GEOTECHNICAL INVESTIGATION REPORT
ADDITION TO THE READING LIBRARY
64 MIDDLESEX AVENUE
READING, MASSACHUSETTS

December 13, 2010

GSI Project No. 210314

Prepared for:

Peter Byerly
Beacon Architectural Associates
145 South Street
Boston, Massachusetts 02111

Prepared by:

Geotechnical Services, Inc.
18 Cote Avenue
Goffstown, New Hampshire 03045

GEOTECHNICAL SERVICES INC.

Geotechnical Engineering · Environmental Studies · Materials Testing · Construction Monitoring

December 13, 2010

Peter Byerly
Beacon Architectural Associates
145 South Street
Boston, MA 02111

RE: Geotechnical Investigation Report
Addition to the Reading Library
64 Middlesex Avenue
Reading, Massachusetts
GSI Project No. 210314

Dear Mr. Byerly:

Geotechnical Services, Inc. (GSI) is pleased to submit the following geotechnical report for the referenced project. The contents of this report are subject to the Limitations outlined in Appendix A.

PROJECT OVERVIEW AND SITE CONDITIONS

The Town of Reading, Massachusetts has proposed an addition to the existing library located at 64 Middlesex Avenue in Reading, MA. The library lies to the south of Middlesex Avenue, in between School Street to the east and Deering Street to the west. The current library building was originally constructed as the Highland School in 1986, by architect Horace G. Wadlin, and is listed in the National Register of Historic Places as building #84002643, added on July 19, 1984. The structure is a multi-story, masonry building with a full basement, and is currently accessed from the north and west. Parking is available to the south of the building. The structure sits upon a topographic rise, with the current site grades sloping downward to the north and west, and to the south beyond the parking area. Green areas have been constructed to the north and east of the facility.

The proposed construction is to consist of a multi-story addition, with a full basement, which will abut the existing facility to the east, displacing the current drive-loop, and expanding upon the original library building. The new addition will extend outward within the area to the east currently used as a landscape area. The development plans provided did not indicate the proposed alterations to the parking areas or site access; however, it is expected that the pavement will extend around the east side of the new addition. Construction details were derived from the plan sheet prepared by Beacon Architectural Associates of Boston, Massachusetts, and dated November of 2010.

GEOTECHNICAL INVESTIGATION

A series of three test borings were advanced on November 29, 2010 for the purpose of evaluating the geotechnical properties of the existing soils and developing a subsurface profile. These explorations classified the on-site soils according to their color, grain size, and other material properties. The soil-boring program was conducted by Expedition Drilling of Manchester, New Hampshire, utilizing a CME truck mounted drill rig turning 2.25-inch diameter augers. The test borings were advanced within the proposed building footprint in accordance with methods prescribed by ASTM D 1586.

Soil samples were typically obtained at the surface and at two foot to five-foot intervals with a 1-⅜ inch diameter split-spoon sampler. The test borings were advanced to a typical termination depth of 20-feet below existing grade or refusal at shallower depths as noted on the test boring logs. Standard Penetration Tests (SPTs) were performed at the sampling intervals in accordance with ASTM D1586. Field descriptions and penetration resistance of the soils encountered, observed depth to groundwater while drilling when observed, and other pertinent observations are contained in the attached test boring logs. The test boring locations are illustrated on Figure 2 of this report.

SUBSURFACE CONDITIONS

Surface Samples

Drilling operations took place within the east access driveway and the adjacent grass area. The asphalt pavement was approximately 3-inches in thickness at test boring locations B-1 and B-2. Twelve (12)-inches of topsoil was noted at test boring location B-3, which was advanced within the lawn area to the east of the existing building.

Sand and Gravel

The predominate soil encountered at all three test boring locations is a medium to very dense, coarse to fine Sand, and Gravel, little Silt, which became denser with depth. A shallow refusal was encountered at test boring B-1, but due to the location of this test boring in between the other two, and the advancement of the other borings beyond a depth of 20-feet in close proximity, it is highly unlikely that refusal was met upon bedrock.

Groundwater

Groundwater was not encountered during the execution of the test-boring program. Due to the immediate topography, groundwater may be deep in the immediate area. Groundwater levels at the time of the test-boring program were determined via measurement of water within the borehole and observed within wet soil samples. Groundwater is not expected to be an immediate issue during construction; however, the general contractor should be prepared for groundwater within the subgrade excavations should the water level fluctuate or become more readily apparent within a large open excavation or following rain events.

