LE·Environmental

21 North Main Street • Waterbury, Vermont 05676
Phone: (802) 917-2001 • www.leenv.net

December 22, 2016

Mr. Dan Albrecht
Chittenden County Regional Planning Commission
110 West Canal Street, Suite 202
Winooski, Vermont 05404

RE: Work Plan and Price Proposal for Brownfields Phase II Environmental Site Assessment
Proposed Flynn & Pine Development, Burlington, Vermont

Dear Mr. Albrecht:

LEE is pleased to present this price proposal and the attached work plan for a Brownfields Phase II Environmental Site Assessment (ESA) at the proposed Flynn & Pine development. The work plan describes the technical approach to addressing Recognized Environmental Conditions (RECs) identified in the Phase I ESA report. Please look these materials over and let me know if there are any questions. To engage the work, please issue a task order per the Master Services Agreement and we will get started as soon as possible.

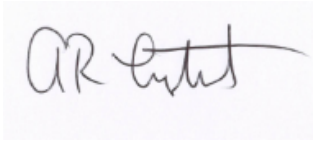
Pricing

LEE will perform the Brownfields Phase II ESA in accordance with the work plan document dated December 22, 2016, on a fixed price basis including all labor, equipment, and expenses, for $10,550. This price includes the same work scope as the previous proposal and also includes QAPP development, data validation, addition of Brownfields quality assurance field sampling, and additional laboratory analysis required by the Brownfields program. This pricing is provided subject to the following assumptions:

- EPA/DEC approves the work as written.
- All drill cuttings are disposed of on site. If LEE needs to drum the investigation derived wastes and/or dispose of them in a different manner additional fees will apply.
- No snow removal included, if snow banks need to be moved that would be extra.
- The final report is issued electronically in PDF format. Hard copies can be provided for an additional fee to cover the printing.

Please call with any questions or to authorize LEE to submit the work plan to DEC. Thank you.

Sincerely,



Alan Liptak, CPG, EP
Senior Geologist

LEE# 16-055

For EPA Internal Use ONLY

ASSESSMENT PROGRAM
INFORMATION NEEDED TO DETERMINE SITE ELIGIBILITY (updated 4/11)

(Use Tab, arrow keys or mouse to move through questions; use Spacebar or mouse to check boxes)

A. BACKGROUND INFORMATION

Date: 12/30/16

1. Grant number: BF00A00214

2. Grant recipient: Chittenden County Regional Planning Commission

3. Person providing site information: Justin Dextradeur

4. Property/site name: 316 Flynn Avenue Mixed Use Development

5. Property address: 316 Flynn Avenue, Burlington VT

6. Current property owner: 316 Flynn LLC

7. Work to be done: ☐ Phase I ☒ Phase II ☐ Phase III ☐ Other
   Explain Other:

B. SITES ELIGIBILE FOR FUNDING

1. Does the site meet the definition of a Brownfields (*a real property, the expansion, redevelopment or reuse of which is complicated by the presence or potential presence of hazardous substances, pollutants or contaminants*)? ☒ Yes ☐ No

2. Type of contamination present: ☒ Hazardous Substances ☐ Petroleum ☐ Co-Mingled
   (If the site has both hazardous substances and incidental petroleum contamination, check the box the "co-mingled" box. If the site has hazardous substances and distinguishable petroleum contamination, you must obtain approval from the State and EPA.)

3. Describe the operational history and current use(s) of the site: The property consists of an existing 2,736 SF convenience store & an adjacent 2,242 SF triplex. There is also a vacant garage formerly used as a bottle/can redemption center and historically used for engine repair.

4. Describe the environmental concerns at the site, including when and how the site became contaminated and, to the extent possible, the nature and extent of the contamination. If the environmental concerns are unknown, or if the land has been vacant for many years, why do you think it is contaminated? : The site is in an urban location adjacent to a major road and

presumed to contain urban soils contaminated with elevated levels of PAH. A previous owner is know to have repaired engines in the garage and oil/solvents contamination is possible (stained concrete noted).

5. Describe the proposed expansion, redevelopment or reuse of the property: Site cleanup would enable significant additional housing and retention of existing commercial space through development of a single mixed-use buidling in an area planned for mixed-use development by the municipality and region. The proposed new building will contain ground floor commercial space and at-grade, under-building parking,with upper apartments.

C. SITES NOT ELIGIBLE FOR FUNDING

Please answer the following questions to the best of your knowledge:

1. Is your facility listed (or proposed for listing) on the National Priorities List? ☐ Yes ☒ No

2. Is your facility subject to unilateral administrative orders, court orders, administrative orders on consent, or judicial consent decrees issued to or entered into by parties under CERCLA? ☐ Yes ☒ No

3. Is your facility subject to the jurisdiction, custody, or control the US government? (Land held in trust by the US government for an Indian tribe is eligible.) ☐ Yes ☒ No

*Note: If you answered YES to any of the above (C. 1-3) your property is **not** eligible.*

D. SITES NOT ELIGIBLE FOR FUNDING WITHOUT A PROPERTY SPECIFIC DETERMINATION:

Certain properties cannot be approved without a "Property Specific Determination". Please answer the following questions to the best of your knowledge:

