Test Pit 104. All subsurface utility piping and structures and related fill or backfill should be completely removed and utilities rerouted beyond the proposed addition limits. Any cutoff or abandoned utilities or porous bedding layers that may transmit water toward the addition or existing building should be cutoff and sealed. Any existing utilities to remain should be accommodated in the design. The location and depth of existing foundations that abut the proposed addition should be confirmed with test pits once the equipment pads and sidewalk along the building are removed or relocated.

Surficial fill materials were encountered in all of the test pits performed and would not be suitable for support of the proposed addition in their current conditions. The fill and any buried topsoil (if encountered) should be excavated for their full depth from within and to at least five feet beyond the proposed addition limits. Our recent test pits indicate existing fill typically extends to depths of about 4 feet bgs except for Test Pit 104 in which the test pit encountered 7 feet of fill atop a buried water main. It should be anticipated that the depth of the fill could vary between the explored locations and could be locally deeper depending on utility invert levels and other prior work performed within the areas.

Following the removal of the existing surface fill and utilities, the exposed natural soil subgrades to be filled or remaining at subgrade levels should be proofrolled, moisture conditioned if necessary, and recompacted to a relatively firm and unyielding consistency under the observation of a representative from GZA and to at least 95 percent of their maximum dry density. Compaction adjacent to the building should be performed using portable vibratory equipment such as a double drum trench roller, as necessary, to prevent damage to existing improvements.

Any fill required to reach the design subgrade levels following the excavation of existing fill below structural areas should consist of controlled compacted materials. The existing fill materials consisted mostly of silty sands which had moisture contents ranging from approximately 7 to 9 percent, at or near their anticipated optimum moisture content for compaction purposes. Cobbles and boulders would need to be culled from excavated soils prior to reuse. We estimate the majority of these materials could be reused as structural fill in their current condition. Should the materials become wet, drying of the soils would be required. Excavated silty and clayey soils would be less desirable for reuse. Any

deleterious materials or buried topsoil should be segregated and removed prior to reuse of the excavated soils.

Imported fill, if required to complete the building area backfill, should consist of uncontaminated relatively well-graded sand and gravel soils containing less than 15 percent by weight of material passing a U.S. Standard No. 200 sieve and a maximum particle size of 4 inches. Documentation of the environmental quality of the fill should include a written certification from the fill supplier stating that the fill is virgin material from a commercial or non-commercial source.

All fill within the building addition should consist of controlled compacted fill that is spread in layers on the order of 12 inches or less in loose thickness and uniformly compacted to at least 95 percent of maximum dry density as determined by the ASTM D-1557 test procedure. Due to the close proximity of the existing building, compaction should be performed using portable vibratory equipment such as a dual-drum trench roller. Backfill placed in confined areas such as foundation or utility trench excavations should be spread in layers of 6 to 8 inches or less in loose thickness and compacted to similar densities with smaller vibratory compaction equipment.

Construction excavations should be performed in accordance with applicable safety codes, including the latest OSHA Excavation Regulations. Based on the soils encountered in the test pits, it is our opinion that the encountered granular fill and native sandy soils materials are typical of Type "C" soils as defined by the OSHA Excavation Regulations.

Groundwater seepage was not encountered in the majority of our explorations and is not expected to be a major construction concern for the anticipated shallow excavations. Seepage was encountered in

Test Pit 101 at about 9 feet bgs and perched and trapped water should be expected to be encountered, especially after wet weather periods, and as such, some localized dewatering of excavations should be expected. If stone is present below existing utilities or existing footings of the existing building, the stone could be another source of local water seepage into excavations. The contractor should prevent surface water runoff and roof runoff from accumulating in the excavations. It is anticipated that pumping from a series of sumps and trenches located in or adjacent to the excavations would be satisfactory to facilitate dewatering most shallow excavations. The construction documents should require the contractor to provide all means necessary to maintain relatively dry excavations at all times during construction.

Foundation Design Criteria: Following the site preparation procedures previously described, the proposed building addition may be supported by conventional shallow foundations deriving their support from the undisturbed natural soils or controlled compacted fill installed atop the native soils. Foundations established on these materials may be designed to impose maximum allowable net bearing pressures of up to 4,000 pounds per square foot.

