

**GEOTECHNICAL ENGINEERING SERVICES
VA MEDICAL CENTER PARKING STRUCTURE
PHILADELPHIA, PENNSYLVANIA
PENNONI PROJECT No.: THAI 0901.SPD
AUGUST 26, 2009**

for

**TIMOTHY HAAHS & ASSOCIATES, INC.
550 TOWNSHIP LINE ROAD
SUITE 100
BLUE BELL, PA 19422**

by

**PENNONI ASSOCIATES INC.
CONSULTING ENGINEERS
2041 AVENUE C, SUITE 100
BETHLEHEM, PA 18017**

August 26, 2009

THAI 0901.SPD

Mr. Petronilo Alarcon, PE
Vice President of Engineering
Timothy Haahs & Associates, Inc.
550 Township Line Road
Suite 100
Blue Bell, PA 19422

**Re: Geotechnical Engineering Services
VA Medical Center Parking Expansion
Woodland Ave & University Ave
Philadelphia, Pennsylvania**

Mr. Alarcon:

We are pleased to submit our geotechnical engineering report for the project site located at the VA Medical Center in the City of Philadelphia, Pennsylvania. Work was initiated in general accordance with Pennoni's proposal dated March 30, 2009 and your subsequent authorization.

An interim memorandum dated May 18, 2009 presenting our findings and preliminary engineering recommendations was submitted to help expedite design. A copy of the interim report is enclosed in Appendix D.

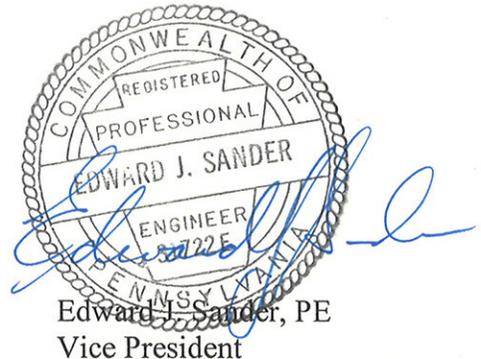
We trust that this report presents the data you require at this time and we thank you for the opportunity to assist you with this project. If you have any questions or if we may be of further assistance, please contact the undersigned at this office.

Respectfully yours,

PENNONI ASSOCIATES INC.



Daniel P. Marano Jr., EIT
Associate Engineer



Edward J. Sander, PE
Vice President

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1.0 INTRODUCTION

1.1 Proposed Construction

The proposed construction consists of a 4.5-story pre-cast concrete parking structure with plans for future expansion of an additional 6 stories. The structure will have isolated columns on the west and east sides with a continuous footing/grade beam in the center of the structure. Shear walls are proposed on the north and south ends of the structure. Portions of the perimeter walls will be designed as retaining walls. Entrances to the garage will be on the ground level on the south side at Elev. 33.09 and Elev. 35.67, and on the 2nd level on the north side at Elev. 46.5. Most of the floors will be sloped ramps with the lowest elevation in the basement at Elev. 27.25. Column loads are expected to vary between 532 and 1,070 tons; wall loads are not expected to exceed 85 kips per lin ft. Structural data were provided by Timothy Haahs & Associates, Inc. (THAI).

1.2 Objectives

Our objectives were to determine subsurface conditions at the project site, evaluate these conditions with respect to the proposed construction, and present recommendations regarding:

- recommendations for foundation design, including discussions of alternate solutions if applicable:
 - if applicable, allowable bearing values and elevations for spread footings or mat foundations
 - if applicable, allowable bearing and side friction values (compression and uplift) for drilled pier foundations; estimated bottom elevations, casing requirements, and potential for bellling will also be discussed
- soil Site Class based on applicable IBC 2006 requirements
- ground slab on-grade including modulus of vertical subgrade reaction
- lateral earth design pressures for retaining walls, basement walls and passive resistance pressures available for resistance to sliding or displacement of foundations due to lateral loads
- ground water conditions with recommendations for waterproofing/hydrostatic design requirements including requirements for wall and/or under-slab drainage (a specific design is not included)
- removal or treatment of objectionable material
- discussion of potential for consolidation and/or differential settlements of substrata encountered
- use and treatment of in-situ materials for controlled fill
- quality assurance and field-testing and inspection during construction

2.0 FIELD AND LABORATORY WORK

2.1 Previous Field Work

Drawings dated February 20, 1987 prepared by Hayes, Large, Suckling, Fruth & Wedge indicate that 44 borings were completed throughout various areas of the property, mostly where existing structures stand. Seven of the borings (B-31, B-32, B-40, B-41, B-42, B-43 and B-44) were located within reasonable distance to the newly proposed structure, and were used in our analyses of the project area.

2.2 Field Work

From May 13 through June 3, 2009 a total of 14 borings were drilled by Connelly & Associates, Inc., at the approximate locations presented on Drawing BOR-1 enclosed in Appendix A. The boring locations were mutually selected by VA Center and Pennoni personnel, and established in the field by Pennoni personnel. Soil samples were obtained in accordance with ASTM D 1586; rock core samples were obtained in accordance with ASTM D 2113. Test boring logs are enclosed in Appendix A.

Our E. Sander, PE directed the field work; D. Marano, EIT performed a site reconnaissance and observed the test drilling.

2.3 Laboratory Work

The samples collected were delivered to our laboratory. Representative samples were selected and tested to determine moisture contents, gradation characteristics, plasticity indices, specific gravity, unconfined shear strengths, and volumetric characteristics of the subsoils. Unconfined shear strengths of representative rock cores were also obtained. Laboratory testing results and a list of testing procedures are presented in Appendix B.

3.0 SITE CHARACTERISTICS

3.1 Location and Surface Features

The VA Medical Center is located in the southwest quadrant of the intersection of Woodland Avenue and University Avenue in the City of Philadelphia, Pennsylvania. The complex is bounded to the north by Woodland Ave., to the east by University Ave., to the south by Amtrak rail lines followed by the Schuylkill River, and to the west by the Woodlands Cemetery.

The project area is located south of the existing hospital and west of the existing parking garage. The area is currently being used as an on-grade employee parking lot. Ground cover is generally bituminous concrete with landscaped islands and scattered trees located throughout. Driveways that provide access to the existing parking garage border the project area to the north and west, and traverse the project area to the south. A moderately used concrete walkway traverses the site in a north to south direction on the east side of the proposed structure. Topography of the site generally descends gradually from the northeast to the southwest. Evidence of below-ground utilities was observed around the perimeter and throughout the site.

3.2 Geology

The project property is located within the Lowland and Intermediate Upland section of the Atlantic Coastal Plain Physiographic Province of Pennsylvania. The main topographic feature of this section is a flat upper terrace surface cut by narrow, steep-sided valleys to open, shallow valleys; includes the Delaware River floodplain.

Available geological data indicate that the subject site is underlain by a contact between the Wissahickon Formation and the Pensauken & Bridgeton Formations. The Wissahickon Formation consists of a coarsely crystalline, excessively micaceous schist. Fracturing results in a well developed, platy pattern. This Formation is fissile to thinly bedded, moderately resistant to weathering, and often highly weathered to a moderate depth.

The Pensauken Formation consists of yellow to dark-reddish brown sand, extensively cross-bedded, interbedded with coarse gravel; boulders are common. This Formation is deeply weathered and crudely fractured.

The Bridgeton Formation consists of extensively cross bedded clayey sand stained reddish brown; below red zone the sand is yellow or white. This Formation is deeply weathered; no fracturing is apparent.

3.3 Subsoils

Borings B-1, B-5, B-7, B-9, and B-11 disclosed a 2 to 3 in. thick layer of topsoil. The remainder of the borings disclosed a 6 in. thick layer of bituminous concrete underlain by a 3 to 4 in. thick stone base. Each boring disclosed a layer of fill to depths below existing grade on the order of 9.5 to 28.5 ft. The underlying subsoils/rock have been grouped by us into five principal strata based on their engineering properties and our interpretation of their origin. Brief strata descriptions are provided on the following page.

<u>STRATUM</u>	<u>DESCRIPTION</u>
F	FILL: SILT/Clayey SILT/CLAY/Sandy SILT with varying amounts of fine to medium Sand, some to little Gravel, brick fragments, concrete fragments, organics, micaceous (SM, SP-SM, ML, CL)
1	SILT/Clayey SILT/SILT & CLAY, with varying amounts of fine to medium Sand, trace Organics (ML, ML-CL)
2	coarse to medium to fine SAND, some coarse to fine Gravel, little to trace Silt (SM)
3	DECOMPOSED SCHIST: medium to fine Sand , little Silt, micaceous (SM, SP-SM)
4	SCHIST, slightly to severely weathered in joints

3.4 Ground Water

The borings indicate water levels vary approximately from Elev. 18.8 to Elev. 28.0. Water readings were obtained immediately after completion of drilling and after a 24 hour period at several boring locations. Rock was cored in each of the borings, therefore the immediate water measurements are most likely not indicative of the true water level(s). The water readings are for the times and conditions described and might not be indicative of seasonal or short-term variations in the ground water levels.

Records from previous borings, performed in 1987, indicate that water was encountered at depths that vary between 11.3 and 50 ft below grades existing at that time (between Elev. 20.8 and Elev. -22.6).

4.0 ANALYSES AND RECOMMENDATIONS

4.1 General

Based on the results of our field exploration and laboratory testing, we conclude that construction of the proposed parking structure is feasible. Because of the presence of a thick variable fill layer, underlain by weak soils of Stratum 1, the proposed structure should be supported on deep foundations bearing in the decomposed and/or competent rock of Strata 3 and 4. Perched water and/or seepage might be encountered in excavations, but static ground water should not be encountered in shallow excavations. On-site, existing fills can be reused as fill in lightly loaded areas including floor slab support. Detrimental long-term post construction settlements are not expected if the recommendations presented herein are followed.

The borings disclosed subsurface conditions generally described according to the 2006 International Building Code (IBC) as having a soil-profile corresponding to Site Class C – very dense soil and soft rock.

4.2 Earthwork

Comparison of the proposed ground floor elevations and existing topography indicates that fills on the order of 1 to 3 ft high are expected within the southwest corner of the building footprint; cuts on the order of 1 to 14 ft deep and 7 to 15 ft deep are expected for the first level and basement level, respectively.

Before placing any new fill, and before the construction of the foundations and floor slabs, all topsoil/vegetation and bituminous concrete located within the proposed footprint should be removed. Pavement millings can be re-used in load bearing fills provided there are no associated environmental issues and the largest particle size is not greater than 2 inches. The existing utilities located within the proposed construction area will be abandoned and relocated outside the proposed building footprint. Any existing utility line abandoned in-place should be grouted or the line should be removed and the trench appropriately backfilled.

Exposed subgrades should be thoroughly proof-rolled, in the presence of a representative from Pennoni, using a loaded dump truck or equivalent, or the subgrade soils should be manually probed in an attempt to disclose unstable surface areas. Any unsuitable area found should be excavated and replaced with suitably compacted fill, or the unstable soils should be stabilized by adjusting the moisture content of the subgrade soils and compacting them, or stabilized by other methods (placing a geotextile and stone layer, lime stabilization, etc.).

