Melick-Tully
& Associates

A Division of GZA

GEOTECHNICAL INVESTIGATION

CAPITAL PROJECT 1483
CONSTRUCT NEW ANIMAL SHELTER
POMONA, NEW YORK

November 9, 2021
File No. 26.0092453.00

PREPARED FOR:
Rauhaus Freedenfeld & Associates
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GEOTECHNICAL
ENVIRONMENTAL
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November 9, 2021
File No. 26.0092453.00

Rauhaus Freedenfeld & Associates
97 Broadway
Boston, Massachusetts 02116

Attention: Mr. Warren Freedenfeld, AIA

Gentlemen:

Updated Report
Geotechnical Investigation
Capital Project 1483
Construct New Animal Shelter
Pomona, New York

Introduction

This updated report presents the results of a geotechnical investigation performed by Melick-Tully and Associates, a Division of GZA GeoEnvironmental, Inc., affiliated with GZA GeoEnvironmental of New York (GZA) for a proposed animal shelter to be built to replace an existing animal care facility located at 65 Firemen's Memorial Drive in Pomona, Rockland County, New York. The site is located adjacent to and west of Fireman's Memorial Drive, just north of the Rockland County Fire Training facility. The approximate location of the facility is shown on the Site Location Map, Plate 1. This report was prepared in general accordance with our proposal dated July 30, 2021, as modified and updated to reflect the most recent site plan revisions. No additional explorations were performed for this updated report.

Proposed Construction

The site is currently occupied by an existing animal shelter which will remain. The new shelter will be a one-story building on the order of 15,500 square feet which would be located in the rear of the site. Site plans have been modified substantially since our initial exploration work and includes a significant rise in building grades. The Site Grading and Drainage Plan by Langan, dated September 27, 2021, indicates proposed finished floor would be established at approximately Elevation +469.5 feet, from approximately 3 feet above existing grade at the front (east side) of the building to up to about 12 feet above existing grade at the rear (west side) of the building.

New pavements, utilities and stormwater facilities would be built. The existing animal shelter and related animal cages, septic facilities, and other utilities in the eastern portion of the site would be demolished and removed and replaced by a new parking lot established near existing grades outside the structures. Since the original field work, plans for a stormwater basin and a retaining wall along the north, west and south sides of the site have been developed, generally outside the areas of exploration. The updated plans indicate the retaining wall at the rear of the property could be up to 12 feet high.

Purpose and Scope of Work

The purpose of our services as modified to reflect the plan change was to:

1) explore the subsurface soil, rock and groundwater conditions as near as practical to the proposed building location;

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

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

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

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

6) estimate the post-construction settlements of the recommended floor and foundation systems;

7) provide estimated lateral earth pressure and drainage criteria for use in the preliminary design of a revised retaining wall location;

8) provide geotechnical-related parameters for use in pavement design; and

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

To accomplish these purposes, a subsurface exploration program consisting of test borings and manual test pit/auger borings was performed at the site based on the prior footprint and, with the absence of sufficient utility markout from the One Call and reports of unmarked electric lines to heated animal cages, impacted the progress of the exploration program. Three borings, B-1 through B-3 were drilled in the accessible east side of the site. The borings were advanced using track-mounted, all-terrain hollow-stem auger drilling equipment and extended to depths of 19 to 22 feet below the surface, and to sampler/auger refusal on boulders or rock. Samples were extracted at closely spaced intervals in general accordance with the procedures of the Standard Penetration Test.

The presence of existing cages, fencing, utilities and other above and below ground improvements, as well as woods with fallen trees, heavy surface vegetation and surface boulders to the rear of the existing

building impacted the ability to access much of the proposed building area during the investigation. Due to the restricted access, manual hand augers were performed within the footprint of the proposed building in the western portion of the site.

Five manual borings (HA-1 through HA-5) were advanced by MTA within the wooded rear portion of the site where access was restricted. A Dynamic Cone Penetrometer (DCP) was also utilized in selected manual explorations to gauge the density of the materials which appeared relatively dense below about one foot. The manual explorations extended to depths of up to 2 feet below the existing surface grades and were terminated upon refusal atop dense subsoils or cobbles/boulders.

All field work was performed under the direct technical supervision of geotechnical engineers or geologists from GZA. Our representatives located the explorations in the field, maintained continuous logs of the explorations as the work proceeded, and obtained selected samples of the encountered materials to develop the desired subsurface information.

The approximate locations of the explorations are shown on the Plot Plan, Plate 2. Detailed descriptions of the encountered subsurface conditions are presented on the individual Logs of Borings, Plates 3A through 3C and Logs of Hand Auger Borings, Plates 4A through 4E. The soils have been visually classified in general accordance with the Unified Soil Classification System described on Plate 5.

The soil samples obtained from the explorations were brought to our office where they were visually examined in our soil mechanics laboratory. Selected samples were subjected to laboratory water content tests and gradation testing to aid in their engineering evaluation and classification. The moisture content tests are provided on the exploration logs. The results of the laboratory gradation tests are

presented on the Gradation Curves, Plate 6. The boring sample descriptions and laboratory test results in our report are based on testing of split spoon or grab samples of limited size. Therefore, larger gravel and cobble-size particles or rock fragments which are not reflected in the sample description could be present.

The results of our field exploration and laboratory testing programs and review of the revised building and grading plan 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 an Appendix to this report.