1. Is your site/facility subject to a planned or ongoing CERCLA removal action? ☐ Yes ☒ No

2. Has your site/facility been issued a permit by the U.S. or an authorized state under the Solid Waste Disposal Act (as amended by the Resource Conservation and Recovery Act (RCRA)), the Federal Water Pollution Control Act (FWPCA), the Toxic Substances Control Act (TSCA), or the Safe Drinking Water Act (SWDA)? ☐ Yes ☒ No

3. Is your site/facility subject to corrective action orders under RCRA (sections 3004(u) or 3008(h))? ☐ Yes ☒ No

4. Is your site/facility a land disposal unit that has submitted a RCRA closure notification under subtitle C of RCRA or is subject to closure requirements specified in a closure plan or permit? ☐ Yes ☒ No

5. Has your site/facility had a release of polychlorinated biphenyls (PCBs) that is subject to

remediation under TSCA? ☐ Yes ☒ No

6. Has your site/facility received funding for remediation from the Leaking Underground Storage Tank (LUST) Trust Fund? ☐ Yes ☒ No

Note: If you answered YES to any of the above (D. 1-6), please call your Project Officer and she/he will explain how to prepare a property specific determination. Refer to Appendix 2, Section 2.5, of the Proposal Guidelines for additional information.

**** For petroleum sites, please proceed to Section F – Petroleum Only Sites**

E. PROPERTY OWNERSHIP ELIGIBILITY

1. Are there any known ongoing or anticipated environmental enforcement actions (at the federal, state or local level) regarding the responsibility of any party for contamination or hazardous substances at the site? ☐ Yes ☒ No If yes, please explain:

Information on Liability and Defenses/Protections - Answer the following if the assessment grant recipient does NOT own the site:

1. Did the assessment grant recipient ever arrange for the disposal of hazardous substances at the site, or transport hazardous substances to the site? ☐ Yes ☒ No

2. Did the assessment grant recipient ever cause or contribute to any releases of hazardous substances at the site? ☐ Yes ☒ No

3. Describe the assessment grant recipient's relationship with the current owner and the owner's role in the work to be completed: The Chittenden County RPC has a formal relationship with Justin Dextradeur, as an employee of Redstone, as he sits on the CCRPC Board of Directors representing Socio-Economic Housing interests and also sits CCRPC's Brownfields Advisory Committee. He requested assistance from CCRPC's Brownfields Program and provided information to the Committee at its December 12, 2016 meeting related to the request to CCRPC for $6,330 funds for a Phase II ESA. Give the potential conflict of interest he recused himself from the deliberations (and was not present) when the Committee voted to recommend to the CCRPC to fund the request. He also will not partcipate in deliberations nor be present when the Committee addresses his request for an additional $4,220 to fund the QAPP and additional samples at their planned January 9, 2017 meeting.

Information on Liability and Defenses/Protections - Answer the following if the assessment grant recipient owns the site or will own the site during the grant performance period:

1. How was the property acquired (or how will it be acquired)?

    a. ☐ Negotiated purchase from a private individual
    b. ☐ Purchase or transfer from another governmental unit
    c. ☐ Tax foreclosure
    d. ☐ Eminent domain
    e. ☐ Donation
    f. ☐ Other (explain): s

2. What was the date when the property was acquired (or the anticipated date when it will be acquired)?

3. What is the name and identity of the party from whom the property was (or will be) acquired?

4. Describe all familial, contractual, corporate or financial relationships or affiliations the assessment grant recipient has or has had with all prior owners or operators of the property:

5. Did disposal of all hazardous substances at the site occur before the assessment grant recipient acquired (or will acquire) the property? ☐ Yes ☐ No

6. Did the assessment grant recipient ever arrange for the disposal of hazardous substances at the site, or transport hazardous substances to the site? ☐ Yes ☐ No

7. Did the assessment grant recipient ever cause or contribute to any releases of hazardous substances at the site? ☐ Yes ☐ No

8. Did the assessment grant recipient perform any environmental inquiry prior to the purchase of the property? ☐ Yes ☐ No

9. If a pre-purchase inquiry was performed, describe the types and dates of the assessments performed, indicate on whose behalf the assessments were performed, and indicate whether the applicant performed the pre-purchase inquiry in accordance with EPA's All Appropriate Inquiry rule (or ASTM E1527-05, or its equivalent at the time of purchase):

F. PETROLEUM ONLY SITES - PROPERTY OWNERSHIP ELIGIBILITY

Petroleum-only sites are to be submitted to the state for eligibility determination. Please contact your state representative to obtain the information they require to determine site eligibility. As a courtesy, send a copy of the site eligibility information to your EPA Project Officer so he or she is aware of potential upcoming work. The assessment grant recipient must provide their EPA Project Officer with a copy of the state's determination letter. The following questions are typical of the petroleum site information you may need to provide to the state:

1. Did the current and/or immediate past owner dispense or dispose of petroleum or petroleum

products, or exacerbate existing petroleum contamination on the site? ☐ Yes ☐ No

Note: If the answers to question F.1 is no, the site may be eligible.