Our experience and laboratory test results indicate that the on-site, inert soils can be used in compacted load bearing fills. Visual observations and laboratory testing indicates that the near surface soils consist of fine-grained silt and clay in varying proportions as well as granular deposits of sand, gravel, and construction remnants. The laboratory test results indicate that the present moisture contents of the fine-grain soils vary from near to above the optimum moisture contents normally associated with these soils to achieve the desired degree of compaction. **Lowering the moisture contents of these soils before use in any compacted fills and/or subgrade preparation should be expected.** Based on the results of this study we expect the subgrade to become destabilized under repeated wheel loadings from equipment. The exposed subgrades are also susceptible to softening because of sensitivity to moisture addition. A contingency for the use of coarse aggregate should be considered in the contract documents. To reduce the potential for subgrade destabilization, we recommend that grades preventing the accumulation of water be maintained as well as restricting construction traffic to designated construction roads. Initiating earthwork during climatic periods not conducive to soil drying should be avoided, if possible.

Imported fill material (if required) should be selected from suitable borrow sources and be approved by Pennoni Associates Inc. well in advance of fill construction. Granular fill should consist of well-graded material with not more than 20 percent passing the No. 200 sieve and have a plasticity index not greater than 8 percent.

Fills using on-site or similar soils should be placed in layers not exceeding 6 to 8 in. loose measure. Fills consisting of select granular fill should be placed in layers not exceeding 10 to 12 in. loose measure. This criterion might be adjusted by the geotechnical engineer in the field depending on the conditions present at the time of construction, on the compaction equipment used, and on the fill materials selected. Any materials in the fill having any dimension greater than two-thirds the lift thickness should be removed prior to compaction. Fills for support of floor slabs and pavement areas should be compacted to at least 95 percent of the laboratory determined maximum dry density, ASTM D 698, when small hand operated compaction equipment is used, and to at least 93 percent of the laboratory determined maximum dry density, ASTM D 1557, when self propelled, and heavy duty compaction equipment is used. Fills should extend a minimum of 5 ft beyond the exterior edge of a loaded area and have side slopes not steeper than 2 horizontal to 1 vertical.

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

4.3 Foundations

The borings disclosed subgrade soils incapable of supporting the high column loads associated with the proposed structure. The structure should be supported on deep foundations bearing in the underlying rock formation. We have presented three alternatives for consideration: caissons, auger cast piles, and mini-piles.

Deep Foundations

Caissons

The proposed parking structure can be supported by straight shaft caissons bearing in the decomposed rock of Stratum 3 and/or in the competent rock of Stratum 4. The quality of rock encountered in the borings varies from very poor (decomposed) to good; highly weathered and completely decomposed rock was encountered beneath zones of good quality rock. We recommend that the caissons be designed using both end bearing and skin friction resistance. Belling of the caissons can be considered, but difficulties with ground water intrusion may have a detrimental impact on construction.

The caissons can be designed using an end bearing capacity of 10 tsf and/or 25 tsf in the decomposed rock of Stratum 3 and the competent rock of Stratum 4, respectively. Allowable design friction resistance values of 2,000 psf and 6,000 psf in compression and 1,200 psf and 3,000 psf in tension can be used for the 10 tsf and 25 tsf rock, respectively. A minimum of 5 ft of the competent Stratum 4 rock must be present at the bearing level to support the design value of 25 tsf. Table 4-1 presents the depth below existing grade and the corresponding elevation of the top of 10 tsf and 25 tsf rock.

We were informed by a THAI representative that the anticipated lateral loads from the shear walls on an individual caisson could approach 184 kips. A lateral analysis for a 7 ft diameter caisson revealed a deflection less than 0.25 in. could occur.

Table 4-1

<i>Boring</i>	<i>10 tsf</i>		<i>25 tsf</i>	
	Depth	Elev.	Depth	Elev.
B-1	24.0	13.5	38.0	-0.5
B-2	23.5	11.3	35.5	-0.7
B-3	23.5	15.6	52.5	-13.4
B-4	23.5	13.5	54.0	-17.0
B-5	23.5	15.0	72.5	-34.0
B-6	18.5	23.9	35.0	7.4
B-7	24.5	17.5	39.5	2.5
B-8	28.5	14.3	38.5	4.3
B-9	23.5	18.2	38.5	3.2
B-10	28.5	16.6	68.5	-23.4
B-11	28.5	17.6	71.0	-24.9
B-12	23.5	25.0	68.5	-20.0
B-13	28.5	18.6	57.5	-10.4
B-14	23.5	25.5	64.0	-15.0

Consideration can be given to higher design values, but the quality and strength characteristics of the rock must be further explored/evaluated by means of in-situ testing (pressuremeter, dilatometer, etc.).

The rock capacity should be verified in the field by percussion drilling. Provisions should be made for the contractor to provide all necessary labor and equipment to test drill the base of all caissons for a length not less than 1 ½ times the diameter of the base, but in no case less than 10 ft. Test drilling should consist of percussion drilling with a minimum bit diameter of 2 inches. Consideration can be given to using mechanical drilling equipment in lieu of hand-held equipment, but the rates of both types of drilling should be correlated. Select caissons across the site should be test drilled using both methods; the remainder of the holes can then be test drilled using only the mechanical equipment.

Prior to drilling rock sockets the base of the caisson should be probed to a depth equal to the socket length to confirm the quality of rock used for frictional resistance. After excavating the socket, the socket base should be probed to a depth equal to 1-1/2 times the socket diameter. The specifications should provide for multiple test drill holes in a caisson at the discretion of the field representative.

The keys to successful caisson construction are an experienced and adequately equipped contractor and full-time monitoring of the caisson construction by a representative of the geotechnical engineer who is experienced in caisson construction. All caissons should be temporarily cased during construction; casing should be at least 30 in. in diameter to permit adequate clean-out, inspection, etc.

Encountering static ground water and/or seepage during construction of caissons should be expected. Experience with caisson construction and the test boring results indicate that water inflows should generally be adequately controlled by normal caisson construction techniques. Specifications should clearly state that caisson dewatering will be required to the extent necessary for adequate manual clean-out and inspection of caisson bottoms. Tremie placement of concrete should be permitted only when caissons cannot feasibly be dewatered to the extent necessary for placement of concrete in the dry.

Since the schist rock has a tendency to weather rapidly when exposed to air and water, caisson bases should be kept dry and should be concreted immediately after excavation and inspection. If a base is to be exposed for an extended period of time, a minimum 2 in. thick "mud slab" of lean concrete should be placed to protect the surface.

Auger Cast Piles

Alternatively, the proposed structure can be supported by 16 in. diameter auger cast concrete piles that are designed for a vertical compressive load carrying capacity of 125 tons/pile, an uplift capacity of 80 tons/pile, and a lateral load carrying capacity of 3 tons/pile. The piles should bear on the top of rock; estimated pile lengths are on the order of 38 to 73 ft below existing grade.

Mini-piles

The structure can also be supported by mini-piles consisting of 7 OD in. steel casing with a minimum rock socket on the order of 15 ft. The casing is filled with a neat cement grout having a 28-day compressive strength on the order of 5,000 to 6,000 psi. The load carrying capacity of mini-piles is dependent on bonded and unbonded lengths as well as the condition of the rock bearing stratum; however, it is our opinion that a vertical compressive load carrying capacity of 120 tons/pile, an uplift capacity of 90 tons/pile, and a lateral load carrying capacity of 4 tons/pile can be achieved.

In accordance with Building Codes the auger cast piles and mini-piles will require load tests. The load test location should be selected by the geotechnical engineer. The load test pile should not be a production pile if the pile/soil interface is failed during testing. No construction activity transmitting vibratory or impact loads should be permitted on the project site during load testing. The load test set-up should be protected from inclement weather (wind, rain, intense heat, sunlight, etc.), provided with lights for night-time readings, and guarded on a full-time basis.

Technical details (sketch, description, etc.) of the load test set-up together with certification of the loading device, etc. should be submitted to the geotechnical engineer at least 1 week in advance of load test construction. The load test must be monitored on a full-time basis and test results analyzed by a registered geotechnical engineer.

Shallow Foundations

The proposed retaining walls bearing in the existing fill layer can be designed for an allowable net soil bearing capacity of 2,000 psf. A higher design capacity can be considered, but the existing fill must be excavated and replaced with a suitable soil and/or aggregate that is adequately compacted. The fill must be excavated entirely or to a depth of 2 times the footing width, whichever is less. The width of the excavation at the bottom must be equal to the footing width plus 1 ft for every 1 ft excavated below planned footing bottom elevation. Footings in a newly compacted fill can be designed using an allowable net soil bearing capacity up to 4,000 psf.

Continuous footings should be at least 2 ft wide to prevent localized shear failure in soil. The subgrade of all footings, grade beams, and caisson/pile caps, and any other foundation exposed to freezing temperatures, during construction and/or the life of the structure, should be established at least 3 ft below adjacent exposed grades or otherwise protected against frost action. Foundation subgrades should be checked by a representative of Pennoni Associates Inc. to confirm conditions suitable for support of the design bearing pressure. Where an area is questionable, it should be further explored and/or remedied by removal and replacement of unsuitable material.

4.4 Ground Slabs

The proposed ground floor slabs can be constructed on-grade; the subgrade soils will consist of existing fill and/or a newly compacted load bearing fill. A modulus of vertical subgrade reaction (k_v) for the existing fill of 150 pci can be used for design. A 6 in. thick free-draining granular base course should be placed beneath the ground slabs to provide a uniform bearing surface and to aid in the proper curing of the ground slab concrete. At least 6 in. should be maintained between the bottom of the ground slabs and the tops of the foundations to minimize the potential for ground slab cracking at the foundation edges or the slabs should be designed accordingly to minimize cracking. The ground slabs should be isolated from other structural elements of the building to allow for independent movements.

4.5 Ground Water and Surface Water Management

The ground water observations made in the borings indicate that free-standing water should not be encountered during construction of shallow foundation elements, or during earthwork operations for preparation of subgrades. Where wet conditions and/or seepage are encountered, sumps and pumps should be adequate to maintain temporary stable conditions. It is our professional opinion that under-slab drains or a vapor barrier beneath the ground floors is not required for this project.

During construction, surface runoff must not be allowed to contact the subsoils in excavations. Excavations for utilities should be backfilled as rapidly as possible after excavation. While exposed to precipitation the excavation should be protected against infiltration.

During construction surface runoff should be prevented from entering or ponding in excavations by creating soil berms or diversion swales along the perimeter, if the excavation will be left open for an extended period of time. Where ponding does occur, the water should be removed immediately by pumping. Grades should then be established to prevent further ponding.