As a basement is proposed as part of the new construction, construction dewatering may be an issue during subgrade excavation dependent on the actual groundwater levels at that time of year. Also groundwater may pass over and through the ledge rock at various times during the year. It should be noted that groundwater conditions vary depending upon factors such as temperature, season, precipitation, and other unknowns that may be different from those at the time these explorations were made. Groundwater levels at other times, therefore, may differ from those observed and described in this report.

FOUNDATION DESIGN RECOMMENDATIONS

Foundation Design

The results of the test-boring program were combined with the visual observation of soil properties to arrive at the following conclusions derived from established references. Based on the results of our subsurface exploration program, the site conditions will allow for the founding of the proposed improvements on either compacted existing fill materials or very dense native soils, which will provide a competent subgrade for support of the added loads. Based on an analysis of the soil classification and SPT data, the average internal friction angle of the bearing materials was calculated at approximately 32 degrees. GSI recommends the footings be proportioned for a net allowable bearing capacity of 2-tsf (tons per square foot) within the above-mentioned soils. The contractor shall take precautions necessary to protect the subgrade surface against disturbance from construction trafficking and weathering.

The foregoing allowable bearing pressure for soil is predicated by footing geometry and depth below grade. With regard to footing geometry, the minimum footing width of column and strip footings should be 4-ft and 2-ft respectively. The minimum depth for bearing is 4-ft below grade for perimeter footings and 18-inches below the interior finish floor grade for the interior column footings. If existing foundations and or utilities should be encountered, they are to be excavated, demolished where applicable, and replaced with compacted structural fill.

Based on the net allowable bearing pressure for footings placed on prepared subgrades, total footing settlement is not expected to exceed 1 inch with differential settlement between adjacent columns being less than ¾ inch. The majority of the settlement is expected to occur during construction and long-term settlements are anticipated to be negligible. It is recommended that under-drains be provided and tied into the new stormwater system to prevent water related issues within the new basements and ponding of groundwater against the foundations.

Seismic Design Parameters

The seismic design parameters have been reviewed respect to the Massachusetts State Building Code Section 780 CMR, Section 16 – Structural Design. Upon review of the subsurface soils data, the site is to be associated with Site Class "D". The subsurface conditions have been analyzed and are not deemed susceptible to earthquake induced "liquefaction".

Frost Protection

Exterior footings should be protected from frost at a minimum depth for the locality in which the structure is located. Based on local code and building practice, the exterior footing should be protected with at least 4 ft of earthen embedment. Interior footings should be placed at least 18 inches below finish floor grade provided the interior area is to be heated; otherwise a minimum 4 ft of earthen cover is required, unless local building regulations specify that the foundation walls be founded deeper. If foundation construction is to occur during cold weather, the foundation elements should be protected against frost damage.

EARTHWORK RECOMMENDATIONS

Foundation Subgrade Preparation

Prior to foundation construction, all topsoil and any other unsuitable materials encountered should be removed from within the footing zone of influence (see Figure 3). Footings should bear directly upon a competent subgrade as described above and visually observed by GSI. In order to provide a stable platform for structural fill placement or footing construction, the final 12 inches of excavation should ideally be performed with smooth-bladed equipment in order to provide the desired neat, undisturbed excavation bottom.

Foundation and floor slab subgrades should be proof-compacted using a heavy vibratory plate or drum roller as described below, prior to foundation construction or placing additional fill in order to densify disturbed soils resulting from excavation and preload the subgrade.

Recommended proof compaction should include 8 coverages (4 in each orthogonal direction) coverages with a minimum of a 10-ton vibratory roller. During the proof-rolling process the subgrade should be observed by a qualified Geotechnical Engineer to identify areas exhibiting weaving or excessive reaction. Any soils exhibiting excessive reaction should be locally excavated and replaced with free draining structural fill or crushed stone.

Structural fill, if required, should be placed in maximum loose lifts of 8-inches and be compacted to 95 percent of maximum dry density as determined by the modified proctor test (ASTM D1557). The loose lift thickness may be increased to 12-inches if a minimum 10-ton vibratory roller is used for soil compaction. The adequacy of the compaction efforts should be verified by field density testing. Based on the observation of the retrieved soil samples from the test borings, it appears that the existing fill soils are generally unsuitable for re-use as structural fill, but may be re-used ordinary fill.

Protection of Foundation Subgrades

The contractor is required to maintain stable-dewatered subgrades for foundations, pavement areas, and utility trenches. Subgrade disturbance may be influenced by excavation methods, moisture, precipitation, groundwater control, and construction activities. If construction activities are to take place during winter months, the contractor shall protect the work area from freezing, which may necessitate the use of soil blankets or tents and heaters to protect the subgrade surface and fill soils.