Exterior foundations should be established at depths of at least 3 feet below the lowest adjacent exterior grades to provide protection from frost penetration or deeper if required by local code or ordinance to provide frost protection. The depth and location of existing foundations should be determined prior to construction. New foundations should be established at the same elevation as the existing building foundation provided they reach the intended bearing stratum. Interior foundations in permanently heated portions of the structure may be established at convenient depths below the ground level floor

slab. All foundation subgrades should be observed by a representative of GZA prior to the placement of concrete to confirm adequate bearing materials are present.

We estimate that post-construction settlements of foundations designed and constructed in accordance with our recommendations would be on the order of 3/4 of 1 inch or less for foundations established on the native soil or properly placed controlled compacted fill. Differential settlements of up to ½ to ¾ inches between existing and new foundations should be planned for and construction joints incorporated in design as needed.

Seismic Design: For seismic design purposes, the explorations indicate site subsoils would represent a Site Class "C" as referenced in the 2018 International Building Code, New Jersey Edition. Based on this, we recommend seismic design spectral acceleration parameters of S_{DS} = 0.302 and S_{D1} = 0.097 be used for seismic design purposes.

Floor Slab Design: The ground level floor slab of the proposed addition may derive its support from controlled compacted fill placed atop natural soils after complete removal of fill and buried topsoil. A porous subslab drainage layer consisting of a minimum of 4 inches of porous fill such as clean, 3/4-inch crushed stone or washed gravel should be provided below the ground level slab to provide a capillary break between the slab and the underlying subgrade soils. Immediately prior to installation of the clean stone, the exposed subgrade soils should be compacted to densify any soils disturbed by the construction operations. Any soils that cannot be compacted to a dense and stable condition should be removed and replaced or otherwise treated. Estimated post-construction floor slab settlements following site preparation are on the order of 1/4 of 1 inch or less.

Please contact us if you have any questions regarding this report.

The following Plates and Appendices are attached and complete this report:

Plate 1 - Site Location Map
Plate 2 - Plot Plan
Plates 3A through 3E - Logs of Test Pits
Plate 4 - Unified Soil Classification System
Plate 5 - Gradation Curves
Appendix I – MTA Test Pit Logs
Appendix II - Limitations

Respectfully submitted,

GZA GeoEnvironmental, Inc.

Christopher D. McLaughlin, P.E.
Senior Project Manager

Christopher P. Tansey, P.E.
Associate Principal

Andrew Rizk, P.E.
Consultant/Reviewer

CDM:CPT/cdm

Aerial Photo courtesy of Google Earth Pro

SITE LOCATION MAP

PROPOSED WILLIAM PATERSON UNIV. FIELD HOUSE RENOVATIONS–WIGHTMAN FIELD LOCKER ROOMS
WAYNE, NEW JERSEY
WILLIAM PATERSON UNIVERSITY