4.6 Earth Pressure Parameters

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

Parameter	Existing Fill	Newly Compacted Structural Fill
Unit Weight	130 pcf	135 pcf
Angle of Internal Friction	10°	38°
Friction Factor	0.12	0.47
k_a	0.7	0.24
k_o	0.83	0.38
k_p	1.42	4.17

SOIL TYPE

	Existing Fill	Newly Compacted Fill
Active equivalent fluid pressure (pcf)	90	32.5
At-rest equivalent fluid pressure (pcf)	105	51

The lateral zone behind the wall requiring the Newly Compacted Fill is equal to 0.35H, where H= height of wall.

The earth pressure coefficients are based on the assumption of vertical walls, horizontal backfill, no surcharges, no wall friction, and a safety factor of 1.0. A foundation drain is recommended to be placed behind the wall to relieve hydrostatic pressures caused by surface water infiltrating through the subsoils.

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

5.0 RECOMMENDATIONS FOR FURTHER GEOTECHNICAL SERVICES

To determine if soils, other materials, and ground water conditions encountered during construction are similar to those encountered in the borings, and that they have comparable engineering properties or influences on the design of the structure, we recommend that Pennoni Associates Inc. should provide field observation services during excavation; construction of compacted fill; preparation of foundation and ground slab subgrades; and construction of foundations and floor slabs.

6.0 LIMITATIONS

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

APPENDIX A

Field Data

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 37.5
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-15-09 DATE COMPLETED: 5-15-09
 DEPTH TO WATER> INITIAL: 19' AFTER 24 HOURS: 13 CAVING> C

Pennoni
LOG OF BORING
No. B-1

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
0	3" TOPSOIL						
0.3	FILL: BROWN SILT, SOME MEDIUM TO FINE SAND, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, ORGANICS						
5			F	S-1	10	24-20-9	
6	FILL: GRAY CLAYEY SILT, SOME COARSE TO FINE SAND, LITTLE COARSE TO FINE CONCRETE & BRICK FRAGMENTS			S-2	24	8-6-11-9	
8	FILL: BLACK CLAYEY SILT, SOME COARSE TO FINE SAND, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, COAL ASH, BRICK FRAGMENTS, ORGANICS			S-3	24	3-4-3-3	
10							
9.5	GRAY CLAYEY SILT, SOME MEDIUM TO FINE SAND, MICA						
13.5	GRAY SILT & CLAY, LITTLE FINE SAND, (MOTTLED)			S-4	18	5-8-9	
15			1				
20				S-5	0	29-29-12	
24				S-6	8	25-21-26	SWITCH TO ROLLER BIT
25	DECOMPOSED SCHIST, GRAY/WHITE MEDIUM TO FINE SAND, SOME SILT, MICA						
30			3	S-7	18	10-11-44	
35				S-8	1	50/1"	

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Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
37.5	DECOMPOSED SCHIST, GRAY/WHITE MEDIUM TO FINE SAND, SOME SILT, MICA		4	R-1		REC=100% RQD=80%	AUGER REFUSAL @ 38'
40	SEVERELY WEATHERED SCHIST			R-2		REC=90% RQD=54%	
38.5	MODERATELY WEATHERED, MODERATELY FRACTURED, SOFT SCHIST			R-3		REC=100% RQD=53%	
42	MODERATELY WEATHERED, SLIGHTLY FRACTURED, MEDIUM HARD SCHIST			R-4		REC=100% RQD=46%	
45	MODERATELY WEATHERED, MODERATELY FRACTURED, MEDIUM HARD SCHIST AT 46.2' AND 47.2' SEVERELY WEATHERED SEAMS						
43	SLIGHTLY WEATHERED, MODERATELY FRACTURED, HARD SCHIST						
47.5	SEVERELY WEATHERED, MODERATELY FRACTURED, SOFT SCHIST						
49.3	MODERATELY WEATHERED, MODERATELY FRACTURED, HARD SCHIST						
50.8	MODERATELY WEATHERED, MODERATELY FRACTURED, MEDIUM HARD SCHIST						
53	SLIGHTLY WEATHERED, SLIGHTLY FRACTURED, HARD SCHIST						
54.4	Boring terminated at 55.5 ft.						
60							
65							
70							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 34.8
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-15-09 DATE COMPLETED: 5-15-09
 DEPTH TO WATER> INITIAL: 19' AFTER 24 HOURS: 16' CAVING> C

Pennoni
LOG OF BORING
No. B-2

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
0	6" ASPHALT/3" STONE BASE						
1	FILL: BLACK/TAN, MOIST CLAYEY SILT, SOME COARSE TO FINE SAND, TRACE FINE GRAVEL, ASPHALT FRAGMENTS, BRICK FRAGMENTS, MICA	[Cross-hatched pattern]	F	S-1	2	3-5	
				S-2	24	9-13-13-14	
5				S-3	24	5-9-14-19	
				S-4	24	4-5-9-11	
				S-5	24	4-4-9-9	
9.5	TAN BROWN MEDIUM TO FINE SAND, LITTLE SILT	[Vertical lines]	2				
13.5	TAN BROWN, CLAYEY SILT, SOME MEDIUM TO FINE SAND, MICA	[Vertical lines]		S-6	16	4-4-5	
19.8	TAN BROWN, CLAYEY SILT, SOME MEDIUM TO FINE SAND, COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, MICA	[Vertical lines]	1	S-7	18	6-8-11	
23.5	DECOMPOSED SCHIST, BROWN CLAYEY SILT, SOME MEDIUM TO FINE SAND, MICA	[Cross-hatched pattern]		S-8	18	5-6-11	
29	DECOMPOSED SCHIST, GRAY/WHITE, MEDIUM TO FINE SAND, SOME SILT, MICA	[Cross-hatched pattern]	3	S-9	18	8-10-15	
35.5				S-10	15	33-42-50/3"	

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 34.8
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-15-09 DATE COMPLETED: 5-15-09
 DEPTH TO WATER> INITIAL: 19' AFTER 24 HOURS: 16' CAVING> C



**LOG OF BORING
No. B-2**

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
	SEVERELY WEATHERED, MODERATELY FRACTURED, SOFT SCHIST		4				AUGER REFUSAL @ 35.5'
37.5	MODERATELY WEATHERED, MODERATELY FRACTURED, HARD SCHIST			R-1	REC=100% RQD=42%		
38.8	SLIGHTLY WEATHERED, SLIGHTLY FRACTURED, HARD SCHIST						
40	AT 42' AND 43.5' SEVERELY WEATHERED SEAMS			R-2	REC=100% RQD=68%		
45	SEVERELY WEATHERED, MODERATELY FRACTURED, SOFT SCHIST						
45.5	SLIGHTLY WEATHERED, SLIGHTLY FRACTURED, MEDIUM HARD SCHIST						
46	AT 47' SEVERELY WEATHERED SEAM			R-3	REC=100% RQD=90%		
50	AT 53.5' AND 54.5' SEVERELY WEATHERED SEAMS			R-4	REC=96% RQD=90%		
55	Boring terminated at 55 ft.						
60							
65							
70							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 39.1
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-18-09 DATE COMPLETED: 5-18-09
 DEPTH TO WATER> INITIAL: 18' AFTER 24 HOURS: CAVING> C

Pennoni
LOG OF BORING
No. B-3

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
0	6" ASPHALT/4" STONE BASE						
0.8	FILL: BLACK/BROWN CLAYEY SILT, AND COARSE TO FINE SAND, SOME TO LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, CONCRETE FRAGMENTS	[Cross-hatched pattern]	F	S-1	12	6-8	
				S-2	24	5-7-8-9	
5				S-3	24	7-6-5-9	
				S-4	24	12-15-20-14	
8	FILL: GRAY SILTY CLAY, SOME MEDIUM TO FINE SAND, ORGANICS, BRICK FRAGMENTS	[Cross-hatched pattern]	F	S-5	12	5-9-6-4	
10							
13.5	GRAY/BROWN SILT & CLAY, LITTLE MEDIUM TO FINE SAND, MICA (MOTTLED)	[Vertical line pattern]	1	S-6	18	3-3-4	
15							
18.5	DECOMPOSED SCHIST, ORANGE BROWN SILT, AND MEDIUM TO FINE SAND, MICA	[Dotted pattern]	3	S-7	18	2-4-10	
20							
23.5	DECOMPOSED SCHIST, BROWN/BLACK & WHITE MEDIUM TO FINE SAND, LITTLE SILT, MICA	[Dotted pattern]	3	S-8	7	42-50/5"	
25							
28.5	DECOMPOSED SCHIST, GRAY/WHITE MEDIUM TO FINE SAND, TRACE SILT	[Dotted pattern]	3	S-9	11	11-12-18	
30							
35				S-10	18	12-15-18	

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 39.1
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-18-09 DATE COMPLETED: 5-18-09
 DEPTH TO WATER> INITIAL: 18' AFTER 24 HOURS: CAVING> C

Pennoni
LOG OF BORING
No. B-3

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
37.5	DECOMPOSED SCHIST, GRAY/WHITE MEDIUM TO FINE SAND, TRACE SILT		3	S-11	13	22-31-50/5"	
45				S-12	10	25-41-50/5"	
50				S-13	4	50/4"	
52.5	MODERATELY WEATHERED, MODERATELY FRACTURED, MEDIUM HARD SCHIST		4	R-1		REC=92% RQD=46%	AUGER REFUSAL @ 52.5'
53.5	SEVERELY WEATHERED, MODERATELY FRACTURED, SOFT SCHIST						
55	MODERATELY WEATHERED, MODERATELY FRACTURED, MEDIUM HARD SCHIST						
56.5	SEVERELY WEATHERED, MODERATELY FRACTURED, SOFT SCHIST			R-2		REC=90% RQD=52%	
57.2	SLIGHTLY WEATHERED, MODERATELY FRACTURED, HARD SCHIST						
58.2	MODERATELY WEATHERED, MODERATELY FRACTURED, MEDIUM HARD SCHIST			R-3		REC=97% RQD=74%	
61.5	MODERATELY WEATHERED, MODERATELY FRACTURED, MEDIUM HARD SCHIST						
64	SLIGHTLY WEATHERED, SLIGHTLY FRACTURED, HARD SCHIST WITH QUARTZ						
Boring terminated at 66.5 ft.							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 37.0
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-14-09 DATE COMPLETED: 5-14-09
 DEPTH TO WATER> INITIAL: 18' AFTER 24 HOURS: 15' CAVING> C