Construction Dewatering

Although the test borings indicated groundwater would not be an issue during construction, groundwater may be encountered during excavation for the foundations and associated underground utilities for the proposed structure, and the contractor should be prepared in the event groundwater impacts are felt via seasonal fluctuations or runoff. Stormwater runoff developed from storm events should be diverted away from excavation areas to minimize any impoundment in the excavation or disturbance to the foundation subgrades. It is anticipated that groundwater and storm water may be controlled by localized de-watering efforts employing sumps and pumps. Groundwater water should be maintained at least 12 inches below the foundation grade until backfilling is complete. A lift of crushed stone or free draining structural fill at foundation grade may be utilized to facilitate de-watering and provide a dry and stable subgrade during construction.

Temporary Excavations

Deep excavations (greater than 5 ft) may be required within the proposed building area for associated utility excavations near the building footprint. It is envisioned that any locally deeper excavations may be accomplished with sloped excavations. For stable excavation designs, the on-site sandy soils should be considered Type C soils in accordance with Occupational Safety and Health Administration (OSHA) regulations (29 CFR Part 1926). The maximum temporary slopes for Soil Type C are 1.5H:1V provided groundwater is maintained below the bottom of the excavation. The foregoing slope requirement does not consider surcharge loads (stockpiled soils, equipment, materials) that may be situated at the crest of the slope and vibration loads (blasting, soil compaction). It should be noted that these slope requirements are minimums required by OSHA regulations. The contractor is ultimately responsible for stability of temporary slopes associated with construction activities.

CONSTRUCTION MONITORING

It is recommended that GSI be retained to observe foundation construction, subgrade preparation, backfilling, and compaction in conformance with the requirements of local building codes. GSI has the geotechnical personnel trained and experienced in monitoring earthwork excavation and testing, as well as a full-service Soils and Materials laboratory. As a guide, we have enclosed a *Recommended Program for Structural Tests and Inspections for Soils and Foundations*, attached as Appendix C of this report.

CLOSURE

We appreciate the opportunity to perform this investigation and look forward to working with you on the design and construction phases of this project. If you have any questions as to the contents of this report, please do not hesitate to contact us.

Very truly yours,

GEOTECHNICAL SERVICES, INC.

Harry K. Wetherbee, P.E.
Principal Engineer

Table 1

Figure 1: Site Location Plan
Figure 2: Test Boring Location Plan
Figure 3: Zone of Influence Detail

Appendix A: Limitations
Appendix B: Test Boring Logs
Appendix C: Recommended Program for Structural Tests and Inspections for Soils and Foundation

GEOTECHNICAL SERVICES, INC.

PROPOSED READING LIBRARY ADDITION
64 MIDDLESEX STREET
READING, MASSACHUSETTS
GSI PROJECT NO. 210314
RECOMMENDED SOIL GRADATION SPECIFICATIONS