2. If the answer to either question F.1 is yes, did the responsible party take reasonable steps to address the petroleum contamination on site? ☐ Yes ☐ No Explain:

3. If the answer to either question F.1 is yes, is the responsible party financially capable to assess and clean up the site? ☐ Yes ☐ No Explain:

Note: If question F.1 identified a responsible party who is liable for petroleum contamination at the site, and that party is financially viable to pay for assessment and cleanup costs, then the site is ***not*** *eligible. If the identified responsible party took reasonable steps to address the petroleum contamination at the site, and/or is not financially viable to pay for the assessment and cleanup costs, then the site may still be eligible.*

4. Is the site "relatively low risk" compared with other "petroleum-only" sites in the state:

   a. Is the site currently being cleaned up using LUST trust fund monies? ☐ Yes ☐ No

   b. Is the site currently subject to a response under the Oil Pollution Act (OPA)? ☐ Yes ☐ No

Note: If the answers to questions F.4a and F.4b are no, the site would be considered to be of relatively low risk for purposes of determining eligibility.

5. Has any responsible party been identified for the site through, either:

   a. A judgment rendered in a court of law or an administrative order that would require any person to assess, investigate, or cleanup the site: ☐ Yes ☐ No

   b. An enforcement action by federal or state authorities against any party that would require any person to assess, investigate, or cleanup the site: ☐ Yes ☐ No

   c. A citizen suit, contribution action or other third party claim brought against the current or immediate past owner, that would, if successful, require the assessment, investigation, or cleanup of the site: ☐ Yes ☐ No

6. Is the site subject to any RCRA orders issued under 9003(h) of the Solid Waste Disposal Act? ☐ Yes ☐ No

Note: If the answer to any of the questions in F.5 or F.6 is yes, the site is ***not*** *eligible.*

G. ACCESS

Does the assessment grant recipient have access or an access agreement for this property?
☒ Yes ☐ No

H. NATIONAL HISTORIC PRESERVATION ACT (NHPA) COMPLIANCE

Note: If you answer yes to any of the following questions you should contact your project officer to determine if any additional information is required.

1. Is your selected property (site) currently listed in the National Register of Historic Places and/or is it a designated National Landmark? ☐ Yes ☒ No

2. Is your selected property (site) eligible to be listed in the National Register of Historic Places? ☐ Yes ☒ No

In order to support your response, please provide any and all documentation from the federal Government and/or State Historic Preservation Officer (SHPO). (i.e., SHPO Determination Letter which you may obtain independent of the EPA process.

3. Is your selected property (site) part of a designated Historic District? ☐ Yes ☒ No

4. Will your project impact the viewshed of any adjacent or surrounding designated Historic Districts or registered historic structures? ☒ Yes ☐ No

5. Does your project have the potential to impact archaeological resources? ☐ Yes ☒ No

I. SITE ELIGIBILITY

(To be filled out by EPA Project Officer.)

The site, at the above-described property, is eligible for assessment work: ☒ Yes ☐ No

Frank Gardner
Project Officer

1/3/17
Date

Need for Attorney Consultation: ☐ Yes ☒ No Notes:

Additional Information:

Brownfields Phase II Environmental Site Assessment Work Plan

316-322 Flynn Avenue
Burlington, Vermont 05401

SMS # 2016-4636

December 22, 2016

Prepared For:
Chittenden County Regional Planning Commission
110 West Canal Street, Suite 202
Winooski, Vermont 05404

LE·Environmental

21 North Main Street
Waterbury, Vermont 05676
(802) 917-2001
www.leenv.net

LEE # 16-055

Contents

Appendices

1.0 INTRODUCTION AND BACKGROUND

LE Environmental (LEE) of Waterbury, Vermont has prepared this work plan for a Brownfields Phase II Environmental Site Assessment (Phase II ESA) at 316-322 Flynn Avenue, Burlington, Vermont (Site). This work plan was prepared for the Chittenden County Regional Planning Commission (CCRPC). A site location map is included in Appendix A.

The property consists of 0.61-acre parcel on the north side of Flynn Avenue and the east side of Pine Street in the City of Burlington, Vermont. Current property uses include a convenience store/deli and a 3-unit apartment building. A garage on the property is currently used for storage. The prospective purchaser is planning on demolishing the store and garage and constructing a new multi-unit commercial and residential structure on the property. The existing apartment house will remain.

Phase I ESA Findings

LEE completed a Phase I ESA in 2016. Hazardous substances and petroleum products identified during the site reconnaissance included a 5-gallon pail of floor stripping compound labeled as corrosive, six aerosol cans of Easy-Off oven cleaner, the contents of a 275-gallon fuel oil tank in the store basement, several gallons of refrigeration lubricant, a 20-pound propane tank, and an apparently full 5-gallon plastic container of diesel fuel in the garage. A portion of the garage floor was moderately oil-stained and the floor was heavily cracked in places. During the site reconnaissance, the owner informed LEE that the garage had formerly been used to build racing engines.

LEE reviewed available environmental data within the purview of ASTM E1527-13 and identified three RECs as defined in the standard. These include:

1. Documented fill soils from an unknown source, including coal ash.
2. Past garage use for engine building with staining and cracking of the cement floor noted.
3. The property includes the southern half of Englesby Brook to its centerline, which is DEC Site 93-1505.

LEE recommended that a Phase II ESA be conducted to more fully characterize the identified RECs. The Vermont Department of Environmental Conservation (DEC) reviewed the Phase I ESA report and concurred with the RECs identified in the Phase I report. The Site was assigned DEC Site #2016-4636.

Review of Previous Site Assessments

No previous Phase II ESAs are known to have taken place. A 2011 geotechnical report for the property included four soil borings and an auger probe boring in support of a proposed site redevelopment plan. The soil boring logs indicate that

the property is underlain by fill soils ranging in thickness from 1.5-7.6' and that some of the fill includes coal ash. Beneath the fill soils are an apparent native silty clay layer, a glacial till layer, and cobbles or bedrock. Wet soils were encountered at approximately 11-15' below grade. The report notes these soils may not be indicative of the depth of the actual water table, and that no observation wells were installed.