Pennoni
LOG OF BORING
No. B-4

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
0	6" ASPHALT/4" STONE BASE						
0.8	FILL: TAN BROWN/BLACK SILT, AND COARSE TO FINE SAND, SOME COARSE TO FINE GRAVEL, BRICK FRAGMENTS, ORGANICS, CONCRETE FRAGMENTS		F	S-1	12	7-5	PETROLEUM ODOR IN CUTTINGS FROM 10' TO 13'
				S-2	14	7-7-50/5"	
5				S-3	20	14-10-13-17	
6	FILL: TAN BROWN/BLACK SILT, SOME MEDIUM TO FINE SAND, LITTLE COARSE TO FINE BRICK FRAGMENTS	S-4	24	5-8-8-17			
10		S-5	20	7-7-15-17			
13.5	TAN CLAYEY SILT, SOME MEDIUM TO FINE SAND, MICA		1	S-6	18	2-2-3	
15				S-7	3	2-4-7	
20							
23.5	DECOMPOSED SCHIST, BROWN/GRAY MEDIUM TO FINE SAND AND SILT, MICA		3	S-8	14	14-21-32	
25							
28.5	DECOMPOSED SCHIST, GRAY/WHITE MEDIUM TO FINE SAND, LITTLE SILT, MICA		3	S-9	18	22-36-30	
30				S-10	18	38-25-42	
35							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THA1 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 37.0
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-14-09 DATE COMPLETED: 5-14-09
 DEPTH TO WATER> INITIAL: 18' AFTER 24 HOURS: 15' CAVING> C

Pennoni
LOG OF BORING
No. B-4

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks	
37.5	DECOMPOSED SCHIST, GRAY/WHITE MEDIUM TO FINE SAND, LITTLE SILT, MICA		3	S-11	11	33-50/5"		
40					S-12	18	11-20-30	
45					S-13	11	42-50/5"	
50					S-14		33-50/1"	
54	SEVERELY WEATHERED, SOFT, SCHIST		4	R-1		REC=75% RQD=25%	AUGER REFUSAL @ 54'	
55.5	SLIGHTLY WEATHERED, SLIGHTLY FRACTURED, HARD GRANITE PEGMATITE				R-2			REC=53% RQD=6%
56	SEVERELY WEATHERED, MODERATELY TO SEVERELY FRACTURED, HARD GRANITE PEGMATITE				R-3			REC=5% RQD=0%
60								
65	Boring terminated at 66 ft.							
70								

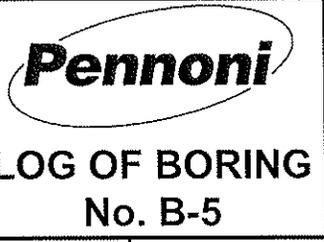
PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 38.5
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-29-09 DATE COMPLETED: 5-29-09
 DEPTH TO WATER> INITIAL: 18 AFTER 24 HOURS: CAVING> C

Pennoni
LOG OF BORING
No. B-5

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
0	3" TOPSOIL						
0.3	FILL: TAN BROWN SILT, SOME MEDIUM TO FINE SAND, LITTLE FINE GRAVEL SIZE ROCK FRAGMENTS			S-1	12	3-3-4-5	
2	FILL: MULTICOLORED COARSE TO FINE SAND, SOME COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, LITTLE SILT			S-2	20	13-13-15-15	
5	FILL: DARK BROWN SILT, SOME COARSE TO FINE SAND, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, BRICK FRAGMENTS, CONCRETE FRAGMENTS, MICA			S-3	24	10-10-6-10	
4				S-4	24	8-9-16-11	
10			F	S-5	24	6-8-18-21	
15				S-6	18	9-7-5	
18.5	TAN BROWN COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, SOME COARSE TO FINE SAND, LITTLE SILT		2	S-7	18	2-10-12	
23.5	DECOMPOSED SCHIST, BROWN/GRAY MEDIUM TO FINE SAND, LITTLE SILT, MICA			S-8	18	6-9-18	
25				S-9	16	12-14-15	
30			3				
33.5	DECOMPOSED SCHIST, GRAY/WHITE, MEDIUM TO FINE SAND, LITTLE SILT			S-10	5	50/5"	
35							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THA1 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 38.5
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-29-09 DATE COMPLETED: 5-29-09
 DEPTH TO WATER> INITIAL: 18 AFTER 24 HOURS: 18 CAVING> C



This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
37.5	DECOMPOSED SCHIST, GRAY/WHITE, MEDIUM TO FINE SAND, LITTLE SILT			S-11	8	20-50/2"	
40							
45				S-12	13	33-34-50/4"	
50				S-13	14	20-41-50/3"	
55			3	S-14	1	50/1"	
60				S-15	10	45-50/4"	
65				S-16	0	50/0"	
70				S-17	0	50/0"	



**LOG OF BORING
No. B-5**

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 38.5
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-29-09 DATE COMPLETED: 5-29-09
 DEPTH TO WATER> INITIAL: 18 AFTER 24 HOURS: 18 CAVING> C

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
72.5	SLIGHTLY WEATHERED, SLIGHTLY TO MODERATELY FRACTURED, HARD SCHIST	4		R-1		REC=100% RQD=58%	AUGER REFUSAL @ 72.5'
75	MODERATELY WEATHERED, SLIGHTLY FRACTURED, MEDIUM HARD SCHIST			R-2		REC=83% RQD=75%	
75.5	MODERATELY WEATHERED, MODERATELY TO SEVERELY FRACTURED, SOFT TO MEDIUM HARD SCHIST			R-3		REC=100% RQD=48%	
79.5	SEVERELY WEATHERED TO DECOMPOSED, SEVERLY FRACTURED SOFT SCHIST						
80.5	MODERATELY WEATHERED, MODERATELY FRACTURED, MEDIUM HARD SCHIST						
82	SLIGHTLY WEATHERED, MODERATELY FRACTURED, HARD SCHIST						
83.5	Boring terminated at 85.5 ft.						
85							
90							
95							
100							
105							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 42.4
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-29-09 DATE COMPLETED: 5-29-09
 DEPTH TO WATER> INITIAL: 22' AFTER 24 HOURS: CAVING> C.

Pennoni
LOG OF BORING
No. B-6

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
0	6" ASPHALT/4" TOPSOIL STONE BASE						
10	FILL: BROWN MEDIUM TO FINE SAND, SOME SILT, LITTLE COARSE TO FINE GRAVEL ROCK FRAGMENTS			S-1	12	8-7	
				S-2	16	7-8-6-6	
5				S-3	12	12-18-6-5	
6	FILL: GRAY/BROWN SILT, SOME COARSE TO FINE SAND, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, BRICK FRAGMENTS, COAL ASH		F	S-4	20	3-2-3-2	
				S-5	24	3-3-3-4	
10							
13.5	GRAY CLAY AND SILT, SOME MEDIUM TO FINE SAND, TRACE COARSE GRAVEL, MICA		1	S-6	18	3-4-3	
15							
18.5	DECOMPOSED SCHIST, TAN BROWN/WHITE COARSE TO FINE SAND, SOME COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, LITTLE SILT			S-7	11	21-30-50/4"	
20							
23.5	DECOMPOSED SCHIST, TAN BROWN MEDIUM TO FINE SAND AND SILT		3	S-8	18	3-5-6	
25							
28.5	DECOMPOSED SCHIST, GRAY/WHITE MEDIUM TO FINE SAND, LITTLE SILT			S-9	10	33-50/5"	
30							
35	SEVERELY WEATHERED TO DECOMPOSED, SOFT SCHIST			S-10	1	50/1"	
							AUGER REFUSAL

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 42.4
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-29-09 DATE COMPLETED: 5-29-09
 DEPTH TO WATER> INITIAL: 22' AFTER 24 HOURS: CAVING> C.

Pennoni
LOG OF BORING
No. B-6

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
35.5	MODERATELY WEATHERED, MODERATELY FRACTURED, HARD SCHIST	[Patterned Graphic]	4	R-1		REC=100% RQD=28%	@ 35'
37	MODERATELY WEATHERED, SEVERELY FRACTURED, HARD SCHIST						
38.5	MODERATELY WEATHERED, MODERATELY FRACTURED, SOFT SCHIST						
40	SLIGHTLY WEATHERED, MODERATELY FRACTURED, HARD SCHIST				R-2		REC=100% RQD=58%
40.5	MODERATELY TO SEVERELY WEATHERED, MODERATELY FRACTURED, SOFT SCHIST						
42.5	MODERATELY WEATHERED, SLIGHTLY FRACTURED, HARD SCHIST						
44.5	SEVERELY WEATHERED, MODERATELY FRACTURED, SOFT SCHIST						
50	Boring terminated at 45 ft.						
55							
60							
65							
70							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 42.0
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-26-09 DATE COMPLETED:
 DEPTH TO WATER> INITIAL: 23' AFTER 24 HOURS: 14 CAVING> C

Pennoni
LOG OF BORING
No. B-7

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
0	2" TOPSOIL						
0.2	FILL: TAN BROWN SILT, SOME COARSE TO FINE SAND, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, BRICK FRAGMENTS, CONCRETE FRAGMENTS, COAL ASH		F	S-1	14	4-3-4-5	
2	FILL: GRAY COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS SOME COARSE TO FINE SAND, TRACE SILT			S-2	16	42-37-50/5"	
4	FILL: GRAY COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS SOME COARSE TO FINE SAND, TRACE SILT			S-3	20	18-14-8-9	
6	FILL: GRAY CLAY AND SILT, LITTLE MEDIUM TO FINE SAND, MOTTLED			S-4	20	8-7-8-5	
8	FILL: BROWN SILT AND COARSE TO FINE SAND, SOME BRICK FRAGMENTS, COAL ASH			S-5	24	9-11-15-17	
13.5	FILL: WHITE/BROWN COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, SOME COARSE TO FINE SAND, LITTLE SILT, BRICK FRAGMENTS, ORGANICS			S-6	18	12-20-18	
15				S-7	14	4-4-7	
23.5	TAN/BROWN COARSE TO FINE SAND, SOME COARSE TO FINE GRAVEL, LITTLE SILT		2	S-8	12	7-5-2	
24.5	DECOMPOSED SCHIST, ORANGE BROWN SILT, SOME MEDIUM TO FINE SAND, MICA		3	S-9	12	12-20-20	
28.5	DECOMPOSED SCHIST: GRAY/WHITE MEDIUM TO FINE SAND, LITTLE SILT, MICA			S-10	4	50/4"	
35							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THA1 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 42.0
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-26-09 DATE COMPLETED:
 DEPTH TO WATER> INITIAL: 23' AFTER 24 HOURS: 14 CAVING> C.