Site Conditions

Areal Geology: USGS mapping indicates the site is blanketed by at least 10 to 20 feet or more of glacial till soils over bedrock. The Rockland County Soil Survey indicates the site area to be underlain by rock of the Passaic Hammer Creek or Brunswick Formation, which generally consist of gray and red sandstone, siltstone, and mudstone. The USDA Soil Survey indicates the site soils to consist of Wethersfield gravelly silt loam soils (WEB) which are generally glacial till with a dense substratum and rock at more than 5 feet below grade.

Surface Features: The site consists primarily of gently to moderately sloping grass covered developed areas in the east which include various structures including the existing animal shelter building and ancillary sheds with heat and air conditioning. Various fences are present, and block access to the rear of the site. Pavements are present to the front of the animal shelter. Wooded areas with heavy

vegetation, numerous fallen trees and surface boulders are present in the central and western portions of the site including most of the proposed building area.

Topographic information shown on the architectural site plan provided to us indicates that the property generally slopes downward from east to west. Surface elevations range from a high of approximately Elevation +472 feet at the extreme west edge of the site to a low of about Elevation +454 feet at the rear west side of the site. Existing grades within the current proposed building area range from about Elevation +468 feet to +458 feet at the east and west sides, respectively.

Subsurface Conditions: The subsurface conditions encountered in the building explorations performed for this study consisted of the following generalized strata, listed in order of increasing depth:

1) Surface Materials: Topsoil which contained significant inclusions of roots and some boulders in the explorations advanced in the wooded area ranging from 8 to 12 inches in thickness was encountered at the surface. The topsoil was noted to be about 4 inches thick in the borings performed in the grass covered, developed eastern portion of the site.

2) Fill: Fill related to past grading and construction was present below the surface materials in the three test borings in the developed east portion of the site. The fill generally consisted of sandy silts and silty clays and extended to depths of about 3 to 4 feet below the surface in the three borings. Fill depths should be expected to vary due to the variable grading history, especially where utility trenches are present.

3) Glacial Till: Glacial till comprised of generally silty sands containing variable percentages of gravel, with cobbles, boulders and layers of sandy gravelly silts, were encountered in the explorations and extended to the completion depths. The deeper subsoils contained rock fragments. Hard zones were noted in the drilling.

Groundwater seepage was observed at 4.5 to 8 feet in Borings 1, 2 and 3 during drilling in the higher eastern site areas and given this area is higher than the ground surface in the western area, it appears likely the water was partially perched atop the deeper subsoils. It was noted that the water level in the

casing at the end of drilling in all three borings was present at depths ranging from about 13 to 14 feet below existing grade and may represent a deeper groundwater surface. Mottling, as well as moist to wet soils, were also observed in some of the explorations above the dense, siltier subsoils and suggests that seepage, often perched or trapped, may occur at higher levels on a seasonal or periodic basis.

Findings and Recommendations

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

1) The revised plans indicate that the building grades have been raised substantially and the initial planned retaining wall eliminated. The data indicates the proposed building could be supported atop conventional shallow spread foundations deriving their support from the natural stiff to very stiff silty and clayey soils, medium dense to dense silty gravelly sand soils, and controlled compacted fill installed atop these soils to reach the currently proposed building subgrade levels. Foundations supported atop the recompacted natural soils or controlled compacted fill could be designed for maximum net allowable bearing pressures of up to two tons per square foot.

2) The proposed at-grade building floor slab could derive its support from the controlled compacted fill installed placed atop stiff natural silty soils and medium dense to dense sandy soils installed to achieve the floor subgrade level. Topsoil, existing fill or soft silty or clayey soils would not be suitable for foundation or slab support and should be excavated and replaced with structural fill below the building and beyond the influence of any few foundations. Localized recompacted existing fill may be able to remain in place below filled pavement areas subject to field evaluation by qualified geotechnical personnel at the time of demolition and construction. The at-grade floor slab should be underlain by a minimum 6 inch thick layer of porous fill to provide a capillary break between the slab and the silty subgrade soils.

3) Groundwater was encountered at depths on the order of 4.5 to 8 feet in the three deeper boring explorations (from about Elevation +461.5 to +464 feet) and does not appear to be a building construction concern due to the filling needed to reach grade. Perched water could be present atop the denser natural strata elsewhere. Groundwater seepage conditions should be expected to vary seasonally and could be present in locally deeper excavations, particularly during and following wet periods, and the contractor should be required to provide dewatering as necessary to maintain relatively dry excavations. Control of surface runoff should also be provided to prevent inundation of subgrades and flooding of excavations. Site drainage should be provided during construction as needed to maintain the subgrades in a dry condition.

4) Excavated gravelly and silty sands would provide a fair to good source of materials for reuse as controlled compacted fill provided they are aerated and dried, where necessary, to moisture contents needed to attain the required compaction. Excavated sandy silt soils would be less desirable for reuse as fill, as they would be highly susceptible to moisture related stability and compaction problems and potential construction delays for drying and recompaction work. Silty soils would be better suited for use in non-structural landscaped areas or if required as structural fill, in deeper fill areas where they could be covered by more granular fill soils. Boulders and large cobbles, as well as any stumps or organics would need to be removed from the excavated site materials to allow the soils to be reused as fill.

5) The site will need to be cleared and grubbed and stripped prior to filling. Removal of boulders may not be needed where more than several feet of fill is required to reach the subgrade levels. Removal of boulders could be required in deeper excavations for foundations, utilities, retaining walls, etc.

6) Pavements or outside slabs, if any, which are established on clayey and silty native or fill soils consisting of these soils or recompacted in-place fill should be designed for a "poor" subgrade support condition, with an estimated California Bearing Ratio (CBR) value of approximately three percent. Pavements established atop the natural silty sand soils or a minimum of 18 inches of imported compacted granular fill could be designed for a "medium" to "good" subgrade support condition, with an estimated CBR value of 7 to 10 percent.