A 2012 geotechnical report included one rock coring and one additional soil boring, along with recommendations and analysis of the 2011 geotechnical data. The rock core was advanced to 28' 9" below grade and encountered dark pinkish Monkton Quartzite bedrock. The soil boring confirmed the presence of fill materials to a depth of 7' below grade, underlain by silt. Groundwater was encountered at 7' below grade. Copies of both geotechnical reports are included in Appendix C.

2.0 PROPOSED WORK SCOPE

LEE will perform a Phase II ESA on the Site to address the RECs identified in the Phase I ESA report. The following work scope tasks will be performed.

A. Site-Specific Quality Assurance Project Plan Addendum (QAPP Addendum)
B. Soil boring advancement including four geoprobe borings
C. Collection and testing of six soil samples and one sediment sample for contaminants of concern (COCs)
D. Data validation and preparation of a summary report

The Phase II ESA will determine whether contamination is present due to the identified RECs and will include collection of environmental data that will be needed to develop a corrective action plan (CAP) per DEC requirements.

2.1 Pre-Excavation Activities

Prior to the initiation of subsurface activities, LEE will premark the proposed soil boring locations and obtain a Dig-Safe number. A site specific Health and Safety Plan will be developed and reviewed by field staff prior to exploratory work. The City of Burlington Public Works Department will be contacted to discuss the work scope and any potential utility conflicts.

2.2 Soil Boring Investigation

LEE will conduct a soil boring investigation to evaluate the Site's environmental soil quality. A geoprobe drill rig will be utilized to advance four soil borings at the locations as shown on the Phase II ESA Site Map in Appendix B. One of the soil borings will be inside the garage, in the vicinity of the stained concrete, to check for petroleum and other substances in the underlying soils. The other three soil borings will be at exterior locations.

Four soil samples will be collected from the fill soils and two soil samples will be collected from the native soils. Soil borings will be advanced to a depth of 15 feet, refusal, or to the groundwater table, whichever is shallowest. Continuous soil sampling will be conducted during soil boring advancement. Soil samples will be screened for VOCs using a calibrated photoionization device (PID). Drill cuttings will be disposed on site. A summary of the planned soil borings is:

- SB-1: co-located with geotechnical soil borings B-1 and AP-1 at the north side of the property. Collect soil sample SS-1 from 0-2' depth where coal slag was reported, to gauge surface soil contaminant concentrations to determine whether a clean soil cap would be needed.

- SB-2: located inside the garage. Collect soil sample SS-2 from 0-2' beneath the stained concrete to determine if a release has taken place. Collect soil sample SS-3 from below 2' depth to characterize native soils and to help delineate the vertical extent of contamination if it is present from 0-2'.

- SB-3: located south of the existing deli building in an area that will be excavated for the new building basement. Collect soil sample SS-4 from 0-2' depth to characterize fill soils and collect soil sample SS-5 from the apparent native soil surface depth to characterize native soils. Geotechnical soil borings B-2 and B-3 suggest that the fill soils are much thinner at the south end of the site than at the north end of the site.

- SB-4: located east of the existing deli building and co-located with geotechnical soil boring B-4. Collect a composite soil sample SS-6 from 0-7' to characterize fill soils.

2.3 Soil Sample Testing

Six soil samples will be collected for laboratory analysis of soil COCs including the following constituents and a duplicate will be collected (total of seven samples):

- VOCs via EPA Method 8260b
- Polynuclear Aromatic Hydrocarbons (PAH) via EPA Method 8270d
- RCRA 8 Metals via EPA Method 6020
- Polychlorinated biphenyl compounds (PCBs) via EPA Method 8082

Samples will be submitted to Eastern Analytical Laboratories of Concord, New Hampshire (EAI) for analysis.

2.4 Sediment Sample Collection and Testing

The sediment sample will be manually collected from a suitable location in the brook using hand tools. The sediment sample will be tested for VOCs via EPA

Method 8260b for comparison with the available data for the Englesby Brook DEC site file. This work plan does not include testing the water in the brook. If obvious visible contamination is present in the water on the day that the samples are collected, LEE will present options for addressing the situation.

2.5 Data Validation and Reporting

Following receipt of analytical data, LEE's quality assurance officer will validate the data according to the site-specific QAPP and LEE's generic QAPP procedures. A Brownfields Phase II ESA Report will be prepared for review and approval. A description of the methodologies and results will be included. Comparison with appropriate environmental and materials quality standards will be made. The report will also contain: a site map, sampling locations map, conceptual site model, laboratory analytical data, recommendations for additional work if necessary, conclusions, and other recommendations, as applicable.

3.0 ORGANIZATION AND STAFFING

Alan Liptak of LEE will manage the project including coordination, communications, procurement of supplies, equipment and subcontractor services, and performance of scheduled tasks. Angela Emerson of LEE will serve as the project reviewer and quality assurance officer and will review all documents and perform the data validation.

4.0 PROJECT SCHEDULE

The work can take place following approval of this work plan by CCRPC. The work will take approximately 10 weeks to complete. This includes the required 4-week EPA QAPP approval period, four weeks to generate field and laboratory data, and two weeks for reporting and validation.