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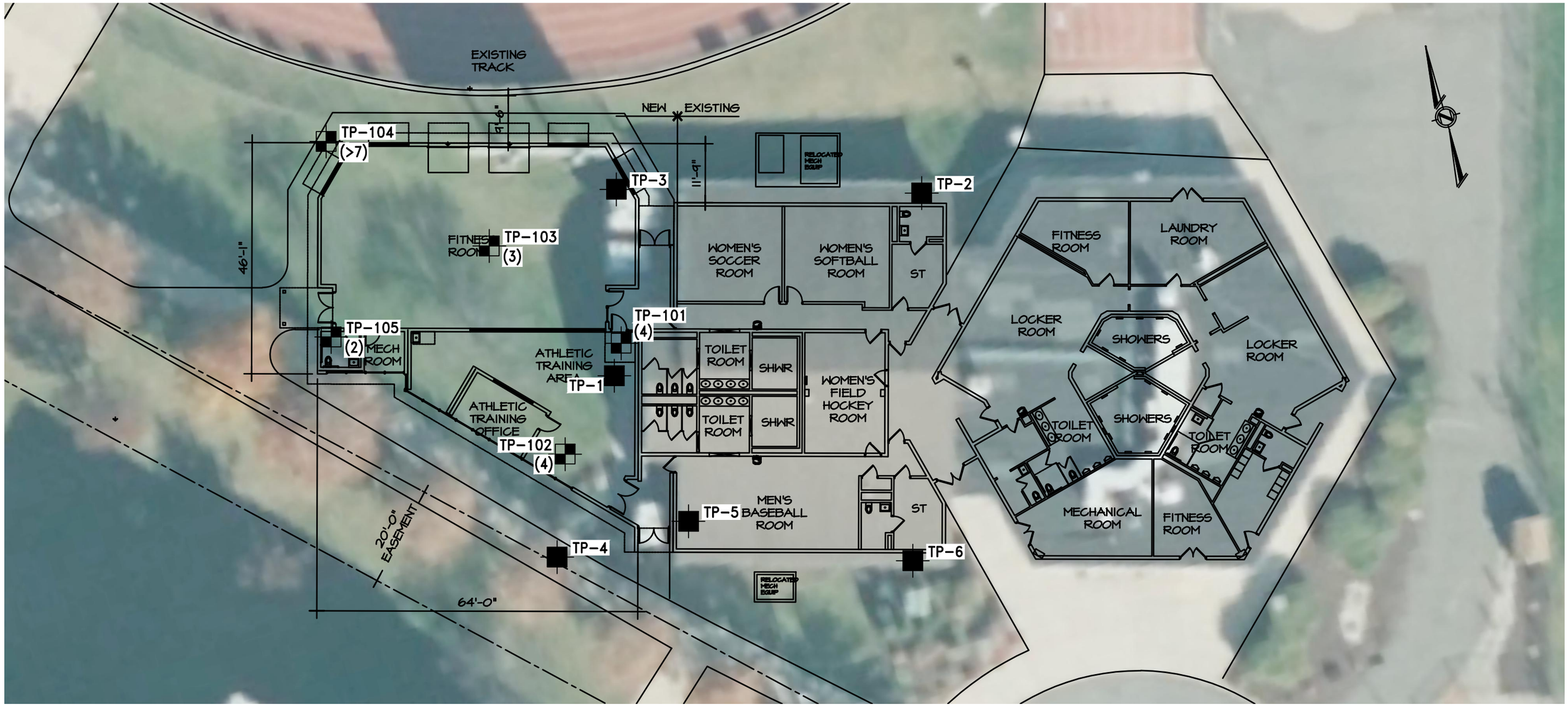
JOB NO.	FILE NO.	DR. BY	CHK. BY	DATE	SCALE	PLATE
26.0092769.00	–	VJD	CDM	9/14/22	1"=2,000'	1



KEY:

TP-101 NUMBER AND APPROXIMATE LOCATION OF TEST PITS PERFORMED FOR THIS STUDY

TP-1 NUMBER AND APPROXIMATE LOCATION OF TEST PITS PERFORMED BY MELICK TULLY & ASSOCIATES, P.C. IN 1992

(4) APPROXIMATE DEPTH IN FEET TO BOTTOM OF FILL BELOW THE EXISTING GROUND SURFACE

NOTES:

1. This drawing is part of GZA GeoEnvironmental, Inc. Report No. 26.0092769.00 and should be read together with the report for complete evaluation.
2. General layout was obtained from a drawing prepared by Settembrino Arch., entitled "Overall Floor Plan" dated 7/20/22 (revised 8/22/22), scale 1/16"= 1'-0", and an aerial image provided by ©Microsoft Corp.©2022 MAXAR©CNES (2022) Distribution Airbus DS.

PLOT PLAN

PROPOSED WILLIAM PATERSON UNIV. FIELD HOUSE RENOVATIONS–WIGHTMAN FIELD LOCKER ROOMS
WAYNE, NEW JERSEY
WILLIAM PATERSON UNIVERSITY

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JOB NO.	FILE NO.
26.0092769.00	–

DR. BY	CHK. BY	DATE	SCALE	PLATE
VJD	CDM	9/14/22	1"= 20'	2

TEST PIT LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

William Paterson University
Wayne, NJ

EXPLORATION NO.: TP-101
SHEET: 1 of 1
PROJECT NO: 26.0092769.00
REVIEWED BY: Chris McLaughlin

Logged By: Abelardo Dizon
Contractor: Heritage Contracting
Operator: Chris Sigle

Test Pit Location: See Plan
Ground Surface Elev. (ft.): NA
Final Test Pit Depth (ft.): 12
Date Start - Finish: 9/8/2022 - 9/8/2022