Further discussions of the above items are presented in subsequent sections of this report.

Site Preparation and Earthwork: The site should be cleared and grubbed of roots, stumps and vegetation, and surface boulders removed and disposed of properly. The topsoil should be stripped and removed from below and to at least 10 feet outside the building and pavement limits in the deeper mass fill areas, or less where retaining wall construction confines the work or where fills are of limited height. Variations in the thickness of topsoil should be anticipated between our explorations. The topsoil will not be suitable for reuse as structural fill. The stripping should be expected to extend below the recorded topsoil levels due to varying thicknesses, disturbance/mixing of soils caused by locally unstable subgrades, and removal of stumps, boulders, concentrations of roots, existing improvements to be removed, etc. Where more than 3 feet of fill is to be placed, removal of local boulders that penetrate

the deeper subsoils may not be necessary provided topsoil, stumps and roots are removed and subject to field evaluation by qualified personnel at the time of the work. The existing fill should be excavated from below the building and any settlement sensitive new improvements. The existing fill may be able to be recompacted and allowed to remain in place below new pavements subject to field evaluation by qualified geotechnical personnel at the time of construction.

The existing structures and other improvements within the work area should be demolished and the debris disposed of properly, as required by the plans and as needed to perform the work. Existing pavements, slabs, foundations, subsurface utilities or other improvements and related backfill should also be removed from below structural areas and replaced with controlled compacted fill. Any abandoned or leaking active pipes or other potential sources of surface water which may enter excavations or drain toward the building or retaining wall areas should be removed, cut off and sealed, or repaired, if required to remain active and left in place.

The subgrade soils exposed after stripping, excavation to the required subgrade levels, and following removal of any unsuitable materials from the building and pavement areas, if any, should be proofrolled, moisture conditioned, if necessary, and compacted to a relatively firm and unyielding consistency and to at least 95 percent of their maximum dry density under the observation of a qualified geotechnical engineer. Proofrolling should be performed using a heavy self-propelled roller, a loaded tandem axle dump truck or other approved heavy rubber-tire construction equipment. If unstable subgrade soils are present after stripping, the exposed materials should be provided sufficient time to dry prior to

proofrolling and recompaction. Any subgrade soils detected to be soft or unstable, or any frozen subgrade materials, should be excavated and replaced with controlled compacted fill.

All subgrades which may be exposed to inclement weather should be sealed by compacting and grading to shed runoff and prevent ponding on a daily basis. Exposed silty/clayey subgrades would be susceptible to disturbance and softening from construction equipment traffic, especially when wet or following thawing. Consequently, construction traffic should be kept off prepared subgrades during and following periods of wet or freezing weather, or overexcavation and replacement of the disturbed soils, or other treatments should be expected to be required to maintain stable subgrades. In structural areas, the contractor should be responsible to not only compact the subgrade soils (as well as any required new fill), but to maintain the fill and native materials in a compacted state until the work is complete.

Control of surface water runoff would be required to prevent surface ponding or inundation of excavations so as to limit disturbance and the potential need for remediation and retreatment of prepared subgrades. Localized drains and swales should be provided if needed to divert perched or trapped seepage, or surface runoff, to allow the work to be performed in a dry condition.

The fill necessary to reach the design subgrade levels below structural areas should consist of controlled compacted materials. Silty/clayey soils from site excavations would provide a relatively poor source of borrow materials for structural fill due to their sensitivity to moisture related compaction and stability problems. To the degree practical, silts should be used as fill in non-structural, landscaped areas or in deeper, drained structural fill areas where they can be covered by more granular materials, as these materials may be difficult or impossible to use as fill during or after wet or freezing weather. Excavated

silty sands, free of large cobbles, boulders, debris or other deleterious materials would provide a relatively good source of materials for reuse as controlled compacted fill to support the building and pavements provided they are maintained at, or conditioned to, moisture contents suitable for compaction.

Larger cobbles and boulders should generally be selectively removed during the fill spreading and placement operations, or if they protrude from finished subgrade, and should be disposed of properly. Soils containing occasional cobbles up to about 8 inches in dimension could be used in selected deep mass structural fill areas where they will not be exposed in excavated subgrades provided they can be adequately mixed into the fill without nesting and subject to the approval of the inspecting geotechnical engineer. Larger cobbles and boulders should generally not be placed in fill areas where they would interfere with subsequent trench excavations for foundations, utilities, etc., due to potential difficulties in excavation and backfilling with these materials, or near finished subgrades where they would interfere with providing a uniform prepared subgrade surface. These materials could be considered for reuse in landscaped areas, if approved by the site engineer or architect.

Imported fill required to complete the site grading in building and pavement areas 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. Retaining wall backfill should comply with the designer's requirements. 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. The fill should also be evaluated in accordance with any applicable county, local or contractual environmental testing and approval requirements.

All mass fill within building, pavement or other structural areas 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. Compaction in non-structural areas should be a minimum of 90 percent of maximum dry density to limit the potential for settlement. The fill materials should generally be at, or conditioned to, within two percent of their optimum moisture content at the time of compaction. Compaction should be provided using a large self-propelled vibratory roller. Backfill placed in confined areas such as foundation or utility trench excavations and compacted using manually operated equipment, including replacement backfill installed following removal of existing improvements, should be spread in layers of 6 to 8 inches or less in loose thickness, or as necessary to achieve the required compaction. The maximum particle size of the fill should generally not exceed 2/3 of the compacted lift thickness.