5.0 MBE/WBE FAIR SHARE INFORMATION

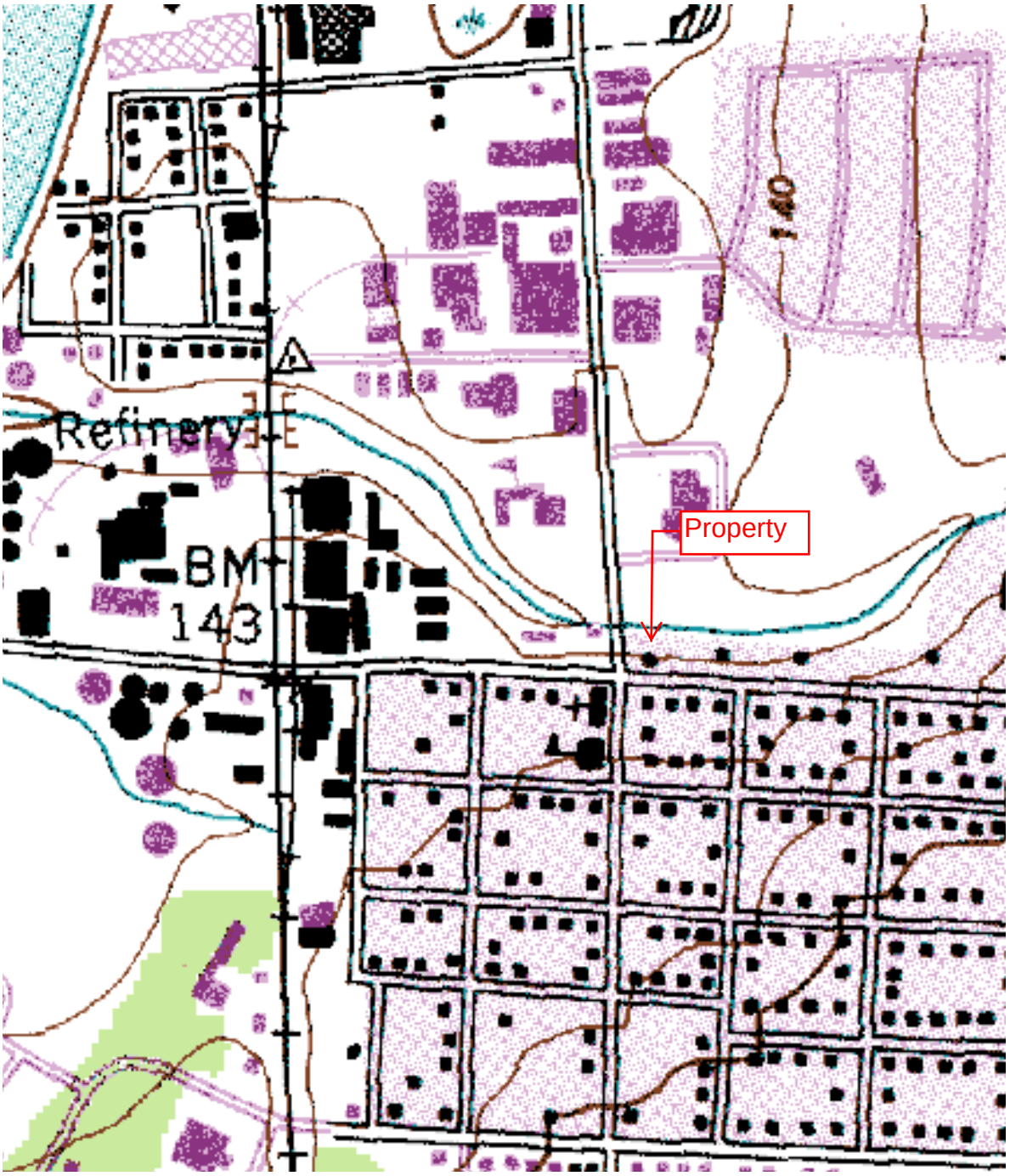
LEE is not a MBE/WBE nor are its subcontractors on this project.

6.0 REFERENCES

1. LEE, Phase I Environmental Site Assessment Report, 316-322 Flynn Avenue, Burlington, Vermont, March 2, 2016.
2. Geodesign Incorporated, Preliminary Geotechnical Report, 316 Flynn Avenue, Burlington, Vermont, March 18, 2011.
3. Willis Consulting Engineers, Inc., Geotechnical Report for Pine Street Deli Development, Burlington, Vermont, November 9, 2012.