TABLE 1

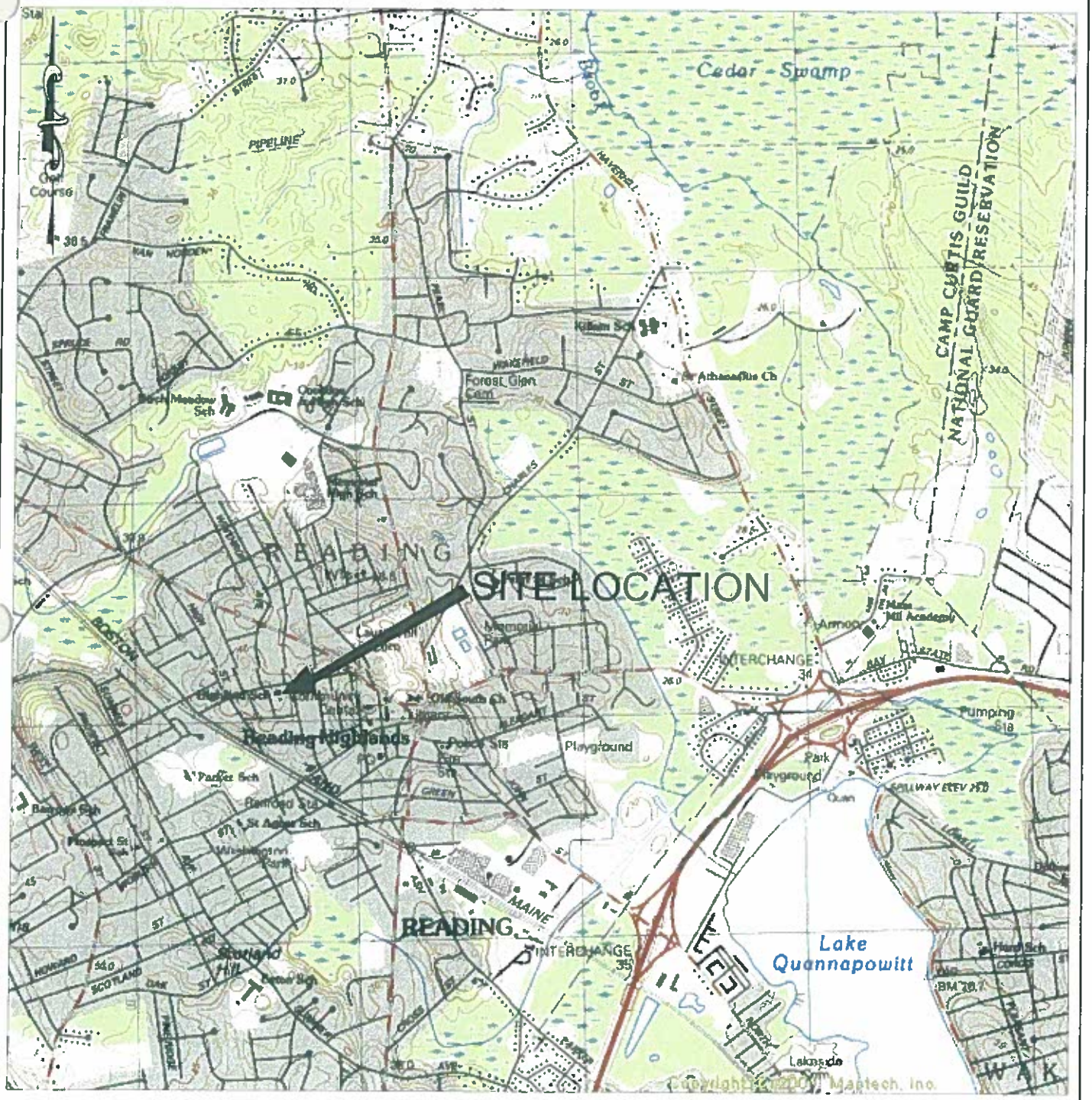
Sieve Size		*PERCENTAGE PASSING BY WEIGHT*		
	Soil Type	Crushed Gravel Base Course	Slab Base Soil	Structural Fill
6"				100
2"		100	100	---
1"		---	---	---
3/8"		30-65[1]	60-100	---
#4[2]		25-55	50-85	40-70
#10		15-40	40-70	---
#40		8-20	25-45	
#200		2-8	10 max	0-15

NOTES:

Ordinary fill used for landscape areas may be any soil material that is relatively free from organic matter, debris, frost, stones larger than 2/3 the maximum lift thickness, or other deleterious materials.