Type of Excavator: Rubber-Tire Backhoe
Excavator Model: J. Deere 410

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab.Time
9/8/22		9	

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (ft.)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1	S1	0.5	0-1		12" Topsoil	1		
2	S2	2.5	1-4		Fill - Brown fine to coarse sand, some fine to coarse gravel, some silt with cobbles (moist) - side wall caved in @ 3'	2	7.2	
3						3		
4						4		
5	S3	5	4-7	SM	Brown fine to coarse sand, some fine to coarse gravel, little silt with cobbles (moist)(medium dense)	5	14.4	
6						6		
7						7		
8			7-12	ML	Dark gray clayey silt, little fine sand (very moist)(stiff)	8		
9	S4	9				9		
10						10		
11						11		
12	S5	11.5				12		
13					End of exploration at 12 feet. Groundwater seepage encountered @ 9' (possible trapped)			
14								
15								

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3A

TEST PIT LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

William Paterson University
Wayne, NJ

EXPLORATION NO.: TP-102
SHEET: 1 of 1
PROJECT NO: 26.0092769.00
REVIEWED BY: Chris McLaughlin

Logged By: Abelardo Dizon
Contractor: Heritage Contracting
Operator: Chris Sigle

Test Pit Location: See Plan
Ground Surface Elev. (ft.): NA
Final Test Pit Depth (ft.): 12
Date Start - Finish: 9/8/2022 - 9/8/2022

Type of Excavator: Rubber-Tire Backhoe
Excavator Model: J. Deere 410

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab.Time
9/8/22		NE	

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (ft.)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
0	S1	0.5	0-0.8		10" Topsoil	0		
1					Fill - Brown fine to coarse sand, some fine to coarse gravel, little silt with cobbles (moist)	1		
2	S2	2.5	0.8-4			2	7.3	
3					- side wall caved in @ 3'	3		
4						4		
5	S3	5			Gray fine to coarse sand, some silt, trace fine gravel with frequent cobbles (moist)(medium dense to dense)	5	7.2	
6			4-8	SM		6		
7						7		
8						8		
9	S4	9			Dark gray-brown clayey silt, little fine to medium sand, trace fine to coarse gravel (very moist)(stiff)	9		
10			8-12	ML		10		
11						11		
12	S5	12			- grading and fine to medium sand	12		
13					End of exploration at 12 feet. Groundwater seepage not encountered			
14								
15								

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3B

3A - MTA TEST PIT USCS; 10/3/2022; 1:14:35 PM

TEST PIT LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

William Paterson University
Wayne, NJ

EXPLORATION NO.: TP-103
SHEET: 1 of 1
PROJECT NO: 26.0092769.00
REVIEWED BY: Chris McLaughlin

Logged By: Abelardo Dizon
Contractor: Heritage Contracting
Operator: Chris Sigle

Test Pit Location: See Plan
Ground Surface Elev. (ft.): NA
Final Test Pit Depth (ft.): 12
Date Start - Finish: 9/8/2022 - 9/8/2022

Type of Excavator: Rubber-Tire Backhoe
Excavator Model: J. Deere 410

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab.Time
9/8/22		NE	

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (ft.)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1			0-0.9		11" Topsoil	1		
2	S1	2.5	0.9-3		Fill - Brown fine to coarse sand, some silt, little fine gravel (moist)	2	8.9	
3						3		
4	S2	4	3-7	SP/SM	Brown fine to coarse sand, some fine gravel, little silt with cobbles and boulders (moist)(medium dense to dense)	4	4.6	
5						5		
6						6		
7	S3	7	7-10	ML	Gray clayey silt, little fine sand (wet)(stiff)	7	25.8	
8						8		
9						9		
10						10		
11	S4	11.5	10-12	SM	Brown fine to coarse sand, some fine to coarse gravel, little silt (moist)(dense)	11		
12						12		
13					End of exploration at 12 feet. Groundwater seepage not encountered			
14								
15								

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3C

TEST PIT LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

William Paterson University
Wayne, NJ

EXPLORATION NO.: TP-104
SHEET: 1 of 1
PROJECT NO: 26.0092769.00
REVIEWED BY: Chris McLaughlin

Logged By: Abelardo Dizon
Contractor: Heritage Contracting
Operator: Chris Sigle

Test Pit Location: See Plan
Ground Surface Elev. (ft.): NA
Final Test Pit Depth (ft.): 7
Date Start - Finish: 9/8/2022 - 9/8/2022