Appendix A

Site Location Map



316-322 Flynn Avenue
Burlington, Vermont

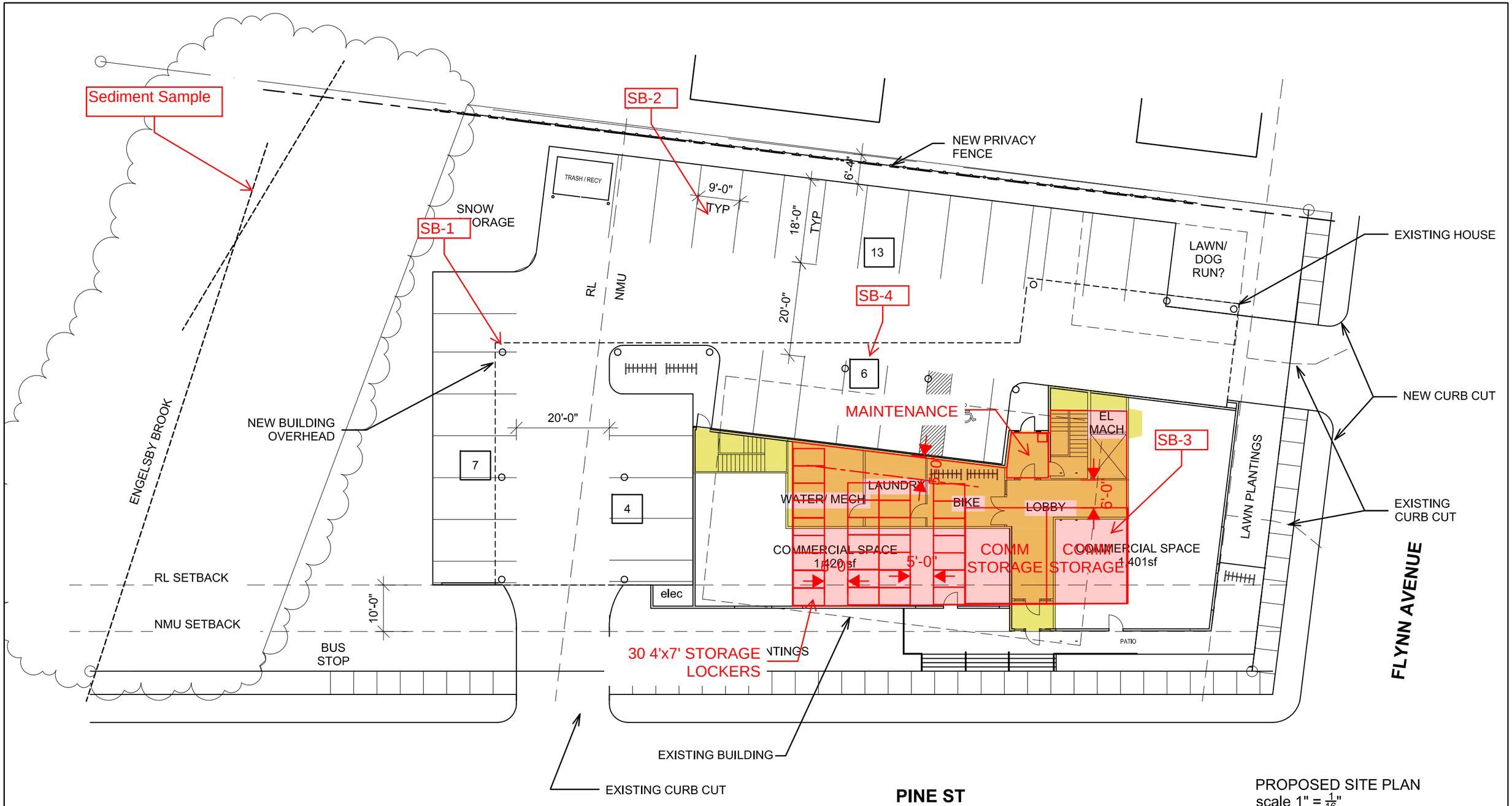
1987 USGS Map

LE-Environmental

LE #:16-055
Date: February 15, 2016
Source: Libremap.org

Appendix B

Proposed Phase II ESA Site Map



PROPOSED SITE PLAN
scale 1" = $\frac{1}{16}$"

Snyder Homes
Great neighborhoods to come home to
4076 Shelburne Road, Suite 6
Shelburne, Vermont 05482
p 802.985.5722 - f 802.497.0701
www.SnyderHomesVT.com

PINE & FLYNN DEVELOPMENT

JANUARY 2016

4/1/16 LEE added proposed soil boring and sediment sample locations

SP-1

Appendix C

Previous Geotechnical Reports

GEODESIGN
INCORPORATED

GEOTECHNICAL / CONSTRUCTION / ENVIRONMENTAL
ENGINEERS and SCIENTISTS

March 18, 2011

Michael Alvanos
Alvanos Property Management Group (Alvanos/PMG)
Williston, VT 05495

Re: Preliminary Geotechnical Report
316 Flynn Avenue – Burlington, VT
GeoDesign File No. 1165-01

Dear Michael:

GeoDesign is pleased to provide this preliminary report of findings and implications for the captioned project. This report is based on the limited scope of services in our January 20, 2011 proposal, and is subject to the attached Limitations. Refer to Figure 1 for a site plan.

Information provided in this report is not sufficient for final design and construction of the building. Subsurface data collection was limited to what could be accomplished in one day of explorations using conventional drilling methods in winter conditions. Additional soil borings, laboratory testing, and engineering analyses are required. This includes a review of the slope beside the proposed building footprint (leading down to Englesby Brook) after the spring thaw once ground conditions are visible. Slope stability was excluded from our current scope of work.

Summary

Assuming that consolidation settlement (yet to be estimated) can be tolerated, spread footings and slab-on-grade construction are appropriate foundation types for this building provided that demolished building foundations and non-engineered fill soils are removed and replaced below new footings with compacted structural fill. Groundwater may also be present above design foundation/excavation levels (via perched conditions) and needs further evaluation with observation monitoring wells. Compressible (clay) soils present below the existing building footprint need testing to estimate consolidation settlements resulting from fill loads to reach new slab levels. Site soils correspond to a Seismic Site Class D per the International Building Code (IBC, 2006) based on the preliminary subsurface data. This classification may be improved by confirming that bedrock or very dense glacial soil is present below exploration refusal depths, and that foundation levels remain the same or lower.