1. Of the material retained on the 3/8' sieve, at least 75% shall have fractured faces.

2. Aggregate retained on the No. 4 sieve shall consist of durable particles of crushed stone, gravel, or slag.



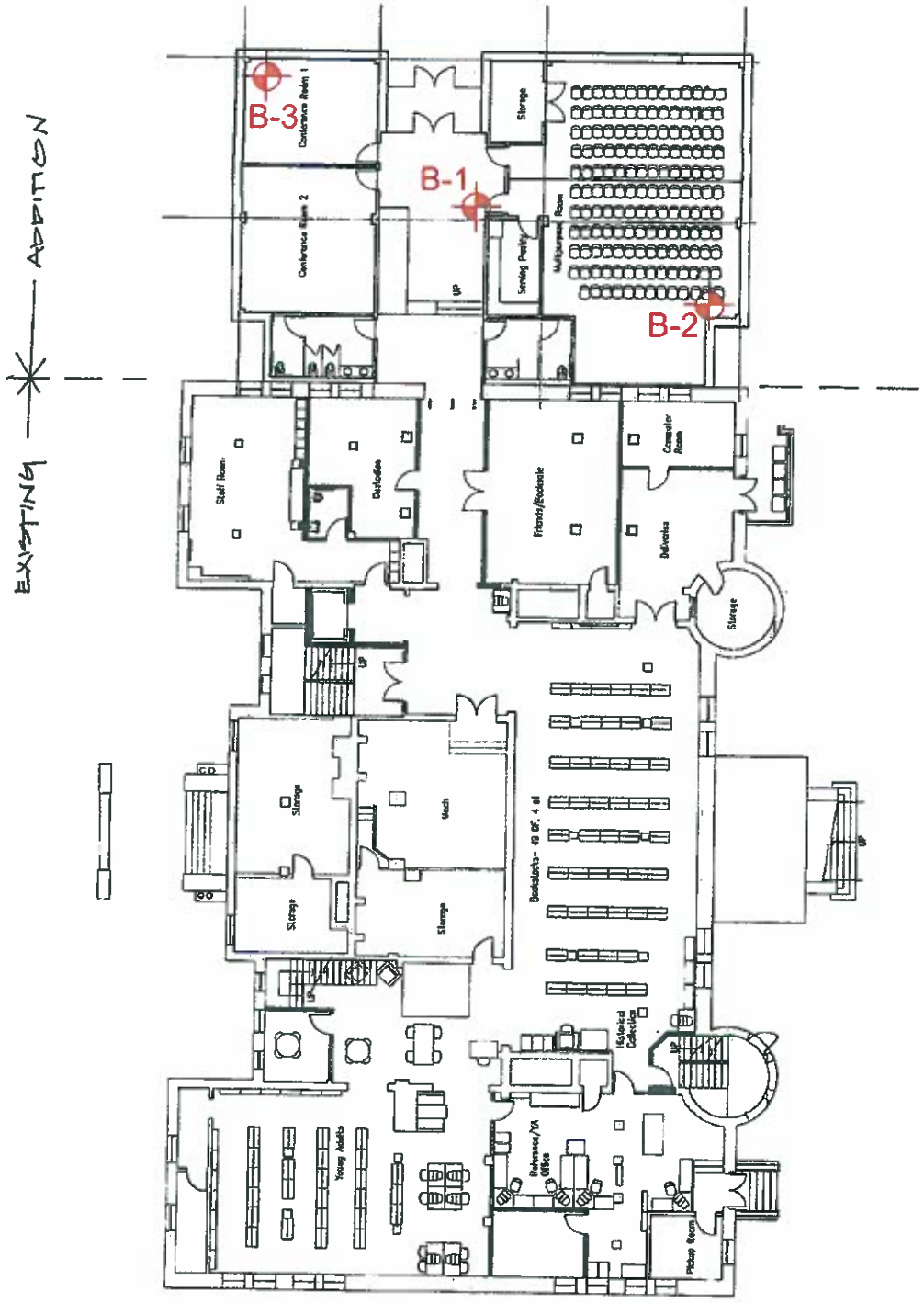
LOCUS MAP

GEOTECHNICAL SERVICES INC.
18 COTE AVENUE, UNIT #11, GOFFSTOWN, NH 03045
TEL. (603) 624-2722 FAX. (603) 624-3733

Reading Library Addition
Reading, Massachusetts

DRAWN BY: KJM	DATE: December 2010
CHECKED BY: HKW	SCALE: 1" = 2000'
FILE NAME: 210314 - Reading Library.dwg	PROJECT NO.: 210314

FIGURE NO. 1



B-1 Test Boring Location (Approximate)