Pennoni
LOG OF BORING
No. B-7

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
37.5	DECOMPOSED SCHIST: GRAY/WHITE MEDIUM TO FINE SAND, LITTLE SILT, MICA		3	S-11		50/0"	AUGER REFUSAL @ 39.5'
39.5	SLIGHTLY WEATHERED, SLIGHTLY FRACTURED, HARD SCHIST			R-1		REC=62% RQD=16%	
40.5	MODERATELY TO SEVERELY WEATHERED, MODERATELY FRACTURED, SOFT SCHIST			R-2		REC=97% RQD=56%	
41.5	MODERATELY WEATHERED, SLIGHTLY FRACTURED, MEDIUM HARD, SCHIST			R-3		REC=87% RQD=33%	
43	SLIGHTLY WEATHERED, MODERATELY FRACTURED, HARD SCHIST		4	R-4		REC=97% RQD=43%	
44.5	MODERATELY WEATHERED, MODERATELY TO SEVERELY FRACTURED, SOFT SCHIST						
50	Boring terminated at 56.5 ft.						
55							
60							
65							
70							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THA1 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 42.8
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-22-09 DATE COMPLETED:
 DEPTH TO WATER> INITIAL: 23' AFTER 24 HOURS: CAVING> C

Pennoni
LOG OF BORING
No. B-8

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
0	6" ASPHALT/4" STONE BASE						
0.8	FILL: BROWN/BLACK COARSE TO FINE SAND, SOME SILT, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, BRICK FRAGMENTS, COAL ASH, CONCRETE FRAGMENTS, MICA	[Cross-hatched pattern]	F	S-1	12	6-8	
				S-2	24	12-16-11-19	
5				S-3	24	4-7-10-7	
6				S-4	20	4-5-5-9	
				S-5	9	50/5"	
10	FILL: TAN BROWN SILT, SOME MEDIUM TO FINE SAND, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, BRICK FRAGMENTS, MICA	[Cross-hatched pattern]	F				
15				S-6	18	12-14-19	
18.5	GRAY CLAY AND SILT, SOME MEDIUM TO FINE SAND, ORGANICS, MICA	[Diagonal lines]	1	S-7	18	3-2-5	
20							
25	DECOMPOSED SCHIST, TAN/BROWN MEDIUM TO FINE SAND, SOME SILT, MICA	[Dotted pattern]	3	S-8	0	14-14-8	
28.5							
30	DECOMPOSED SCHIST, GRAY/WHITE MEDIUM TO FINE SAND, LITTLE SILT	[Dotted pattern]	3	S-9	16	10-14-30	
33.5							
35				S-10	2	50/2"	

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 42.8
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-22-09 DATE COMPLETED:
 DEPTH TO WATER> INITIAL: 23' AFTER 24 HOURS: CAVING> C

Pennoni
LOG OF BORING
No. B-8

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
37.5	DECOMPOSED SCHIST, GRAY/WHITE MEDIUM TO FINE SAND, LITTLE SILT			S-11	3	50/5"	AUGER REFUSAL @ 38.5'
38.5	SEVERELY WEATHERED, SOFT SCHIST			R-1		REC=39% RQD=11%	
40.5	MODERATELY WEATHERED, MODERATELY FRACTURED, HARD SCHIST			R-2		REC=100% RQD=67%	
44.5	MODERATELY WEATHERED, SLIGHTLY FRACTURED, MEDIUM HARD SCHIST			R-3		REC=93% RQD=72%	
47	THIN SEAMS OF SEVERELY WEATHERED, SOFT SCHIST @ 47' AND 48'-2"		4	R-4		REC=100% RQD=78%	
51.5	SLIGHTLY WEATHERED, SLIGHTLY FRACTURED, HARD SCHIST						
56.5	Boring terminated at 56.5 ft.						
60							
65							
70							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 41.7
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-26-09 DATE COMPLETED:
 DEPTH TO WATER> INITIAL: 20' AFTER 24 HOURS: 16' CAVING> C

Pennoni
LOG OF BORING
No. B-9

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
0	2" TOPSOIL						
0.2	FILL: BROWN/BLACK SILT, SOME COARSE TO FINE SAND, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, BRICK FRAGMENTS, CONCRETE FRAGMENTS		F	S-1	18	12-10-10-9	
				S-2	20	11-10-12-7	
5				S-3	18	9-7-11-10	
				S-4	20	8-10-11-7	
10				S-5	16	16-5-16-14	
14.5	FILL: WHITE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS			S-6	2	7-11-34	
18.5	GRAY CLAY & SILT, LITTLE MEDIUM TO FINE SAND, ORGANICS		1	S-7	18	2-3-4	
23.5	DECOMPOSED ROCK, TAN/BROWN MEDIUM TO FINE SAND, AND SILT, MICA			S-8	14	8-8-10	
28.5	DECOMPOSED SCHIST, GRAY WHITE MEDIUM TO FINE SAND, LITTLE SILT, MICA		3	S-9	16	15-14-19	
30				S-10	18	16-13-30	
35							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THA10901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 41.7
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-26-09 DATE COMPLETED:
 DEPTH TO WATER> INITIAL: 20' AFTER 24 HOURS: 16' CAVING> C

Pennoni
LOG OF BORING
No. B-9

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
37.5	DECOMPOSED SCHIST, GRAY WHITE MEDIUM TO FINE SAND, LITTLE SILT, MICA			S-11	1	50/1"	AUGER REFUSAL @ 38.5'
40	SEVERELY WEATHERED, SOFT SCHIST			R-1		REC=78%	
45	SEVERELY WEATHERED, SOFT SCHIST			R-2		REC=100% RQD=63%	
47	SEVERELY TO MODERATELY WEATHERED, SEVERLY TO MODERATELY FRACTURED, SOFT SCHIST		4	R-3		REC=100% RQD=16%	
55				R-4		REC=70% RQD=0%	
Boring terminated at 56.5 ft.							
60							
65							
70							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 45.1
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-19-09 DATE COMPLETED: 5-19-09
 DEPTH TO WATER> INITIAL: ∇ N/E AFTER 24 HOURS: ∇ CAVING> \surd



**LOG OF BORING
No. B-10**

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
0	6" ASPHALT/4" STONE BASE						
	FILL: BROWN SILT & SAND, SOME COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, BRICK FRAGMENTS, CONCRETE FRAGMENTS, MICA		F	S-1	8	12-21	
				S-2	8	8-12	
5				S-3	20	12-8-5-4	
				S-4	6	28	SPOON STARTED TO BEND @ 6.5'
	CONCRETE FRAGMENTS						
10	Boring terminated at 8 ft. AUGER REFUSAL AT 8'						
15							
20							
25							
30							
35							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 45.1
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-19-09 DATE COMPLETED: 5-19-09
 DEPTH TO WATER> INITIAL: ☒ N/E AFTER 24 HOURS: ☒ CAVING> ☒



LOG OF BORING
No. B-10A

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
0	6" ASPHALT/4" STONE BASE						
0.8	AUGER PROBE TO 3'		F				
3	Boring terminated at 3 ft. AUGER REFUSAL						
5							
10							
15							
20							
25							
30							
35							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 45.1
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-19-09 DATE COMPLETED: 5-20-09
 DEPTH TO WATER> INITIAL: 23 AFTER 24 HOURS: CAVING> C.



**LOG OF BORING
No. B-10B**

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
0	6" ASPHALT/4" STONE BASE						AUGER RPOBE TO 8'
0.8	FILL: BROWN SILT & SAND, SOME COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, BRICK FRAGMENTS, CONCRETE FRAGMENTS, MICA						
8	FILL: GRAY/BLACK COARSE TO FINE SAND AND SILT, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, MICA		F	S-5	24	16-13-12-16	
10				S-6	10	10-12-14	
19.5	TAN BROWN SILT AND COARSE TO FINE SAND, SOME COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, MICA			S-7	12	8-10-9	
25			1	S-8	12	4-5-6	
28.5	DECOMPOSED SCHIST, TAN BROWN COARSE TO FINE SAND, SOME SILT, MICA			S-9	13	6-7-9	
30			3	S-10	18	12-20-16	

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 45.1
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-19-09 DATE COMPLETED: 5-20-09
 DEPTH TO WATER> INITIAL: 23 AFTER 24 HOURS: CAVING> C

Pennoni
LOG OF BORING
No. B-10B

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
37.5	DECOMPOSED SCHIST, TAN BROWN COARSE TO FINE SAND, SOME SILT, MICA		3	S-11	12	30-30-51	
43	DECOMPOSED SCHIST, GRAY/WHITE MEDIUM TO FINE SAND, LITTLE SILT			S-12	8	32-50/5"	
45				S-13	14	28-39-43	
50				S-14	16	12-21-32	
55				S-15	5	50/5"	
60				S-16	3	50/3"	
65				S-17	3	50/3"	
68.5	SEVERELY WEATHERED, SOFT SCHIST		4	R-1		REC=100% RQD=30%	AUGER REFUSAL @ 68.5'
69	SLIGHTLY WEATHERED, SLIGHTLY FRACTURED, MEDIUM HARD SCHIST W/QUARTZ						

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 45.1
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-19-09 DATE COMPLETED: 5-20-09
 DEPTH TO WATER> INITIAL: 23 AFTER 24 HOURS: 23 CAVING> C

Pennoni
LOG OF BORING
No. B-10B

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
70	MODERATELY WEATHERED, MODERATELY FRACTURED, SOFT SCHIST		4	R-2		REC=87% RQD=62%	
75	SLIGHTLY WEATHERED, SLIGHTLY FRACTURED, HARD SCHIST W/QUARTZ						
76.5	MODERATELY TO SLIGHTLY WEATHERED, MODERATELY TO SLIGHTLY FRACTURED, MEDIUM HARD SCHIST			R-3		REC=100% RQD=66%	
82	SLIGHTLY WEATHERED, SLIGHTLY FRACTURED, HARD SCHIST			R-4		REC=100% RQD=87%	
86.5	Boring terminated at 86.5 ft.						
90							
95							
100							
105							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 46.1
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-19-09 DATE COMPLETED: 5-21-09
 DEPTH TO WATER> INITIAL: 25' AFTER 24 HOURS: CAVING> C

Pennoni
LOG OF BORING
No. B-11

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
0	2" TOPSOIL						
2	FILL: BROWN SILT, AND COARSE TO FINE SAND, LITTLE COARSE TO FINE GRAVEL SIZE FRAGMENTS, MICA, BRICK FRAGMENTS, ORGANICS			S-1	24	3-3-4-3	
				S-2	11	4-5-7-11	
5				S-3	24	10-12-17-21	
7	FILL: GRAY SILT & CLAY, LITTLE MEDIUM TO FINE SAND (MOTTLED)			S-4	24	7-8-8-10	
8				S-5	24	10-18-20-23	
10	FILL: GRAY/BROWN CLAYEY SILT, SOME COARSE TO FINE SAND, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, COAL ASH, BRICK FRAGMENTS, MICA						
9.5	FILL: DECOMPOSED ROCK, BLACK/WHITE COARSE TO FINE SAND, LITTLE COARSE TO FINE GRAVEL, TRACE SILT, MICA		F	S-6	12	6-7	
13							
15	FILL: GRAY/BROWN SILT, LITTLE MEDIUM TO FINE SAND, BRICK FRAGMENTS, COAL ASH						
20				S-7	12	10-10-11	
23.5	GRAY CLAY AND SILT, SOME MEDIUM TO FINE SAND, ORGANICS		1	S-8	18	2-2-12	
24.8	TAN/WHITE COARSE TO FINE SAND, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS		2				
28.5	DECOMPOSED SCHIST, TAN/BROWN MEDIUM TO FINE SAND, AND SILT, MICA			S-9	18	4-4-6	
30							
33.5	DECOMPOSED SCHIST, TAN/BROWN COARSE TO FINE SAND, AND COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, MICA		3	S-10	17	12-26-50/5"	
35							