Construction excavations should be performed in accordance with the most recent OSHA guidelines and any governing local or project safety codes, or requirements, and as necessary to prevent damage to existing improvements and protect workers and the public. Based on the results of our explorations, we believe that Type "C" soil conditions (1.5H:1V) as defined by OSHA would generally prevail for temporary excavations penetrating into the fill and natural sandy soils or extending below the groundwater seepage levels.

Groundwater was encountered in Borings 1 through 3 at depths of about 4.5 to 8 feet, generally at about Elevation +461.5 to +464 feet, well below the proposed floor level of +469.50 feet, and which is not expected to be a significant construction concern in the building construction. It is expected that local perched and trapped groundwater seepage or runoff may occur in some of the excavations into the subsoils, where required, particularly following wet weather periods, and that dewatering could be required locally. Seepage of water entering from sources outside the new building limits could also emanate from existing or abandoned roof drains, leaking pipes, utility backfill or bedding layers, or other conditions, etc., related to prior or existing construction. Any abandoned pipes or other water sources should be removed and backfilled or cutoff and sealed.

Dewatering should be expected to be locally required during construction, and drainage provided and retaining wall drainage provided to remove any perched seepage within the excavations. The use of sumps in the trenches would likely be satisfactory for dewatering shallow excavations below the seepage levels. The construction documents should require the contractor to provide all means and equipment necessary to maintain dry excavations at all times.

Foundation Design Criteria: Following the site preparation procedures previously described, the proposed building may be supported by conventional shallow foundations. The foundations may derive their support from the natural stiff to very stiff silty soils, medium dense gravelly sandy soils, and the controlled compacted fill placed atop these soils. Any topsoil, existing fill or locally soft soils would be unsuitable for building support and should be removed and replaced below the building. Foundations established on the suitable recompacted natural silty and sandy soils, or controlled compacted fill

materials may be designed to impose maximum allowable net bearing pressures of up to two tons per square foot.

Exterior foundations should be established at depths of at least 3-1/2 feet below the lowest adjacent exterior grades to provide protection from frost penetration, or as required by local building code. Interior foundations in permanently heated portions of the structure may be established at convenient depths below the ground level floor slab.

If disturbed foundation subgrade materials require removal due to weather impacts, the localized use of clean stone or lean concrete to restore subgrade levels could be considered, as determined in conjunction with the inspecting geotechnical engineer at the time of the work.

We estimate that post-construction settlements of foundations designed and constructed in accordance with our recommendations would be on the order of 1/2 of 1 inch or less.

Seismic Design: For seismic design purposes, the explorations and our review of published data indicate site subsoils would represent a seismic Site Class D as defined by the Building Code of New York State.

Ground Level Floor Slab Design: The ground level floor slab of the proposed structure may derive its support from controlled compacted fill placed atop the natural sandy silts or silty sands. We recommend a porous subslab drainage layer consisting of a minimum of 6 inches of porous fill such as clean, 3/4 inch crushed stone or washed gravel 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 porous fill, the subgrade should be recompacted to densify any soils disturbed by the construction operations. Any material which cannot be compacted to a dense, stable condition should be moisture conditioned and recompacted, removed and replaced, or otherwise treated. Care should be taken to avoid allowing the porous fill layer to become clogged with soil from construction activity.

Estimated post-construction floor slab settlements under the anticipated light loading are expected on the order of 1/4 of 1 inch or less.

Lateral Earth Pressures: The revised plans indicate retaining walls are now proposed along the north, west and south sides of the site to allow for the raising of the site grades, and outside the previously investigated areas. The proposed retaining walls as well as any below-grade building walls or excavation support systems should be designed to resist lateral earth pressures imposed by the adjacent soils, as well as surcharge loads due to adjacent construction activity, traffic, floor slab or foundation loads, etc. Walls near the stormwater basin should also consider the stormwater design. All permanent below-grade walls including the retaining wall should be provided with drainage to prevent the build-up of hydrostatic pressures. Below-grade walls which are not fixed and thus free to rotate slightly during backfilling should be designed to resist earth pressures assuming an active earth pressure condition, while fixed walls should accommodate an at rest condition. Excavated sandy soils free of any cobbles and boulders or imported sand and gravel soils would be an acceptable backfill material if allowed by the design engineer. Given the substantial fill that will need to be imported to reach the planned site grades, we suggest that the retaining wall backfill consist of imported soils meeting the requirements of

the wall designer. For preliminary planning, earth pressures from compacted granular materials could be preliminarily estimated assuming a total drained unit weight of 130 pounds per cubic foot and an angle of internal friction of 32 degrees, or as stipulated by the retaining wall designer. Excavated silty and clayey soils would not be desirable for use as backfill as they are poor draining and impose higher lateral pressures.

For design of the retaining wall, a friction factor of 0.35 between mass concrete and native silty and clayey soils would be appropriate. A friction factor of 0.45 would be acceptable where foundations are established atop natural silty sands, granular controlled compacted fill, or a crushed stone base.

Pavement Design Criteria: Pavements or local surface slabs adjacent to the building, if any, established on the recompacted in-place fill or sandy silt soils should be designed for a "poor" subgrade support condition, with an estimated California Bearing Ratio (CBR) value of approximately three percent. Assuming relatively light traffic conditions, pavements established atop the natural silty sand soils or a minimum of 18 inches of compacted granular fill could be designed for a "medium" to "good" subgrade support condition, with an estimated CBR value of 7 to 10 percent.