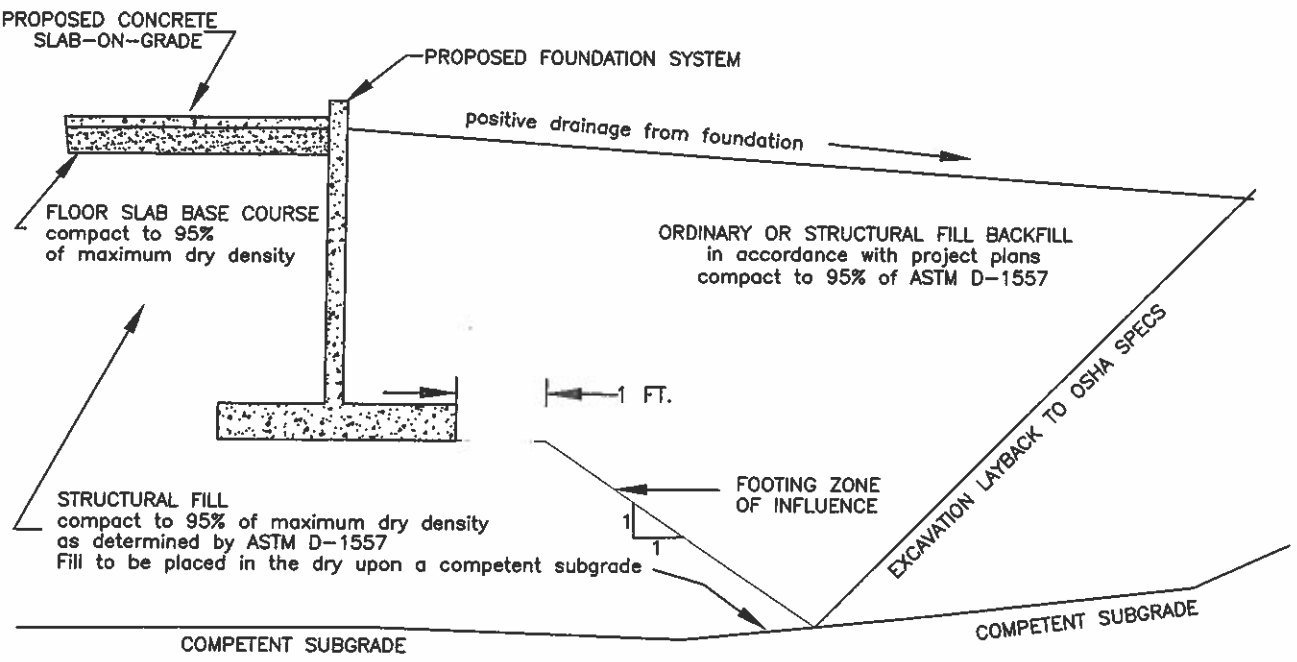
BORING LOCATION PLAN

GEOTECHNICAL SERVICES INC.
18 COTE AVENUE, UNIT #11, GOFFSTOWN, NH 03045
TEL. (603) 624-2722 FAX. (603) 624-3733

Reading Library Addition
Reading, Massachusetts

DRAWN BY: KJM	DATE: December 2010
CHECKED BY: HKW	SCALE: NTS
FILE NAME: 210314 - Reading Library.dwg	PROJECT NO.: 210314

FIGURE NO. 2



FOUNDATION ZONE OF INFLUENCE

GEOTECHNICAL SERVICES INC.
18 COTE AVENUE, UNIT #11, GOFFSTOWN, NH 03045
TEL. (603) 624-2722 FAX. (603) 624-3733

Reading Library Addition
Reading, Massachusetts

DRAWN BY: KJM	DATE: December 2010
CHECKED BY: HKW	SCALE: N.T.S.
FILE NAME: 210314 - Reading Library.dwg	PROJECT NO.: 210314

FIGURE NO. 3

APPENDIX A

LIMITATIONS

LIMITATIONS

Explorations

1. The analyses, recommendations, and designs submitted in this report are based in part upon the data obtained from preliminary subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.

2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretation of widely spaced explorations and samples; actual soil transitions are probably more gradual. For specific information, refer to the individual test pit and/or boring logs.

3. Water level readings have been made in the test pits and/or test borings under conditions stated on the logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors differing from the time the measurements were made.

Review

4. It is recommended that this firm be given the opportunity to review final design drawings and specifications to evaluate the appropriate implementation of the recommendations provided herein.

5. In the event that any changes in the nature, design, or location of the proposed areas are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of the report modified or verified in writing by Geotechnical Services, Inc.

Construction

6. It is recommended that this firm be retained to provide geotechnical engineering services during the earthwork phases of the work. This is to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

Use of Report

7. This report has been prepared for the exclusive use of Beacon Architectural Associates in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

8. This report has been prepared for this project by Geotechnical Services, Inc. This report was completed for preliminary design purposes and may be limited in its scope to complete an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to evaluation considerations only.

APPENDIX B

TEST BORING LOGS

TEST BORING LOG

Boring No. **B-1**

Page 1 of 1

Project	Reading Library Addition	GSI Project No.	210314	Elevation	Pavement
Location	Reading ,MA	Project Mgr.	HKW	Datum	
Client	Peter Byerly	Inspector	John Roth	Date Started	11/29/2010
Contractor	Expedition Drilling	Checked By		Date Finished	11/29/2010
Driller	Lou Floyd	Rig Make	CME	Rig Model	45J

Item:	Auger	Casing	Sampler	Core Barrel
Type	HSA	N/A	SS	N/A
Inside Diameter (in.)	2 3/4"		ST	
Hammer Weight (lb)			140	
Hammer Fall (in.)			30"	

☐ Truck ☐ Skid
☐ Track ☑ ATV
☐ Bomb. ☐ Geoprobe
☐ Tripod ☐ Other
☑ Winch ☐ Cat Head ☐ Roller Bit ☐ Cutting Head

Hammer Type:
☑ Safety Hammer
☐ Doughnut
☐ Automatic

Depth (ft)	Casing (Blows/ft)	Sample No.	Sample Depth (ft)	Rec (in.)	SPT (Bl./ 6-in.)	Rock RQD (%)	PID Rdg. (ppm)	Stratum Change (ft)	Soil-Rock Visual Classification and Description (Soils - Burmister System) (Rock - U.S. Corps of Engineers System)
0		S1	0-2	24/14	26 32 21 17			Asphalt	3 Inches of Asphalt Very dense, brown, fine to course, SAND and GRAVEL, trace silt, dry.
5		S2	5-7	24/0	9 7 3 4			SAND AND GRAVEL	No Recovery
10		S-3	10-12	24/2	4 4 5 12				Loose, brown, fine to medium, SAND and GRAVEL, little silt, dry. Auger and Splitspoon refusal at 12 feet.
15		S-4	15-17						Boring was terminated at 12 feet and backfilled with cuttings.
20		S-5	20-22						
25									