Type of Excavator: Rubber-Tire Backhoe
Excavator Model: J. Deere 410

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab.Time
9/8/22		NE	

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (ft.)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1			0-1		12" Topsoil	1		
2					Fill - Brown fine to coarse sand, some fine to coarse gravel, little silt (moist)(medium dense) (possible telephone/cable wire was cut during excavation)	2		
3	S1	3.5				3	7.3	
4			1-7		10" diameter HDPE pipe @ 4' (damaged)	4		
5						5		
6						6		
7					- top of DIP water line observed @ 7' - test pit abandoned @ 7'	7		
8					End of exploration at 7 feet. Groundwater seepage not encountered			
9								
10								
11								
12								
13								
14								
15								

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3D

TEST PIT LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

William Paterson University
Wayne, NJ

EXPLORATION NO.: TP-105
SHEET: 1 of 1
PROJECT NO: 26.0092769.00
REVIEWED BY: Chris McLaughlin

Logged By: Abelardo Dizon
Contractor: Heritage Contracting
Operator: Chris Sigle

Test Pit Location: See Plan
Ground Surface Elev. (ft.): NA
Final Test Pit Depth (ft.): 10
Date Start - Finish: 9/8/2022 - 9/8/2022

Type of Excavator: Rubber-Tire Backhoe
Excavator Model: J. Deere 410

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab.Time
9/8/22		NE	

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (ft.)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1			0-1		12" Topsoil	1		
2			1-2		Fill - Brown fine to coarse sand, little silt, little fine to coarse gravel (moist)	2		
3	S1	3	2-6	SM	Brown fine to coarse sand, some fine to coarse gravel, little silt with cobbles and boulders (moist)(dense)	3	7.5	
4						4		
5						5		
6	S2	6				6	15.9	
7			6-7	ML	Brown clayey silt, little fine sand (very moist)(stiff)	7		
8			7-10	SM	Brown fine to coarse sand, little silt, trace fine gravel (moist)(dense)	8		
9						9		
10	S3	9.5				10		
11					End of exploration at 10 feet. Groundwater seepage not encountered			
12								
13								
14								
15								

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3E

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS More than 50% of material is LARGER than No. 200 Sieve	GRAVEL & GRAVELLY SOILS More than 50% of coarse fraction RETAINED on No. 4 Sieve	CLEAN GRAVELS (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
		GRAVELS WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SAND AND SANDY SOILS More than 50% of coarse fraction PASSING a No. 4 Sieve	CLEAN SAND (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines.
			SP	Poorly-graded sands, gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS More than 50% of material is SMALLER than No. 200 Sieve.	SILTS AND CLAYS	Liquid limit LESS than 50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS	Liquid limit GREATER than 50	MH	Inorganic silts, micaceous or diatomaceous fine sand or silty soils.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			PT	Peat, humus, swamp soils with high organic contents

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

GRADATION*		COMPACTNESS* sand and/or gravel		CONSISTENCY* clay and/or silt	
% Finer by Weight		Relative Density		Range of Shearing Strength in Pounds per Square Foot	
Trace	0% to 10%	Loose	0% to 40%	Very Soft	less than 250
Little	10% to 20%	Medium Dense	40% to 70%	Soft	250 to 500
Some	20% to 35%	Dense	70% to 90%	Medium	500 to 1000
And	35% to 50%	Very Dense	90% to 100%	Stiff	1000 to 2000
				Very Stiff	2000 to 4000
				Hard	Greater than 4000