54 MAIN STREET • POST OFFICE BOX 699 • WINDSOR, VERMONT 05089-0699
TELEPHONE: 802.674.2033 • FACSIMILE: 802.674.5943
www.geodesign.net

Project Description

The proposed building footprint is shown on the attached Figure 1. We understand this building consists of a new three-story mixed residential and commercial structure with a ground level parking garage below roughly the northern two-thirds of the building (with a parking entrance along Pine Street). The building will be a wood-framed structure with cast concrete foundations.

Proposed finish floor elevations are Elev. 144 for the parking garage and Elev. 148 for the commercial/residential space. Existing site grades range from approximately Elev. 148 at the south end (at Flynn Avenue) to Elev. 143 at the north end (near Engelsby Brook). The site is currently occupied by the Pine Street Deli and a bottle redemption center. Both buildings will be demolished for the new construction.

Geologic Background

Soils in the project vicinity are mapped at a transition of medium to fine sands and Champlain Sea Clay (silt and clay interlayered with fine sand) per the Surficial Geologic Map of the Burlington, Vermont (Wright, Fuller, Jones, McKinney, Rupard, Shaw, 2009). Natural soils encountered in the borings generally matched published data (below the non-engineered fill), in addition to a dense glacial till stratum.

Mapped bedrock consists of Monkton Quartzite with relatively thick sections of dolomite per the Geologic Map of Vermont (Doll, 1961). Bedrock coring was not performed for this project. Hard refusals encountered at the bottom of the soil borings were inferred to be on either bedrock or boulders within the glacial till stratum.

Subsurface Explorations

Geo**Design** coordinated a preliminary subsurface exploration program limited to one day of soil borings. Refer to the attached exploration site plan (Figure 1) and Geo**Design**'s boring logs.

Specialty Drilling & Investigation drilled four soil borings (B-series) and one auger probe (AP-Series) on February 17, 2011 using a truck mounted drill rig. Each exploration was advanced with 4-¼-inch I.D. hollow stem augers (HSA). Split spoon samples were collected by lowering a 2-inch I.D. split-barrel sampler to the bottom of the boring and driving the sampler into the soil with a 140-pound hammer falling 30 inches (ASTM D1586 – Standard Penetration Test (SPT)).

Soil borings and the auger probe were observed and logged by a Geo**Design** field representative. Geo**Design** examined samples immediately after recovery, and preserved representative portions in sealed glass jars. Strata changes shown on the boring and probe logs were inferred based on sample classification and drilling resistances. Upon completion of each boring, the borehole was backfilled with a mixture of soil cuttings generated from the augers and bentonite chips.

Subsurface Conditions

A generalized subsurface profile is shown on the attached Figure 2 and is summarized below. Strata descriptions are based on preliminary exploration data and observations, and need further evaluation with more soil borings for final design. The profile typically consists of a non-engineered fill layer of varying thickness overlying natural, silt/clay soils above glacial till. Bedrock is present below the glacial till at unknown depth.

Fill (Non-Engineered)

Fill soils are present at Borings B-1 (northeast corner) and B-4 (east side) of the proposed building footprint to between 7 and 8 feet deep. Fill was also inferred up to 1.5 feet deep below asphalt pavement at Borings B-2 and B-3. Fill depths are unknown along the west and central portions of the building footprint. Fill samples typically consisted of fine to coarse sand with little silt and trace amounts of fine gravel. Coal slag was observed in the upper five feet of fill soils at Boring B-1. SPT N-values of 16 and 56 blows per foot (bpf) were recorded at Boring B-1, suggesting a non-uniform and erratic density throughout the fill layer. Fill soils are non-engineered based on their undocumented placement and compaction.

Silt/Clay

Below the non-engineered fill soils, a silt/clay soil stratum was observed in all borings. The silt/clay soils were encountered to 11.5 feet deep at Boring B-1 (northeast corner) and to between 16 and 16.5 feet at Borings B-4 and B-2 (east and southwest corner, respectively). SPT N-values ranged between 6 and 25 bpf, but were typically greater than 10 bpf suggesting a medium stiff to very stiff condition. Generally, the silt/clay stratum increased in plasticity (i.e., clay content and behavior) with depth. Deeper soils in this stratum (silty clay) were stiffer and had a distinctly reddish brown color containing trace amounts of fine to coarse sand and fine gravel.

Glacial Till

Glacial till was encountered below the silty clay soils in Borings B-1, B-2, and B-4. Soils sampled from this stratum typically consisted of fine to coarse sand and silt, with little to some fine gravel. Cohesive soil of varying plasticity (i.e., clayey silt or silty clay) was occasionally observed in the soil matrix. SPT N-values of 40 bpf and greater were recorded in this stratum, suggesting a dense to very dense condition to the boring refusal depths.

Bedrock or Boulders (Inferred)

Hollow stem auger (HSA) refusals in the borings were encountered between 12.5 and 13 feet deep at Boring B-1 and Auger Probe AP-1, respectively (northeast corner) and at 18.5 feet deep at Boring B-2 (southwest corner). Boring B-4 was drilled to 26 feet deep with no HSA refusal. Refusals were hard with no observed advancement of the augers, indicating possible bedrock

below the glacial till stratum or large boulders within the glacial till stratum. Bedrock coring was beyond the limited scope of our work for this phase and was not performed.