Water Level Data

Date	Time	Depth (ft) to: Bott. of Casing	Bott. of Hole	Water
11/29			12'	Dry

Sample Identification
O = Open Ended Rod
U = Undisturbed
S = Split Spoon
C = Rock Core
G = Geoprobe

Cohesive Soils N-Value
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30 Very Stiff
Over 30: Hard

Granular Soils N- Value
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%), Little (10 to 20%), Some (20 to 35%), And (35 to 50%)

Notes:

B-1

Geotechnical Services, Inc. ♦ 18 Cote Avenue, Goffstown, NH 03045 Tel. 603.624.2722 Fax. 603.624.3733 ♦ 12 Rogers Road, Haverhill, MA 02222 Tel. 978.374.7744 Fax. 978.374.7799

TEST BORING LOG

Boring No. B-2

Page 1 of 1

Project	Reading Library Addition	GSI Project No.	210314	Elevation	Pavement
Location	Reading ,MA	Project Mgr.	HKW	Datum	
Client	Peter Byerly	Inspector	John Roth	Date Started	11/29/2010
Contractor	Expedition Drilling	Checked By		Date Finished	11/29/2010
Driller	Lou Floyd	Rig Make	CME	Rig Model	45J

Item:	Auger	Casing	Sampler	Core Barrel
Type	HSA	N/A	SS	N/A
Inside Diameter (in.)	2 3/4"		ST	
Hammer Weight (lb)			140	
Hammer Fall (in.)			30"	

☐ Truck ☐ Skid
☐ Track ☑ ATV
☐ Bomb. ☐ Geoprobe
☐ Tripod ☐ Other

Hammer Type:
☑ Safety Hammer
☐ Doughnut
☐ Automatic

☑ Winch ☑ Cat Head ☐ Roller Bit ☐ Cutting Head

Depth (ft)	Casing (Blows/ft)	Sample No.	Sample Depth (ft)	Rec (in.)	SPT (Bl./ 6-in.)	Rock RQD (%)	PID Rdg. (ppm)	Stratum Change (ft)	Soil-Rock Visual Classification and Description (Soils - Burmister System) (Rock - U.S. Corps of Engineers System)
0		S1	0-2	24/15	31 16 11 7			Asphalt	3 Inches of Asphalt Medium dense, brown, fine to course, SAND, some gravel, little silt, dry.
5		S2	5-7	24/11	17 14 9 8				Medium dense, brown, fine to course, SAND and GRAVEL, little silt, dry.
10		S-3	10-12	24/0	12 12 10 6			SAND AND GRAVEL	No Recovery.
15		S-4	15-17	24/17	17 18 16 16				Dense, brown, fine to course, SAND and GRAVEL, little silt, dry.
20		S-5	18-20	24/12	19 46 52 12				Very dense, brown, GRAVEL, some fine to course sand, little silt, dry.
25									Boring was terminated at 20 feet and backfilled with cuttings.

Water Level Data

Date	Time	Depth (ft) to: Bott. of Casing	Bott. of Hole	Water
11/29			18'	Dry

Sample Identification
O = Open Ended Rod
U = Undisturbed
S = Split Spoon
C = Rock Core
G = Geoprobe

Cohesive Soils N-Value
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30 Very Stiff
Over 30: Hard

Granular Soils N- Value
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%), Little (10 to 20%), Some (20 to 35%), And (35 to 50%)

Notes:

B-2

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TEST BORING LOG

Boring No. B-3

Page 1 of 1

Project	Reading Library Addition	GSI Project No.	210314	Elevation	-2'
Location	Reading ,MA	Project Mgr.	HKW	Datum	
Client	Peter Byerly	Inspector	John Roth	Date Started	11/29/2010
Contractor	Expedition Drilling	Checked By		Date Finished	11/29/2010
Driller	Lou Floyd	Rig Make	CME	Rig Model	45J

Item:	Auger	Casing	Sampler	Core Barrel
Type	HSA	N/A	SS	N/A
Inside Diameter (in.)	2 3/4"		ST	
Hammer Weight (lb)			140	
Hammer Fall (in.)			30"	