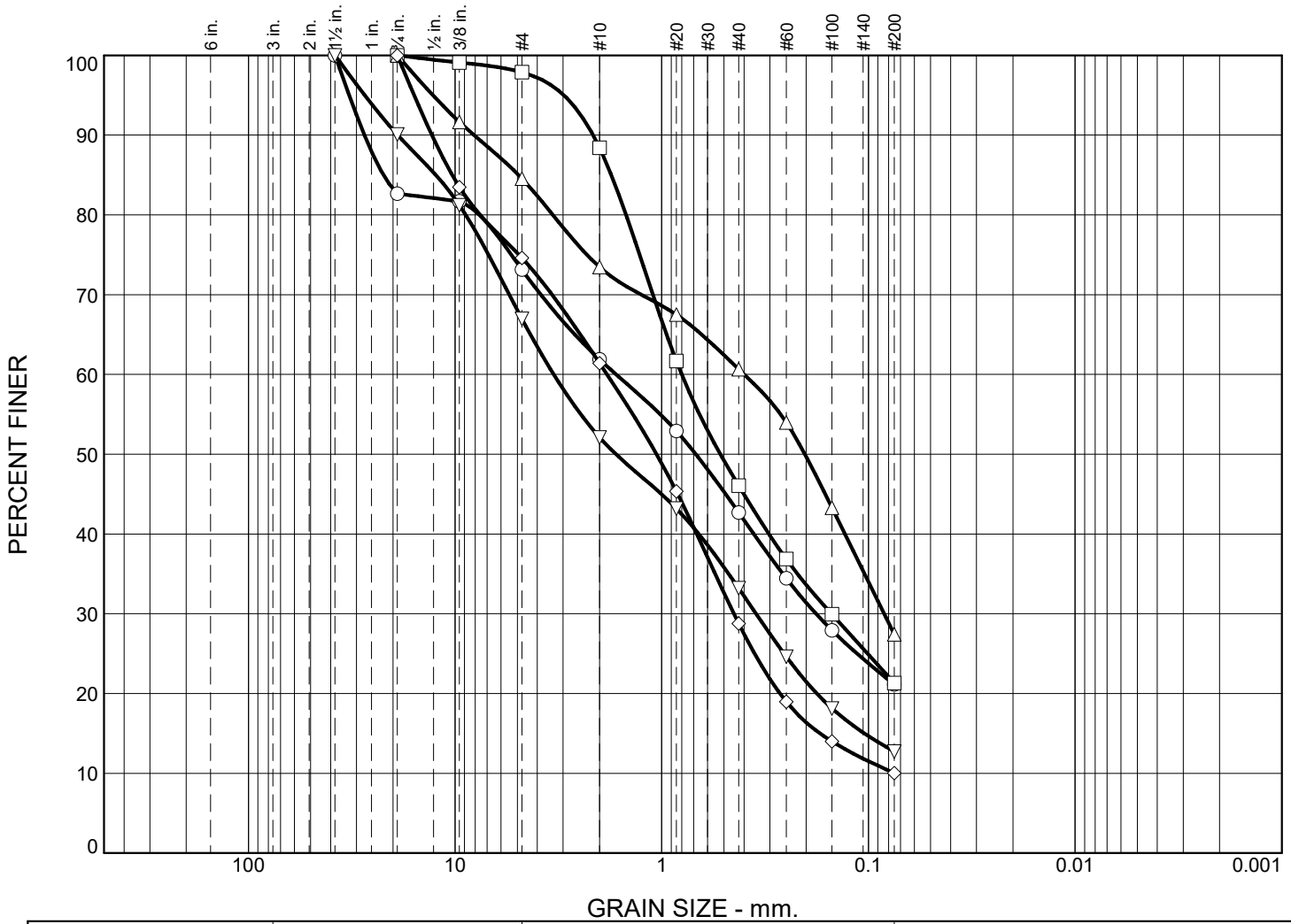
**Values are from laboratory or field test data, where applicable. When no testing was performed, values are estimated.*

UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL CLASSIFICATION CHART

PLATE 4

Gradation Curve(s)



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	17.3	9.6	11.2	19.2	21.6	21.1	
□	0.0	0.0	2.1	9.5	42.3	24.8	21.3	
△	0.0	0.0	15.4	11.1	12.8	33.3	27.4	
◇	0.0	0.0	25.4	13.2	32.6	18.8	10.0	
▽	0.0	9.9	23.1	14.9	18.9	20.5	12.7	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	TP-101	2	2.5	F-c Sand, some f-c Gravel, some Silt (MC=7.2%)	Fill
□	TP-102	3	5	Fine to coarse Sand, some Silt, trace fine Gravel (MC=7.2%)	SM
△	TP-103	1	2.5	Fine to coarse Sand, some Silt, little fine Gravel (MC=8.9%)	Fill
◇	TP-103	2	4	Fine to coarse Sand, some fine Gravel, little Silt (MC=4.6%)	SP-SM
▽	TP-105	1	3	F-c Sand, some f-c Gravel, little Silt (MC=7.5%)	SM

GZA GeoEnvironmental, Inc.