**LOG OF BORING
No. B-11**

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 46.1
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-19-09 DATE COMPLETED: 5-21-09
 DEPTH TO WATER> INITIAL: 25' AFTER 24 HOURS: CAVING>

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks	
38.5	DECOMPOSED SCHIST, TAN/WHITE MEDIUM TO FINE SAND, SOME SILT, MICA		3	S-11	18	12-24-28		
40								
45				S-12	9	50-50/4"		
50				S-13	10	28-36-50/5"		
55				S-14	10	20-45-50/3"		
60				S-15	1	50/5"		
65				S-16	5	50/5"		
70								
71							AUGER REFUSAL	

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 46.1
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 5-19-09 DATE COMPLETED: 5-21-09
 DEPTH TO WATER> INITIAL: 25' AFTER 24 HOURS: CAVING>

Pennoni
LOG OF BORING
No. B-11

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
75	SEVERELY FRACTURED, SEVERLY WEATHERED, HARD SCHIST WITH QUARTZ		4	R-1		REC=67% RQD=0%	@ 71'
				R-2		REC=5% RQD=0%	
79				R-3		REC=95% RQD=70%	
80	MODERATELY WEATHERED, SLIGHTLY FRACTURED, MEDIUM HARD SCHIST						
85	Boring terminated at 84 ft.						
90							
95							
100							
105							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 48.5
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 6-2-09 DATE COMPLETED: 6-3-09
 DEPTH TO WATER> INITIAL: ∇ N/E AFTER 24 HOURS: ∇ CAVING> C

Pennoni
LOG OF BORING
No. B-12

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
0	6" ASPHALT/4" STONE BASE						
	FILL: BROWN SILT, SOME COARSE TO FINE SAND, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, BRICK FRAGMENTS		F	S-1	12	13-7	
				S-2	24	7-8-8-9	
5				S-3	12	19-12-50/1"	
	Boring terminated at 5.5 ft. AUGER REFUSAL						
10							
15							
20							
25							
30							
35							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 48.5
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 6-2-09 DATE COMPLETED: 6-3-09
 DEPTH TO WATER> INITIAL: N/E AFTER 24 HOURS: CAVING> C



**LOG OF BORING
No. B-12A**

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
0	6" ASPHALT/4" STONE BASE						AUGER PROBE TO 6'
0-5	FILL: BROWN SILT, SOME COARSE TO FINE SAND, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, BRICK FRAGMENTS						
5-6	FILL: GRAY COARSE TO FINE SAND, SOME COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, LITTLE SILT		F	S-4	18	14-12-16-15	
6-8	FILL: GRAY/BROWN SILT, AND COARSE TO FINE SAND, WITH COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, BRICK FRAGMENTS			S-5	24	9-12-10-12	
8-10							
10-12	Boring terminated at 12 ft. AUGER REFUSAL						
12-15							
15-20							
20-25							
25-30							
30-35							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THA10901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 48.5
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 6-2-09 DATE COMPLETED: 6-3-09
 DEPTH TO WATER> INITIAL: 23' AFTER 24 HOURS: CAVING> C

Pennoni
LOG OF BORING
No. B-12B

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
0	6" ASPHALT/4" STONE BASE						
0.8	FILL: BROWN SILT, SOME COARSE TO FINE SAND, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, BRICK FRAGMENTS		F				AUGER PROBE TO 13.5'
5							
10							
13.5	FILL: BRICK FRAGMENTS			S-6	13	9-12-15	
15							
18.5	FILL: TAN BROWN MEDIUM TO FINE SAND, SOME SILT, SPECKLED WITH BRICK FRAGMENTS, MICA			S-7	18	7-6-5	
20							
23.5	DECOMPOSED SCHIST, TAN BROWN MEDIUM TO FINE SAND, LITTLE SILT, MICA			S-8	18	6-7-10	
25							
30			3	S-9	18	19-21-33	
33.5	DECOMPOSED SCHIST, GRAY/WHITE MEDIUM TO FINE SAND, LITTLE SILT, MICA			S-10		21-36-50/4"	
35							

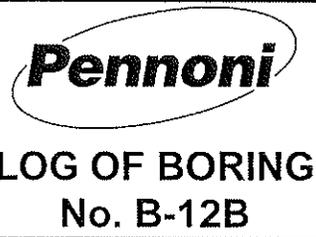
PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 48.5
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 6-2-09 DATE COMPLETED: 6-3-09
 DEPTH TO WATER> INITIAL: 23' AFTER 24 HOURS: CAVING> C

Pennoni
LOG OF BORING
No. B-12B

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
37.5	DECOMPOSED SCHIST, GRAY/WHITE MEDIUM TO FINE SAND, LITTLE SILT, MICA			S-11	16	20-32-50/4"	
40							
45				S-12	11	30-50/5"	
50							
53.5	DECOMPOSED SCHIST, GRAY/WHITE COARSE TO FINE SAND, SOME COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, TRACE SILT		3	S-13	5	50/5"	
55							
60				S-14	5	25-50/5"	
65							
68.5				S-15	1	50/1"	
70	MODERATELY WEATHERED, SLIGHTLY FRACTURED SCHIST, MEDIUM HARD			S-16	0	50/0	
				R-1		REC=75% RQD=60%	AUGER REFUSAL @ 68.5'

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 48.5
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 6-2-09 DATE COMPLETED: 6-3-09
 DEPTH TO WATER> INITIAL: 23' AFTER 24 HOURS: CAVING> C



This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
75	MODERATELY WEATHERED, SLIGHTLY FRACTURED SCHIST, MEDIUM HARD		4	R-2		REC=100% RQD=68%	
80	Boring terminated at 76.5 ft.						
85							
90							
95							
100							
105							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 47.1
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 6-1-09 DATE COMPLETED: 6-2-09
 DEPTH TO WATER> INITIAL: 22' AFTER 24 HOURS: CAVING> C



**LOG OF BORING
No. B-13**

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
0	6" ASPHALT/4" STONE BASE						
0.8	FILL: BROWN SILT, AND COARSE TO FINE SAND, SOME COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS			S-1	12	8-10	
2	FILL: TAN/WHITE COARSE TO FINE SAND, SOME COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, LITTLE SILT			S-2	20	19-21-24-19	
4	FILL: BROWN MEDIUM TO FINE SAND AND SILT			S-3	20	19-17-12-10	
6	FILL: BROWN COARSE TO FINE SAND, SOME SILT, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS			S-4	18	14-14-17-12	
10				S-5	20	12-12-14-11	
13.5	FILL: BROWN SILT, SOME COARSE TO FINE SAND, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, BRICK FRAGMENTS, MICA		F	S-6	9	4-4-6	
20				S-7	16	4-4-4	
25				S-8	8	3-3-4	
28.5	DECOMPOSED SCHIST, BROWN/GRAY MEDIUM TO FINE SAND, SOME SILT, MICA			S-9	18	6-8-9	
33.5	DECOMPOSED SCHIST, GRAY/WHITE MEDIUM TO FINE SAND, LITTLE SILT		3	S-10	5	50/5"	
35							

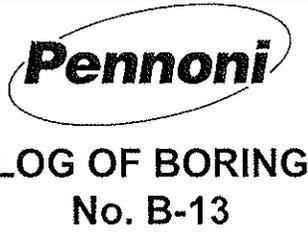
PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 47.1
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 6-1-09 DATE COMPLETED: 6-2-09
 DEPTH TO WATER> INITIAL: 22' AFTER 24 HOURS: CAVING> C

Pennoni
LOG OF BORING
No. B-13

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks	
38	DECOMPOSED SCHIST, GRAY/WHITE MEDIUM TO FINE SAND, LITTLE SILT		3	S-11	18	6-18-26		
40								
45				S-12	5	50/5"		
50				S-13	5	50/5"		
55				S-14	4	50/4"		
57.5	SEVERELY WEATHERED, SEVERLY FRACTURED, SOFT SCHIST		4	R-1		REC=78% RQD=36	AUGER REFUSAL @ 57.5'	
57.8	MODERATELY FRACTURED, SLIGHTLY WEATHERED, HARD SCHIST							
60	SEVERELY WEATHERED, SEVERLY FRACTURED, SOFT SCHIST							
60.5	MODERATELY FRACTURED, SLIGHTLY WEATHERED, HARD SCHIST							
62.5	SEVERELY WEATHERED, SEVERLY FRACTURED, SOFT SCHIST							
62.8	MODERATELY FRACTURED, SLIGHTLY WEATHERED, HARD SCHIST							
64	MODERATELY TO SEVERELY WEATHERED, MODERATELY FRACTURED, SOFT SCHIST							
65.5	3" & 5" SEAMS OF HARD SCHIST WITH DECOMPOSED SCHIST LAYERS IN BETWEEN							
68								

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THA10901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 47.1
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 6-1-09 DATE COMPLETED: 6-2-09
 DEPTH TO WATER> INITIAL: 22' AFTER 24 HOURS: 22' CAVING> C



This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
	SEVERELY WEATHERED, MODERATELY FRACTURED, SOFT SCHIST Boring terminated at 70.5 ft.						
75							
80							
85							
90							
95							
100							
105							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 49
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 6-1-09 DATE COMPLETED: 6-1-09
 DEPTH TO WATER> INITIAL: 25' AFTER 24 HOURS: CAVING> C

Pennoni
LOG OF BORING
No. B-14

This information pertains only to this boring and should not be interpreted as being indicative of the site. (12/03)

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (Inches)	Blow Counts	Remarks
0	6" ASPHALT/4" STONE BASE						
0.8	FILL: BROWN SILT, AND COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, SOME COARSE TO FINE SAND		F	S-1	12	12-10	
2	FILL: GRAY COARSE TO FINE SAND, AND COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, LITTLE SILT			S-2	14	14-12-9-9	
4	FILL: DARK BROWN SILT, SOME COARSE TO FINE SAND, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, BRICK FRAGMENTS			S-3	18	3-4-3-5	
8	FILL: BRICK FRAGMENTS			S-4	24	3-4-6-6	
10				S-5	24	12-14-18-21	
13.5	FILL: DARK BROWN SILT, SOME COARSE TO FINE SAND, LITTLE COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, BRICK FRAGMENTS			S-6	12	21-30-50/3"	
15				S-7	18	6-6-7	
20							
23.5	DECOMPOSED SCHIST, TAN/BROWN COARSE TO FINE SAND, SOME COARSE TO FINE GRAVEL SIZE ROCK FRAGMENTS, LITTLE SILT, LARGE MICA FLAKES		3	S-8	18	4-6-7	
25				S-9	18	4-7-8	
33.5	DECOMPOSED SCHIST, GRAY/WHITE MEDIUM TO FINE SAND, LITTLE SILT			S-10	5	50/5"	
35							

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 49
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 6-1-09 DATE COMPLETED: 6-1-09
 DEPTH TO WATER> INITIAL: 25' AFTER 24 HOURS: CAVING> C

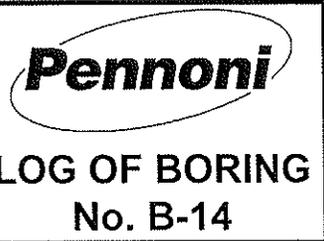


**LOG OF BORING
No. B-14**

This information pertains only to this boring and should not be interpreted as being indicative of the site.