Immediately prior to pavement construction, the subgrade soils should be proofrolled and recompacted to at least 95 percent of its maximum dry density (ASTM D-1557) to densify any soils disturbed by the construction operations. Proofrolling of any pavement areas should be performed with a heavy truck to simulate the trucks that would be used to deliver the asphalt. Any unsuitable or disturbed subgrades should be treated under the observation of qualified geotechnical personnel prior to paving.

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

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

Plate 1 - Site Location Map
Plate 2 - Plot Plan
Plates 3A through 3C - Logs of Borings
Plates 4A through 4E - Logs of Hand Auger Borings
Plate 5 - Unified Soil Classification System
Plate 6 - Gradation Curves
Appendix - Limitations

Respectfully submitted,

MELICK-TULLY and ASSOCIATES,
a Division of GZA GeoEnvironmental, Inc.

James H. Beattie, P.E.
Senior Consultant

Robert E. Schwankert, P.E.
Principal

Mark R. Denno, P.E.
Consultant/Reviewer

JHB:RES/nac
(1 copy submitted via e-mail)

Aerial Photo courtesy of Google Earth Pro

MELICK–TULLY AND ASSOCIATES
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Geotechnical Engineers & Environmental Consultants
117 Canal Road
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(732) 356-3400

SITE LOCATION MAP

PROPOSED ANIMAL SHELTER
POMONA, NEW YORK

JOB NO.	FILE NO.	DR. BY	CHK. BY	DATE	SCALE	PLATE
26.0092453.00	–	VJD	RES	9/8/21	1"=1,000'	1

GRAPHIC SCALE

20 0 10 20 40

1 inch = 20 ft.

KEY:

B-1 — NUMBER AND APPROXIMATE LOCATION OF BORINGS PERFORMED FOR THIS STUDY

HA-1 — NUMBER AND APPROXIMATE LOCATION OF MANUAL AUGER BORINGS PERFORMED FOR THIS STUDY

NOTES:

1. This drawing is part of Melick–Tully and Associates, a Division of GZA, Report No. 26.0092453.00 and should be read together with the report for complete evaluation.
2. General layout was obtained from a drawing prepared by Langan Eng., entitled "Grading & Drainage Plan" dated 9/27/21, scale 1"= 20', and an aerial image downloaded from Google Earth Pro.

PLOT PLAN

PROPOSED ANIMAL SHELTER
POMONA, NEW YORK

MELICK–TULLY AND ASSOCIATES
A Division of GZA
Geotechnical Engineers & Environmental Consultants
117 Canal Road
South Bound Brook, New Jersey 08880
(732) 356-3400

JOB NO.	FILE NO.
26.0092453.00	–

DR. BY	CHK. BY	DATE	SCALE	PLATE
VJD	RES	9/8/21	1"= 20'	2

TEST BORING LOG

MTA, a Division of GZA GeoEnvironmental, Inc
Engineers and Scientists

Rauhaus Freedenfeld & Associates
Proposed Animal Shelter
Pamona, NY

EXPLORATION NO.: B-1
SHEET: 1 of 1
PROJECT NO: 26.0092453.00
REVIEWED BY: A. DeZenzo

Logged By: J. Matallana
Drilling Co.: General Borings, Inc.
Driller: Jim/Sean

Type of Rig: Track Rig
Rig Model:
Drilling Method: HSA

Boring Location: See Plan
Ground Surface Elev. (ft.): 469
Date Start - Finish: 9/8/2021 - 9/8/2021
Final Boring Depth (ft.): 20.8

Hammer Type: Automatic Hammer
Hammer Weight (lb.): 140
Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.):

Groundwater Depth (ft.)			
Date	**Time**	**Water Depth**	**Stab. Time**
9/8/21		6	
9/8/21		13	

Depth (ft)	Sample No.	Sample Depth (ft.)	Sample Blows (per 6 in.)	Sample SPT Value	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
	S1	0-2	2 6 5 4	11		4" Topsoil Fill - Dark brown clayey silt, little fine to medum sand (stiff)(moist)		15.3	
	S2	2-4	3 9 9 8	18		- 2" gravel layer @ 3'		12.2	
5	S3	4-6	4 10 17 15	27	SM	Yellow brown fine to coarse sand, and silt, some fine to coarse gravel (moist)(medium dense) - grading with gray mottling and iron stained gravel and sand - rig chatter from 5' to 7'	5		
	S4	6-8	7 5 6 10	11	ML	Yellow brown clayey silt, and fine to medium sand (wet)(stiff)		24.5	
	S5	8-10	7 4 3 3	7	SM	Yellow brown fine to coarse sand, and silt, trace fine gravel (wet)(loose)			
10	S6	10-12	4 4 15 33	19		- grading to (medium dense) - rig chatter starting at 12' - hard drilling from 14' to 15'	10		
15	S7	15-17	56 17 35 40	52	ML	Gray silt, little fine to medium sand, little fine gravel with gravel in tip (possible rock or cobble fragments)(moist)(hard)	15		
20	S8	20-20.8	66 50/4"	100+	SM	Gray fine to coarse sand, little to some silt, little fine to coarse gravel (possible rock or cobble fragments)(wet)(very dense) - sampler refusal @ 20.8'	20		
25						End of exploration at 20.8 feet. Mottling encountered @ 4' Perched groundwater encountered @ 6' Groundwater encountered @ 13' with casing tip at 20'			
30									