South Bound Brook, NJ

Client: William Paterson University

Project: Wightman Field House Addition - Wayne, New Jersey

Project No.: 26.0092769.00 **Plate** 5

APPENDIX I

MTA TEST PIT LOGS

LOG OF TEST PITS

TEST PIT NO. 1 JOB NUMBER : 4267-005

SURFACE ELEV. +451 ft.(±) COMPLETION DATE: 8/18/92

DEPTH FT	SAMPLES	MOISTURE CONTENT %	SYMBOL	DESCRIPTION
0-				3" Topsoil
	▪	14		FILL - Brown fine to coarse sand, some silt, little fine to coarse gravel, frequent cobbles (very moist)(loose to medium dense)
5-	▪	29	OL	FILL - Dark brown sandy organic silt, with roots (buried topsoil)(very moist)(loose to medium dense)
	▪	26		
10-	▪		ML	Light brown clayey silt, some fine to medium sand (wet)(medium to stiff)
				TEST PIT COMPLETED @ 10-1/2' GROUNDWATER LEVEL NOT ENCOUNTERED
15-				

MELICK - TULLY AND ASSOCIATES, INC.

TEST PIT NO. 2 JOB NUMBER : 4267-005

SURFACE ELEV. +451 ft.(±) COMPLETION DATE: 8/18/92

DEPTH FT	SAMPLES	MOISTURE CONTENT %	SYMBOL	DESCRIPTION
0-	▪			4" Topsoil
				FILL - Brown fine to coarse sand, little silt, little fine to coarse gravel (wet)(loose to medium dense)
	▪		SP/SM	OL 8" Black organic silt, roots (original topsoil layer)(very moist)(loose)
5-	▪			
			GP/GM	Brown fine to medium sand, trace silt, trace fine gravel (moist)(medium dense)
10-				Brown fine to coarse gravel, some fine to coarse sand, trace silt (moist)(dense to very dense)
				TEST PIT COMPLETED @ 10' GROUNDWATER LEVEL NOT ENCOUNTERED
15-				

MELICK - TULLY AND ASSOCIATES, INC. PLATE 2A

LOG OF TEST PITS

TEST PIT NO. 3 JOB NUMBER : 4267-005

SURFACE ELEV. +451 ft.(±) COMPLETION DATE: 8/18/92

DEPTH FT	SAMPLES	MOISTURE CONTENT %	SYMBOL	DESCRIPTION
0				4" Topsoil
				FILL - Brown fine to coarse sand, some silt, little fine to coarse gravel, trace cobbles (wet)(loose to medium dense)
5	▪		OL	
	▪		ML	FILL - Dark brown sandy organic silt, with roots (buried topsoil)(wet)(loose)
			SP/SM	Dark brown organic silt (original topsoil layer)(wet)(loose)
10				Orange-brown clayey silt, some fine to medium sand, trace fine to coarse gravel (very moist)(medium dense to dense)
				Brown fine to medium sand, trace silt, trace fine to coarse gravel (very moist)(medium dense to dense) -grading with increasing gravel @ 9'±
15				TEST PIT COMPLETED @ 10' GROUNDWATER LEVEL NOT ENCOUNTERED

TEST PIT NO. 4 JOB NUMBER : 4267-004

SURFACE ELEV. +451 ft.(±) COMPLETION DATE: 8/18/92

DEPTH FT	SAMPLES	MOISTURE CONTENT %	SYMBOL	DESCRIPTION
0				4" Topsoil
				FILL - Brown fine to coarse sand, some silt, little fine to coarse gravel, frequent cobbles (wet)(loose to medium dense)
5	▪		OL	
	▪			FILL - Dark brown sandy organic silt (buried topsoil)(very moist)(loose)
			ML	Dark brown organic silt (original topsoil layer)(wet)(loose)
10				Light brown clayey silt, some fine to medium sand (very moist)(medium to stiff)
15				TEST PIT COMPLETED @ 10' GROUNDWATER LEVEL NOT ENCOUNTERED

LOG OF TEST PITS

TEST PIT NO. 5 JOB NUMBER : 4267-004

SURFACE ELEV. +449 ft.(±) COMPLETION DATE: 8/18/92

DEPTH FT	SAMPLES	MOISTURE CONTENT %	SYMBOL	DESCRIPTION
0				6" Topsoil
				FILL - Brown fine to coarse sand, some silt, little fine to coarse gravel, frequent cobbles (wet)(loose to medium)
5	▪		SP/SM	Brown fine to coarse sand, some fine to coarse gravel, trace silt (slightly mosit)(medium dense to dense)
10				TEST PIT COMPLETED @ 5-1/2' GROUNDWATER LEVEL NOT ENCOUNTERED
15				

MELICK - TULLY AND ASSOCIATES, INC.