☐ Truck ☐ Skid ☐ Track ☑ ATV ☐ Bomb. ☐ Geoprobe ☐ Tripod ☐ Other

Hammer Type: ☑ Safety Hammer ☐ Doughnut ☐ Automatic

☑ Winch ☐ Cat Head ☐ Roller Bit ☐ Cutting Head

Depth (ft)	Casing (Blows/ft)	Sample No.	Sample Depth (ft)	Rec (in.)	SPT (Bl./6-in.)	Rock RQD (%)	PID Rdg. (ppm)	Stratum Change (ft)	Soil-Rock Visual Classification and Description (Soils - Burmister System) (Rock - U.S. Corps of Engineers System)
0		S1	0-2	24/14	2 3 3 6			Topsoil	12 inches of topsoil.
									Loose, brown, fine to course SAND and GRAVEL, little silt, dry.
5		S2	5-7	24/15	4 4 3 6				Loose, brown, fine to course SAND and GRAVEL, little silt, dry.
10		S-3	10-12	24/1	4 7 10 15			SAND AND GRAVEL	Medium dense, brown, fine to course, SAND and SILT, damp.
15		S-4	15-17	24/19	77 32 32 29				Very dense, brown, fine to course, SAND and GRAVEL, little silt, dry.
		S-5	18-20	24/19	25 22 18 15				Dense, brown, fine to course, SAND and GRAVEL, little silt, dry.
20									Boring was terminated at 20 feet and backfilled with cuttings.
25									

Water Level Data

Date	Time	Depth (ft) to: Bott. of Casing	Bott. of Hole	Water
11/29			18'	Dry

Sample Identification
O = Open Ended Rod
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S = Split Spoon
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G = Geoprobe

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4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30 Very Stiff
Over 30: Hard

Granular Soils N- Value
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%), Little (10 to 20%), Some (20 to 35%), And (35 to 50%)

Notes:

B-3

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APPENDIX C

RECOMMENDED PROGRAM FOR STRUCTURAL TESTS AND INSPECTIONS FOR SOILS AND FOUNDATIONS

GEOTECHNICAL SERVICES, INC.

RECOMMENDED PROGRAM FOR STRUCTURAL TESTS AND INSPECTIONS FOR SOILS AND FOUNDATIONS

A. Program for Structural Tests and Inspections (780 CMR 1705.3)

1. Structural tests and inspections of soils and foundation work are for the purpose of providing assurance to the Owner, Building Official, and Structural Engineer of Record, that the construction complies with the structural design components associated with the work performed by the Geotechnical Engineer of Record (GE). These tests and inspections are for quality assurance audits and their implementation does not relieve the Contractor or Sub-Contractors of their responsibility for quality control of the work and any design for which they are responsible.

2. The GE will direct the implementation of this program and select any structural inspectors required to undertake the program.

3. Fees and costs related to the implementation of this program will be borne by the Owner.

B. Testing Agency and Personnel Requirements

1. Comply with the following requirements:
   a. Testing Agency shall have had a minimum of five years experience In performing the type and scope of work required for this project.
   b. 780 CMR RR: Concrete Testing Laboratories Licensing.
   c. Any Individual performing the inspection and/or testing of cast-in-place concrete work shall be qualified on the basis of certification and/or satisfactorily documented work experience appropriate to the assigned task.
   d. 780 CMR R2: Concrete Testing Personnel Licensing

C. Criteria for Structural Tests and Inspections:

1. Comply with following documents

   1. Approved Contract Documents and Geotechnical Engineering Report.
   2. Approved Shop Drawings, as applicable.
   3. 780 CMR: The Massachusetts State Building Code, Sixth Edition
      1. Chapter 17 - Structural Tests and Inspections.
      2. Chapter 18 - Foundations and Retaining Walls.
      3. Chapter 19 - Concrete.
   4. ASTM Standards.

D. Verification of Bearing Strata (780 CMR 1804.0)

1. Observe and test footing excavations to verify conformance to approved Contract Documents and Geotechnical Report.
2. Verify that the foundation is of proper-size and depth and free of any loose, deleterious, or foreign material.
3. Inspect and verify the subgrade supporting the footings of buildings or structures immediately prior to the placement of plain or reinforced concrete.

E Inspection of Prepared Fill (780 CMR 1705.9)

1. Site Preparation.

   a. Prior to placement of the prepared fill, determine that the site has been prepared In accordance with the approved Contract Documents and Geotechnical Report.

2. During Fill Placement.

   a. During the placement and compaction of the fill material, determine that the material being used and the maximum lift thicknesses comply with the approved Contract Documents and Geotechnical Report.

3. Evaluation of In-Place Density.

   a. Determine, at the approved frequency, that the in-place density of the compacted fill complies with the approved Contract Documents and Geotechnical Report.

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