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

1A - MTA BORING LOG USCS; 11/1/2021; 10:10:37 AM

TEST BORING LOG

MTA, a Division of GZA GeoEnvironmental, Inc
Engineers and Scientists

Rauhaus Freedenfeld & Associates
Proposed Animal Shelter
Pamona, NY

EXPLORATION NO.: B-2
SHEET: 1 of 1
PROJECT NO: 26.0092453.00
REVIEWED BY: A. DeZenzo

Logged By: J. Matallana
Drilling Co.: General Borings, Inc.
Driller: Jim/Sean

Type of Rig: Track Rig
Rig Model:
Drilling Method: HSA

Boring Location: See Plan
Ground Surface Elev. (ft.): 469.5
Date Start - Finish: 9/8/2021 - 9/8/2021
Final Boring Depth (ft.): 19

Hammer Type: Automatic Hammer
Hammer Weight (lb.): 140
Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.):

Groundwater Depth (ft.)			
Date	**Time**	**Water Depth**	**Stab. Time**
9/8/21		8	
9/8/21		14	

Depth (ft)	Sample No.	Sample Depth (ft.)	Sample Blows (per 6 in.)	Sample SPT Value	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
	S1	0-2	2 4 12 4	16		4" Topsoil Fill - Brown silty clay, little fine to coarse sand, trace fine to coarse gravel (moist)(stiff)		17.4	
	S2	2-4	3 8 13 14	21		Yellow brown fine to coarse sand, some silt, trace fine gravel (moist)(medium dense)			
5	S3	4-6	7 13 16 22	29			5	12.0	
	S4	6-8	15 14 13 11	27		- grading to little fine to coarse gravel (very moist)			
10	S5	8-10	14 8 5 3	13	SM	- grading to little silt (wet)	10		
						- hard drilling @ 13'			
15	S6	15-17	9 16 17 21	33	SM	Gray fine to coarse sand, some silt, little fine gravel (possible rock fragments)(wet)(dense) - hard drilling from 18' to 19' - auger refusal @ 19'	15		
20						End of exploration at 19 feet. Mottling encountered @ 4' Perched groundwater encountered @ 8' Groundwater encountered @ 14' with casing tip at 19'			
25									
30									

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

TEST BORING LOG

MTA, a Division of GZA GeoEnvironmental, Inc
Engineers and Scientists

Rauhaus Freedenfeld & Associates
Proposed Animal Shelter
Pamona, NY

EXPLORATION NO.: B-3
SHEET: 1 of 1
PROJECT NO: 26.0092453.00
REVIEWED BY: A. DeZenzo

Logged By: J. Matallana
Drilling Co.: General Borings, Inc.
Driller: Jim/Sean

Type of Rig: Track Rig
Rig Model:
Drilling Method: HSA

Boring Location: See Plan
Ground Surface Elev. (ft.): 468.5
Date Start - Finish: 9/8/2021 - 9/8/2021
Final Boring Depth (ft.): 22

Hammer Type: Automatic Hammer
Hammer Weight (lb.): 140
Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.):

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab. Time
9/8/21		4.5	
9/8/21		14	

Depth (ft)	Sample No.	Sample Depth (ft.)	Sample Blows (per 6 in.)	Sample SPT Value	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
	S1	0-2	3 5 5 5	10		5" Topsoil Fill - Yellow brown silt, some fine to medium sand (moist)(stiff)		11.0	
	S2	2-4	3 5 4 5	9		- poor recovery with angular gravel fragements in spoon			
5	S3	4-6	7 6 26 50/4"	32	SM	Gray fine to coarse sand, some silt, some fine to coarse gravel (wet)(dense) - hard drilling @ 5' with cobbles in auger spoils	5		
	S4	6-8	20 9 4 4	13		Brown fine to coarse sand, and silt, trace fine gravel (wet)(medium dense)		15.5	
	S5	8-10	2 2 2 12	4		- grading to (loose)			
10	S6	10-12	5 9 12 50/3	21	SM	- grading to (medium dense)	10		
15	S7	15-17	12 37 43 61	80		- hard drilling @ 14' Gray fine to medium sand, some silt, little fine gravel with gravel fragments in tip (possible rock fragments)(moist)(very dense)	15		
20	S8	20-22	19 20 47 52	67	SM	- grading to fine to coarse sand, some silt, trace fine gravel (very moist) - sampler refusal @ 22'	20		
25						End of exploration at 22 feet. Perched groundwater encountered @ 4.5' Groundwater encountered @ 14' with casing tip at 20'			
30									

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

1A - MTA BORING LOG USCS; 11/1/2021; 10:10:38 AM

HAND AUGER LOG

MTA, a Division of GZA GeoEnvironmental, Inc
Engineers and Scientists

Rauhaus Freedenfeld & Associates
Proposed Animal Shelter
Pamona, NY

EXPLORATION NO.: HA-1
SHEET: 1 of 1
PROJECT NO: 26.0092453.00
REVIEWED BY: A. DeZenzo

Logged By: A. DeZenzo
Contractor:
Operator:

Exploration Location: See Plan
Ground Surface Elev. (ft.): 460

Final Exploration Depth (ft.): 2.2
Date Start - Finish: 9/8/2021 - 9/8/2021

Type of Excavator:

Excavator Model:

Groundwater Depth (ft.)			
Date	**Time**	**Water Depth**	**Stab.Time**

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 - Dark brown clayey silt, trace fine to medium sand with occasional cobbles, many fine to medium roots, coarse roots near surface (very moist)(soft)	1	23.4	
1	S2	1	1-2.2	SM	Grayish brown and yellow brown fine to coarse sand and clayey silt (very moist)(loose) - grading to (medium dense) @ 18" - hand auger refusal on cobbles @ 20" - DCP refusal @ 26"	2		
2					End of exploration at 2.2 feet. Groundwater not encountered			
3								
4								
5								
6								
7								
8								
9								
10								