TEST PIT NO. 6 JOB NUMBER : 4267-004

SURFACE ELEV. +451 ft.(±) COMPLETION DATE: 8/18/92

DEPTH FT	SAMPLES	MOISTURE CONTENT %	SYMBOL	DESCRIPTION
0				3" Topsoil
	▪	13		FILL - Light brown fine to medium sand, some silt (wet)(loose to medium dense)
5	▪			FILL - Dark brown sandy organic silt (buried topsoil)(very moist)(loose to medium dense)
			ML	Light brown clayey silt, some fine to medium sand, trace fine to coarse gravel (very moist)(stiff)
	▪		SP/SM	Brown fine to coarse sand, little fine to coarse gravel, trace silt (moist)(medium dense to dense)
10				TEST PIT COMPLETED @ 9' GROUNDWATER LEVEL NOT ENCOUNTERED
15				

MELICK - TULLY AND ASSOCIATES, INC. PLATE 2C

APPENDIX II

Limitations

APPENDIX

Limitations

A. Subsurface Information

Locations: The locations of the explorations were approximately determined by tape measurement from existing site features. Elevations of the explorations were not available. The locations and elevations of the explorations should be considered accurate only to the degree implied by the method used.

Interface of Strata: The stratification lines shown on the individual logs of the subsurface explorations represent the approximate boundaries between soil types, and the transitions may be gradual.

Field Logs/Final Logs: A field log was prepared for each exploration by a member of our staff. The field log contains factual information and interpretation of the soil conditions between samples. Our recommendations are based on the final logs as shown in this report and the information contained therein, and not on the field logs. The final logs represent our interpretation of the contents of the field logs, and the results of the laboratory observations and/or tests of the field samples.

Water Levels: Water level readings have been made in the explorations at times and under conditions stated on the individual logs. These data have been reviewed and interpretations made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater will occur due to variations in rainfall, temperature, and other factors.

Pollution/Contamination: Unless specifically indicated to the contrary in this report, the scope of our services was limited only to investigation and evaluation of the geotechnical engineering aspects of the site conditions, and did not include any consideration of potential site pollution or contamination resulting from the presence of chemicals, metals, radioactive elements, etc. This report offers no facts or opinions related to potential pollution/contamination of the site.

Environmental Considerations: Unless specifically indicated to the contrary in this report, this report does not address environmental considerations which may affect the site development, e.g., wetlands determinations, flora and fauna, wildlife, etc. The conclusions and recommendations of this report are not intended to supersede any environmental conditions which should be reflected in the site planning.

B. Applicability of Report

This report has been prepared in accordance with generally accepted soils and foundation engineering practices for the exclusive use of William Paterson University for specific application to the design of the proposed Field House Addition. No other warranty, expressed or implied, is made.

This report may be referred to in the project specifications for general information purposes only, but should not be used as the technical specifications for the work, as it was prepared for design purposes exclusively.

C. Reinterpretation of Recommendations

Change in Location or Nature of Facilities: In the event that any changes in the nature, design or location of the building are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing.

Changed Conditions During Construction: The analyses and recommendations submitted in this report are based in part upon the data obtained from five widely-spaced test pit excavations performed for this study. The nature and extent of variations between the explorations may not become evident until construction. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.

Changes in State-of-the-Art: The conclusions and recommendations contained in this report are based upon the applicable standards of our profession at the time this report was prepared.

D. Use of Report by Prospective Bidders

This soil and foundation engineering report was prepared for the project by GZA GeoEnvironmental, Inc. (GZA) for design purposes and may not be sufficient to prepare an accurate bid. Contractors utilizing the information in the report should do so with the express understanding that its scope was developed to address design considerations. Prospective bidders should obtain the owner's permission to perform whatever additional explorations or data gathering they deem necessary to prepare their bid accurately.

E. Construction Observation

We recommend that GZA be retained to provide on-site soils engineering services during the earthwork construction and foundation phases of the work. This is to observe compliance with the design concepts and to allow changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.