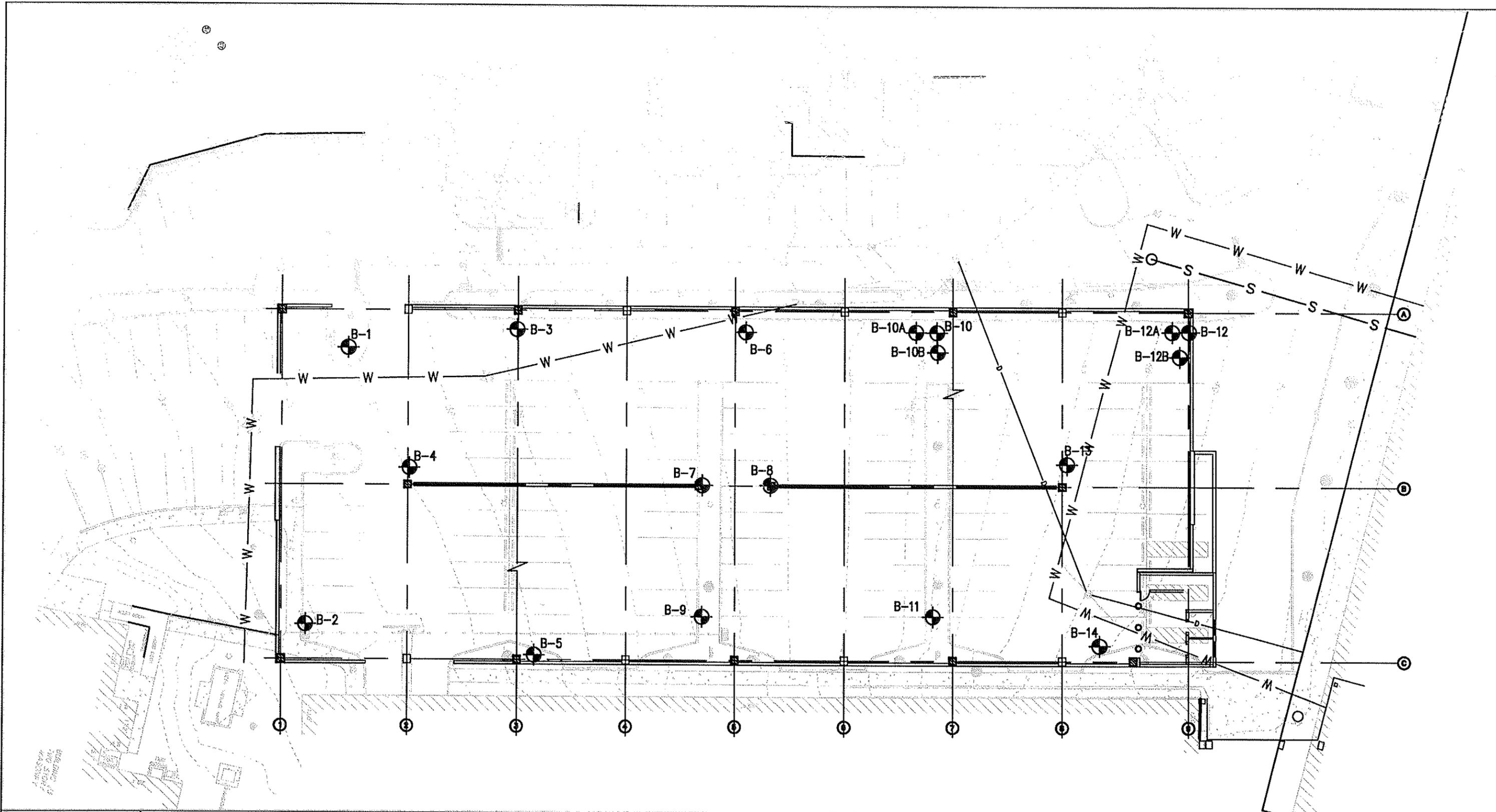
Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks	
38	DECOMPOSED SCHIST, GRAY/WHITE MEDIUM TO FINE SAND, LITTLE SILT		3	S-11	1	50/1"		
40								
45				S-12	18	13-21-43		
50				S-13	4	50/4"		
55				S-14	0	50/2"		
60								
64	MODERATELY WEATHERED, MODERATELY FRACTURED, MEDIUM HARD SCHIST			S-16	0	50/0"	AUGER REFUSAL @ 64'	
65			R-1		REC=78% RQD=30%			
67	SEVERELY WEATHERED, SEVERLY FRACTURED, SOFT SCHIST							
67.5								
70	MODERATELY WEATHERED, MODERATELY FRACTURED, MEDIUM HARD SCHIST			R-2		REC=80% RQD=0%		
70	MODERATELY WEATHERED, MODERATELY FRACTURED,		4					

PROJECT: VA MEDICAL BUILDING PROJECT NO.: THAI 0901
 PROJECT LOCATION: PHILADELPHIA, PA
 DRILLING FIRM: CONNELLY & ASSOCIATES ELEVATION: 49
 FOREMAN: M. BALLEW LOGGED BY: D. MARANO
 DRILLING METHOD: HOLLOW STEM AUGER
 DATE STARTED: 6-1-09 DATE COMPLETED: 6-1-09
 DEPTH TO WATER> INITIAL: 25' AFTER 24 HOURS: CAVING> C



This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Description	Graphic	Stratum	Sample No.	Recovery (inches)	Blow Counts	Remarks
71.5	MEDIUM HARD SCHIST		4	R-3		REC=88% RQD=51%	
75	MODERATELY WEATHERED, MODERATELY FRACTURED, MEDIUM HARD SCHIST						
80	Boring terminated at 76.5 ft.						
85							
90							
95							
100							
105							



Pennoni Associates Inc.
Consulting Engineers



2041 AVE C
SUITE 100
BETHLEHEM, PA

VA MEDICAL CENTER PARKING EXPANSION BORING LOCATION PLAN

SCALE: 1"=30'
DATE: 06/02/09
DWN BY: DPM
REV.:
REV. BY:
DWG #: BOR-1
JOB #: THAI0901
SHEET: 1 OF 1

APPENDIX B
Laboratory Data

LABORATORY TESTING PROCEDURES

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

1. Consolidation Test of Soils
Preparation of samples and testing procedures generally follow the methods described in Lambe, op. Cit. In addition, the time of loading may be selected on the basis of:
 - a. Controlled rate of percent of consolidation
 - b. Controlled pore pressure gradient
 - c. Controlled strain

The method of test is selected to suit the soil type in question and the test is conducted in accordance with generally accepted engineering practice.
2. Atterberg Limits – Plasticity Indices
 - a. Liquid limit of soils, ASTM D 4318
 - b. Plastic limit and plasticity index of soils, ASTM D 4318
 - c. Shrinkage factors of soils, ASTM D 427

(Moisture content is also determined with the Atterberg Limit test, and liquidity index is also computed)
3. Moisture Content of Soil
ASTM D 2216
4. Particle Size Analysis of Soils
ASTM D 421, Dry preparation of soil samples;
ASTM D 422, Sieve and/or hydrometer analysis.
5. Triaxial Compression Test of Soils
Sample preparation, apparatus, and testing generally follow the procedures outlined in Soil Testing for Engineers, T.W. Lambe, John Wiley & Sons, Inc., New York, 1951 and in The Measurement of Soil Properties in the Triaxial Test, Alan W. Bishop & D.J. Henkel, 2nd Edition, St. Martin's Press, New York, 1962
6. Unconfined Compression Strength of Cohesive Soil
ASTM D 2166
7. Specific Gravity of Soils
ASTM D 854
8. Unit Weight Determination of Soils
See ASTM D 2166 for preparation of specimen except that sample size may differ. For moisture content see ASTM D 2216.
9. Visual Identification of Soil Samples
All soil samples are visually identified and/or classified. The classification system used is shown in Table L-1.
10. Identification of Rock
Rock core samples are identified by the character and appearance of newly fractured surfaces of unweathered pieces, by core conditions and characteristics, and by the determination of simple physical and chemical properties.
11. Compaction Test of Soils
 - a. Moisture-density relations of soils using 5.5 lb. hammer and 12 in. drop, ASTM D 698
 - b. Moisture-density relations of soils using 10 lb. hammer and 18 in. drop, ASTM D 1557
12. Maximum and Minimum Densities of Granular Soils
Testing procedures follow D.M. Burmeister, "Suggested Method of Test for Maximum and Minimum Densities of Granular Soils" cited in Proceedings for Testing Soils, Fourth Edition, ASTM, Philadelphia. 1964, pp 175-177.
13. Bearing Ratio of Laboratory Compacted Soils
ASTM D 1883 (Sometimes called California Bearing Ratio or CBR)
14. Organic Content
A modified dichromate oxidation method using ferrous ammonium sulfate is employed in determining the percent of organic matter in soil.

APPENDIX C
Standard Symbols

STANDARD SYMBOLS

B	Width of footing	P	deviator stress
c	cohesion	P_c	estimated probable preconsolidation pressure
c_v	coefficient of consolidation	P_o	existing overburden pressure
C_c	compression index	q_a	allowable soil bearing pressure
C	coefficient of secondary compression	Q	triaxial compression test unconsolidated and undrained
C_3	swelling index	Q_c	triaxial compression test consolidated and undrained
C_u	uniformity coefficient (D_{60}/D_{10})	S	triaxial compression test consolidated and drained
CBR	California Bearing Ratio	S_r	degree of saturation
D_f	depth of foundation	u	pore-water pressure
D_p	diameter of grain corresponding to percentage p on grain size curve	U	degree of consolidation
D_{10}	effective grain size	U_c	unconfined compression test
E	modulus of linear deformation	w_f	moisture content at end of test
E_s	Young's Modulus	w_l	liquid limit
e	void ratio	w_n	natural moisture content
F_s	factor of safety	w_p	plastic limit
G	specific gravity	γ	unit weight
h	hydraulic head	γ_d	dry unit weight
H	stratum thickness	γ_b	submerged unit weight
i	hydraulic gradient	ϵ	unit linear strain
I_L	liquidity index	ϵ_f	unit linear strain at failure
I_p	plasticity index	σ	normal stress
k	coefficient of permeability	σ_1	major principal stress
k_h	coefficient of horizontal subgrade reaction	σ_3	minor principal stress
k_v	coefficient of vertical subgrade reaction	τ	shear stress
l	length of footing	ϕ	angle of internal friction
n	porosity	k_a	coefficient of active pressure
		k_p	coefficient of passive pressure
		δ	friction angle
		$\tan \delta$	friction factor

APPENDIX D

Interim Memorandum

May 18, 2009

THAI 0901.SPD

Mr. Noli Alarcon
Vice President - Engineering
Timothy Haahs & Associates, Inc.
550 Township Line Road, Suite 100
Blue Bell, PA 19422

**Re: Geotechnical Engineering Services
VA Medical Center Parking Expansion
Woodland Ave & University Ave
Philadelphia, Pennsylvania**

Dear Mr. Alarcon:

The following is a summary of our findings and preliminary recommendations for this project.