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.: 4A

HAND AUGER LOG

MTA, a Division of GZA GeoEnvironmental, Inc
Engineers and Scientists

Rauhaus Freedenfeld & Associates
Proposed Animal Shelter
Pamona, NY

EXPLORATION NO.: HA-2
SHEET: 1 of 1
PROJECT NO: 26.0092453.00
REVIEWED BY: A. DeZenzo

Logged By: A. DeZenzo
Contractor:
Operator:

Exploration Location: See Plan
Ground Surface Elev. (ft.): 461
Final Exploration Depth (ft.): 1.2
Date Start - Finish: 9/8/2021 - 9/8/2021

Type of Excavator:

Excavator Model:

Groundwater Depth (ft.)			
Date	**Time**	**Water Depth**	**Stab.Time**

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (ft.)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
			0-1		Previous tree roots/void from roots of fallen tree			
1			1-1.2	ML	Yellow brown clayey silt - standing water perched on surface of clayey silt	1		
					End of exploration at 1.2 feet. Groundwater not encountered			
2								
3								
4								
5								
6								
7								
8								
9								
10								

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.: 4B

HAND AUGER LOG

MTA, a Division of GZA GeoEnvironmental, Inc
Engineers and Scientists

Rauhaus Freedenfeld & Associates
Proposed Animal Shelter
Pamona, NY

EXPLORATION NO.: HA-3
SHEET: 1 of 1
PROJECT NO: 26.0092453.00
REVIEWED BY: A. DeZenzo

Logged By: A. DeZenzo
Contractor:
Operator:

Exploration Location: See Plan
Ground Surface Elev. (ft.): 463
Final Exploration Depth (ft.): 1.8
Date Start - Finish: 9/8/2021 - 9/8/2021

Type of Excavator:

Excavator Model:

Groundwater Depth (ft.)			
Date	**Time**	**Water Depth**	**Stab.Time**

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (ft.)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
	S1	0.3	0-0.7		8" Topsoil - Dark brown clayey silt, trace fine to medium sand, trace fine gravel with many fine to coarse roots (moist)			
1	S2	1	0.7-1.8	SM	Yellow brown and dark yellow brown fine to coarse sand, and clayey silt (moist) - hand auger refusal @ 15" - DCP refusal @ 22"	1	16.8	
2					End of exploration at 1.8 feet. Groundwater not encountered			
3								
4								
5								
6								
7								
8								
9								
10								

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.: 4C

HAND AUGER LOG

MTA, a Division of GZA GeoEnvironmental, Inc
Engineers and Scientists

Rauhaus Freedenfeld & Associates
Proposed Animal Shelter
Pamona, NY

EXPLORATION NO.: HA-4
SHEET: 1 of 1
PROJECT NO: 26.0092453.00
REVIEWED BY: A. DeZenzo

Logged By: A. DeZenzo
Contractor:
Operator:

Exploration Location: See Plan
Ground Surface Elev. (ft.): 463
Final Exploration Depth (ft.): 1.7
Date Start - Finish: 9/8/2021 - 9/8/2021

Type of Excavator:

Excavator Model:

Groundwater Depth (ft.)			
Date	**Time**	**Water Depth**	**Stab.Time**

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 - Dark brown clayey silt, trace fine to coarse sand, little fine to coarse gravel with many cobbles and fine to coarse roots (moist)	1		
	S2	1.2	1-1.7	ML	Yellow brown and brown silt, little fine to medium sand, trace fine to coarse gravel (moist) - hand auger refusal @ 18" - DCP refusal @ 20"			
2					End of exploration at 1.7 feet. Groundwater not encountered			
3								
4								
5								
6								
7								
8								
9								
10								

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.: 4D

HAND AUGER LOG

MTA, a Division of GZA GeoEnvironmental, Inc
Engineers and Scientists

Rauhaus Freedenfeld & Associates
Proposed Animal Shelter
Pamona, NY

EXPLORATION NO.: HA-5
SHEET: 1 of 1
PROJECT NO: 26.0092453.00
REVIEWED BY: A. DeZenzo

Logged By: A. DeZenzo
Contractor:
Operator:

Exploration Location: See Plan
Ground Surface Elev. (ft.): 465
Final Exploration Depth (ft.): 1
Date Start - Finish: 9/8/2021 - 9/8/2021

Type of Excavator:

Excavator Model:

Groundwater Depth (ft.)			
Date	**Time**	**Water Depth**	**Stab.Time**

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 - Dark brown clayey silt, trace fine to medium sand, trace fine to coarse gravel - refusal on coarse roots and cobbles @ 12"	1		
2					End of exploration at 1 feet. Groundwater not encountered			
3								
4								
5								
6								
7								
8								
9								
10								

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.: 4E

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.

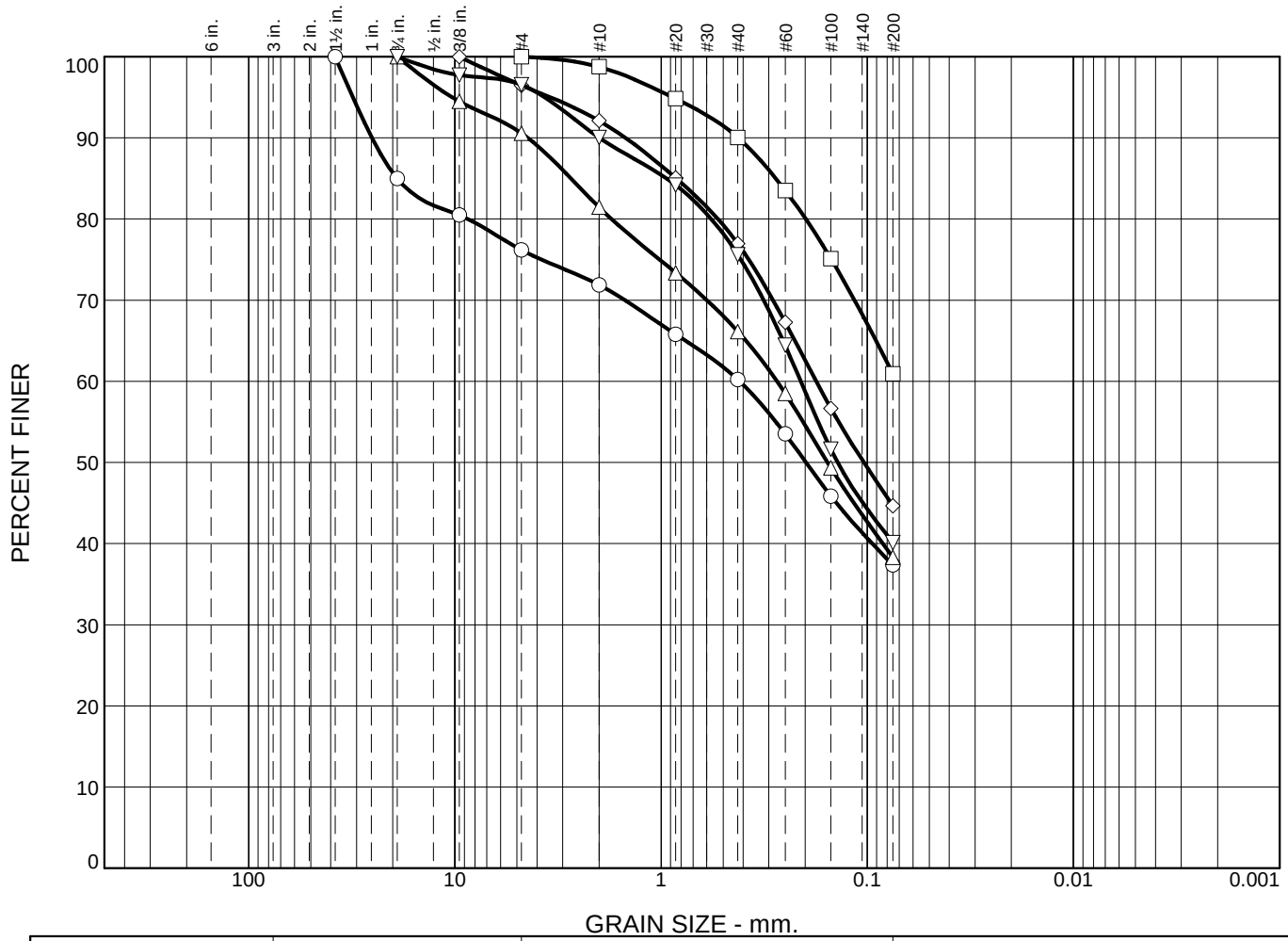
GRADATION*		COMPACTNESS* sand and/or gravel		CONSISTENCY* clay and/or silt	
% Finer by Weight		Relative Density		Range of Shearing Strength in Pounds per Square Foot	
Trace	0% to 10%	Loose	0% to 40%	Very Soft	less than 250
Little	10% to 20%	Medium Dense	40% to 70%	Soft	250 to 500
Some	20% to 35%	Dense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

Gradation Curve(s)



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	15.0	8.8	4.3	11.7	22.8	37.4	
□	0.0	0.0	0.0	1.2	8.7	29.2	60.9	
△	0.0	0.0	9.4	9.2	15.3	27.8	38.3	
◇	0.0	0.0	3.5	4.4	15.1	32.4	44.6	
▽	0.0	0.0	3.5	6.5	14.4	35.5	40.1	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	B-1	2	2-4	F-c Sand, and Silt, some f-c Gravel (MC=12.2%)	SM
□	B-1	4	6-8	Silt, and f-m Sand (MC=24.5%)	ML
△	B-3	4	6-8	F-c Sand, and Silt, trace f Gravel (MC=15.5%)	SM
◇	HA-1	2	1	F-c Sand, and Silt, trace f Gravel (MC=23.4%)	SM
▽	HA-3	2	1	F-c Sand, and Silt, trace f Gravel (MC=16.8%)	SM

Melick-Tully & Associates
a Division of GZA GeoEnvironmental, Inc.
South Bound Brook, NJ

Client: Rauhaus Freedenfeld & Associates
Project: Proposed Animal Shelter - Pomona, NY

Project No.: 26.0092453.00 **Plate** 6

APPENDIX

APPENDIX

Limitations

A. Subsurface Information

Locations: The locations of the explorations were approximately determined by tape measurement from known structures shown on the plans provided. Elevations of the explorations were approximately determined by interpolation between contours shown on topographic plans provided to us by the architect. 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 Rauhaus Freedenfeld & Associates for specific application to the design of the proposed Animal Shelter. 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 proposed Animal Shelter 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 three widely-spaced test borings and five widely-spaced manual hand augers 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 Melick-Tully and Associates, a Division of GZA GeoEnvironmental, Inc. (MTA) 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 MTA 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.