Proposed Construction

The proposed construction is on the grounds of the VA Medical Center located in Philadelphia, PA. The proposed construction consists of a 4.25-story pre-cast parking structure adjacent to the existing parking deck. There is also the potential for future expansion which includes six (6) additional levels for a total of ten (10) levels. The maximum column loads are on the order of 1700 tons.

Historical Data

Drawings dated February 20, 1987 from Hayes, Large, Suckling, Fruth & Wedge indicate that forty-four (44) test borings were completed through various sections of the property. Seven (7) of the test borings (B-31, B-32, B-40, B-41, B-42, B-43, and B-44) were located within reasonable distance to the newly proposed structure, and were used to assist in our analyses of the site.

Field Work

From May 13 through May 15, 2009 a total of three (3) of the proposed fifteen (15) test borings have been drilled by Connelly & Associates, Inc., Inc at the approximate locations presented on Drawing TB-1. The test boring locations were selected and established in the field by Pennoni Associates Inc. personnel. Soil samples were obtained in accordance with ASTM D 1586, and rock core samples were obtained in accordance with ASTM D 2113. Preliminary test boring logs and a preliminary Test Boring Location Plan are attached.

Ground Water

The borings indicate that water levels vary between 18 and 19 ft below existing grades, and fluctuate several inches after 24 hours. Water readings were obtained immediately after completion of drilling and left open to obtain a 24 hour reading. The water readings are for the times and conditions described and might not be indicative of seasonal or short-term variations in the ground water levels.

Records of previous borings indicate that water was encountered at depths that vary between 11.3 and 50 ft below existing grades.

Foundations

The current and previous test borings were extended to depths varying from 25 to 66 ft below existing grades where refusal to further penetration of the drilling tools was encountered. The rock was then cored at least 5 ft and up to 19.5 ft. The quality of the rock did not improve significantly with greater depth.

The structure can be supported on a deep foundation system consisting of caissons or mini-piles. Shallow foundations bearing in the existing fill are not suitable for support. If possible, we will evaluate ground modification techniques and determine if it is an economically feasible solution.

Caissons

The new structure can be supported by caissons founded in rock. Because of the variability of the rock quality we recommend that the caissons be designed for an allowable value of 20 to 40 tsf. Presently, bearing elevations are estimated to be on the order of 35 ft and greater below existing grades.

Mini-piles

The structures can also be supported by mini-piles consisting of 7 in. steel casing with a load carrying capacity of 200 tons bearing in the competent bedrock. The casings should be drilled to the top of competent rock and then socketed 15 to 20 ft into the corable rock.

Earthwork

Preliminary information suggests that no significant cuts or fills are necessary to achieve working grades. We do not anticipate difficulties for excavations for utilities. Preliminary soil classifications indicate that the on-site, inert soils can be used in compacted load bearing fills, however, the present moisture contents of these soils vary from near to above the optimum moisture contents normally associated with these soils to achieve the desired degree of compaction. Lowering the moisture contents of these soils before use in any compacted fills and/or subgrade preparation should be expected. Additionally, the fine-grained existing fill soils are moisture sensitive and will become unstable with the addition of moisture. Initiating earthwork during climatic periods not conducive to soil drying should be avoided, if possible.

Ground Floor Slab

The ground floor slab can be constructed on-grade. A layer of free-draining aggregate at least 6 in. thick should be provided immediately beneath the floor slab to provide a uniform bearing surface and to minimize subgrade disturbance caused by construction traffic. A distance of at least 6 in. should be maintained between the bottom of the slab and the foundation tops to reduce the tendency for slab cracking at the foundation edges, or the slab should be designed to resist such cracking. The slab should be isolated from other structural members to allow for the slab to move independently of the other members.

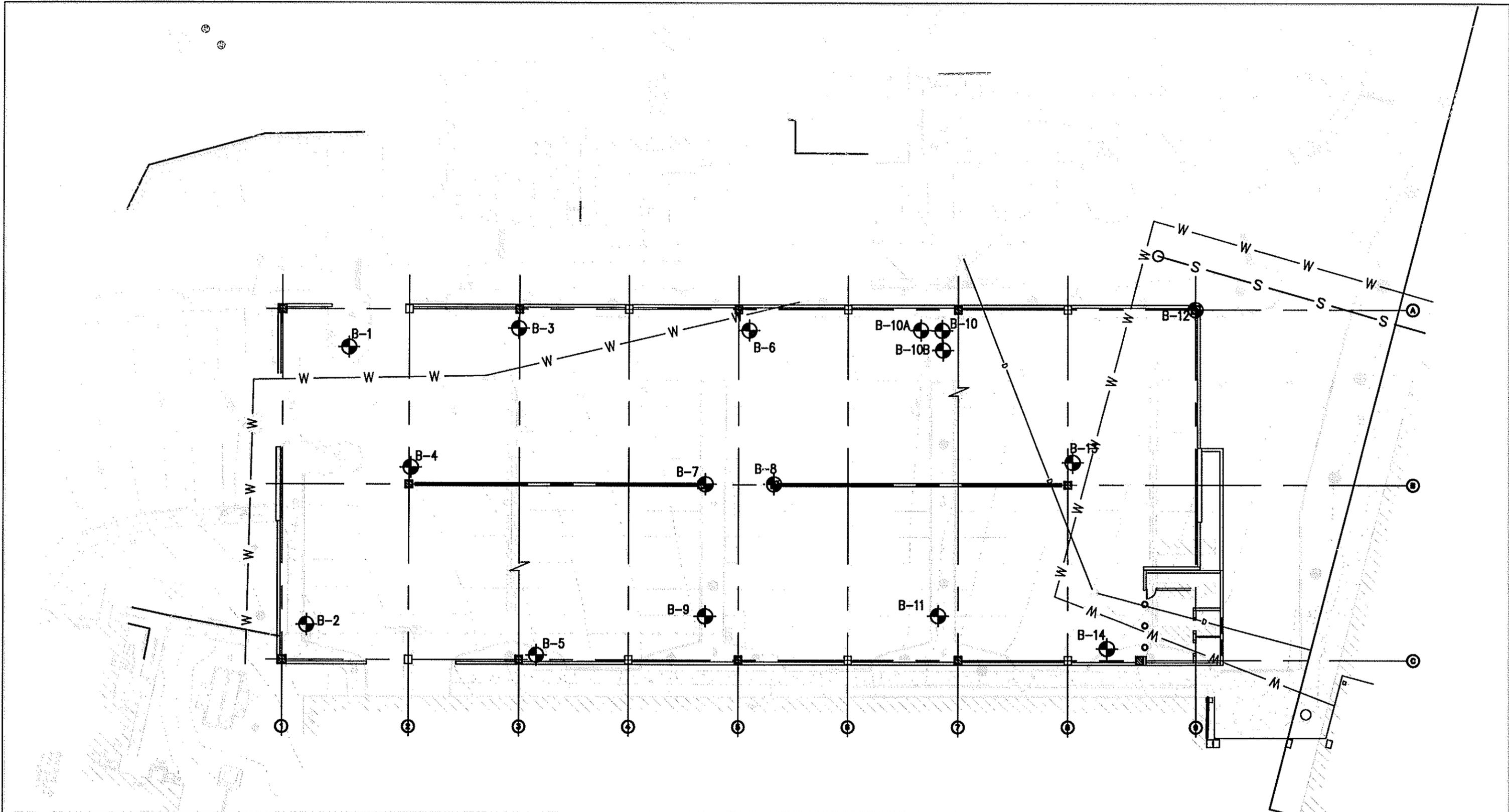
Upon completion of laboratory testing and further evaluation of available data, we will submit our detailed engineering report with refined recommendations.

Respectfully yours,

PENNONI ASSOCIATES INC.

Daniel P. Marano, Jr., EIT
Associate Engineer

Mark Giunta, PE
Project Engineer



Pennoni Associates Inc.
 Consulting Engineers



One Drexel Plaza
 3001 Market Street
 Philadelphia, PA

VA HOSPITAL PARKING GARAGE BORING LOCATION PLAN

SCALE: 1"=30'
DATE: 06/02/09
DWN BY: DPM
REV:
REV. BY:
DWG #: BOR-1
JOB #: THAI0901
SHEET: 1 OF 1



PENNONI ASSOCIATES INC.
CONSULTING ENGINEERS

August 17, 2010

DOVA 1001.01

Mr. Jeffrey Maciejewski
Department of Veteran Affairs
University & Woodland Avenue
Philadelphia, PA 19104

**Re: Percussion Drilling Analysis
VA Parking Garage, Philadelphia, PA**

Dear Mr. Maciejewski:

As requested, please find enclosed the summary of estimated depths to competent rock at each caisson derived from the percussion drilling that was performed at the above referenced site.

Should you have any questions, please do not hesitate to contact us.

Very truly yours,

PENNONI ASSOCIATES INC.

Michel Hatem, P.E.
Senior Engineer
Inspection & Testing Technology

MH/EJS/lwf

Enclosure

Edward J. Sander, P.E.
Vice President

I:\Reports\Reports 2010\DOVA 1001.01-Percussion Drilling Analysis-8-17-10.doc



Column	G.S.	Top of Decomposed Below Existing Grade	Thickness (ft.) Decomposed (ft.) Decomposed
A-1	33.1	26	15
A.7-1	32 +/-	26	26
A.5-3.6	34.4	24	34
A-2	37.5	24	18
A-3	39.1	18.5	34
A-4	36.8	20	30
A-5	35.5	31	22
A-6	39.2	30	32
A-7	40.1	32	36
A-8	41.6	31	29
A-9	44	30	31
A.7-9	41.1	29	35
B.3-1	35 +/-	26	16
B.3-8.5	40.8	43	23
B-2	37	23.5	32
B-3	33.4	24	48
B-4	34.8	30	32
B-4.8	42	24.5	17
B-5.2	42.8	28.5	12
B.5-6	34.6	28	40
B-6	35	28	24
B-7	35.2	42	41
B-8	39.9	56	15
B.3-9	41.8	27	27
B.6-8.5	42 +/-	34	33
B.6-9	42.4	30	32
C-1	35 +/-	28	19
C-2	32.5	20	35
C-3	38.5	23.5	49
C-4	33.6	24	40
C-5	41.7	23.5	15.5
C-6	34.4	28	40
C-7	46.14	30	42
C-8	41	29	36
C-8.5	41.6	31	26
C-9	43.4	41	24
AE.5-19E.5	47.4	26	44