Groundwater

Wet soil samples were first encountered at approximately 11 feet deep in Borings B-1 and B-3, and approximately 15 feet deep in Borings B-2 and B-4. These depths correspond to between approximately Elev. 131 and Elev. 136. Groundwater observation wells were not installed.

Groundwater conditions encountered at the time the soil borings were drilled are not necessarily indicative of actual groundwater conditions or those which will occur during construction or the life of the building. Actual groundwater levels during construction and thereafter may vary from those reported on the logs based on seasonal and other conditions that are different from those present at the time of drilling.

Geotechnical Implications

Preliminary Foundation Design

Assuming that consolidation settlement (yet to be estimated) can be tolerated, shallow foundations (i.e., spread footings) are appropriate for supporting the proposed building. Spread footings also assume that non-engineered fill is removed below footings and their zone of influence, and replaced with compacted structural fill. This includes demolition and removal of the existing building basement foundations and associated backfill soils that extend below new footing levels. Below new slabs, existing fill soils can be removed entirely or remain partially in place and "improved". Complete removal/replacement will provide the lowest slab settlement risk, and will be more economical below the garage floor (El. 144) where total excavation volumes will be less than because the slab is lower.

Spread footing foundations can bear either directly on the natural silt/clay or on compacted structural fill installed above these soils. Exterior footings should bear at least five feet below final exterior grades for frost protection. For preliminary design, we recommend at least a net allowable bearing pressure of 2,500 pounds per square foot (psf) for footings bearing on at least 12 inches of compacted structural fill. This bearing pressure could be increased with additional soil borings and testing for final design.

Seismic Site Classification

Our preliminary evaluation using SPT N-values obtained from the soil borings indicates that site soils correspond with the International Building Code (IBC, 2006) Site Class D for seismic design. As discussed with you and the Structural Engineer, this classification could potentially be improved to a Site Class C based on additional soil boring data and analysis. Specifically, additional soil borings extending below refusal depths encountered in the present borings would

be required to evaluate bedrock conditions (with rock coring) and/or the depth and density of the glacial soil stratum.

An improved site classification will result in cost savings for the building. It will not, however, affect foundation design and preparation recommendations for the project. Improvement to the seismic site classification is also dependent on final design foundation levels, which we have assumed will remain approximately the same (i.e., 144 to 148 feet El.) or be lowered from those shown on the conceptual site plan. We recommend that Geo**Design** provide a final evaluation of the site classification once the building footprint has been determined.

Settlement

A detailed settlement evaluation was beyond our present scope of work. Settlement of the compressible (clay) soils will be particularly important below the demolished building footprint where structural fill load will be added to reach the proposed slab level. We currently anticipate that total and differential post-construction settlements can be limited to normally accepted tolerances provided by the Structural Engineer, based on preliminary loading information they provided us and a limited preliminary settlement analysis based on clay properties from a nearby project site. However, Geo**Design** must prepare settlement estimates and confirm final bearing pressures once the building footprint and foundation design elevations have been finalized, using supplemental soil boring and laboratory (i.e., consolidation) test data.

Groundwater Control

Observations from the preliminary exploration program suggest that groundwater will generally be below excavation depths anticipated to reach the bottom of non-engineered fill. However, groundwater elevations need to be further evaluated during final design as we expect perched water conditions may be present at this site. Positive measures to control groundwater around the perimeter foundations and below the building/garage slabs will also need to be addressed for final design and development of contract bid documents. Reliable groundwater data can be obtained by installing observation wells (e.g., one at the north and one at the south end of the building footprint) in the final design phase borings.

Construction Considerations

Demolition of the existing building and removal of basement foundations, associated backfill soils, and utilities will be required below a portion the new building footprint. These excavations will extend deeper than design foundation levels, and will need to be filled with compacted structural fill. Elsewhere, excavations need to be planned to allow removal of existing non-engineered fill soils below the zone of influence of new foundations (e.g., within 1 Horizontal : 1 Vertical planes extending down to undisturbed, natural soils).

Natural silt/clay soils that will be exposed below non-engineered fill must be protected during backfill and footing subgrade preparation. These soil types are susceptible to disturbance under

construction equipment and foot traffic, particularly when wet. Protection could consist of a working mat of compacted granular soil or crushed stone. Groundwater may also need to be controlled locally (we expect using conventional pumping methods) during construction, particularly at the north end of the building site where groundwater was encountered closest to the bottom of non-engineered fill. Groundwater design and control recommendations must be developed after review of final design phase observation well data.

Final Design Phase Geotechnical Evaluations

Additional explorations and geotechnical analyses are required to prepare final geotechnical recommendations suitable for final design and preparation of construction documents. After the building footprint and foundation design elevations have been finalized, we recommend that Geo**Design** evaluate the following:

- Dense glacial soil or bedrock depths (via coring) to finalize seismic site classification;
- Compressibility and depths to firm, natural clay soil strata for foundation bearing and settlement estimates;
- Groundwater levels (via wells) for foundation design and construction dewatering;
- Limits and characteristics of non-engineered fill below design foundation levels for excavation/replacement and soil handling; and,
- New pavement base/subbase section recommendations (as needed).

We look forward to continuing our working relationship with you on this project.

Sincerely,

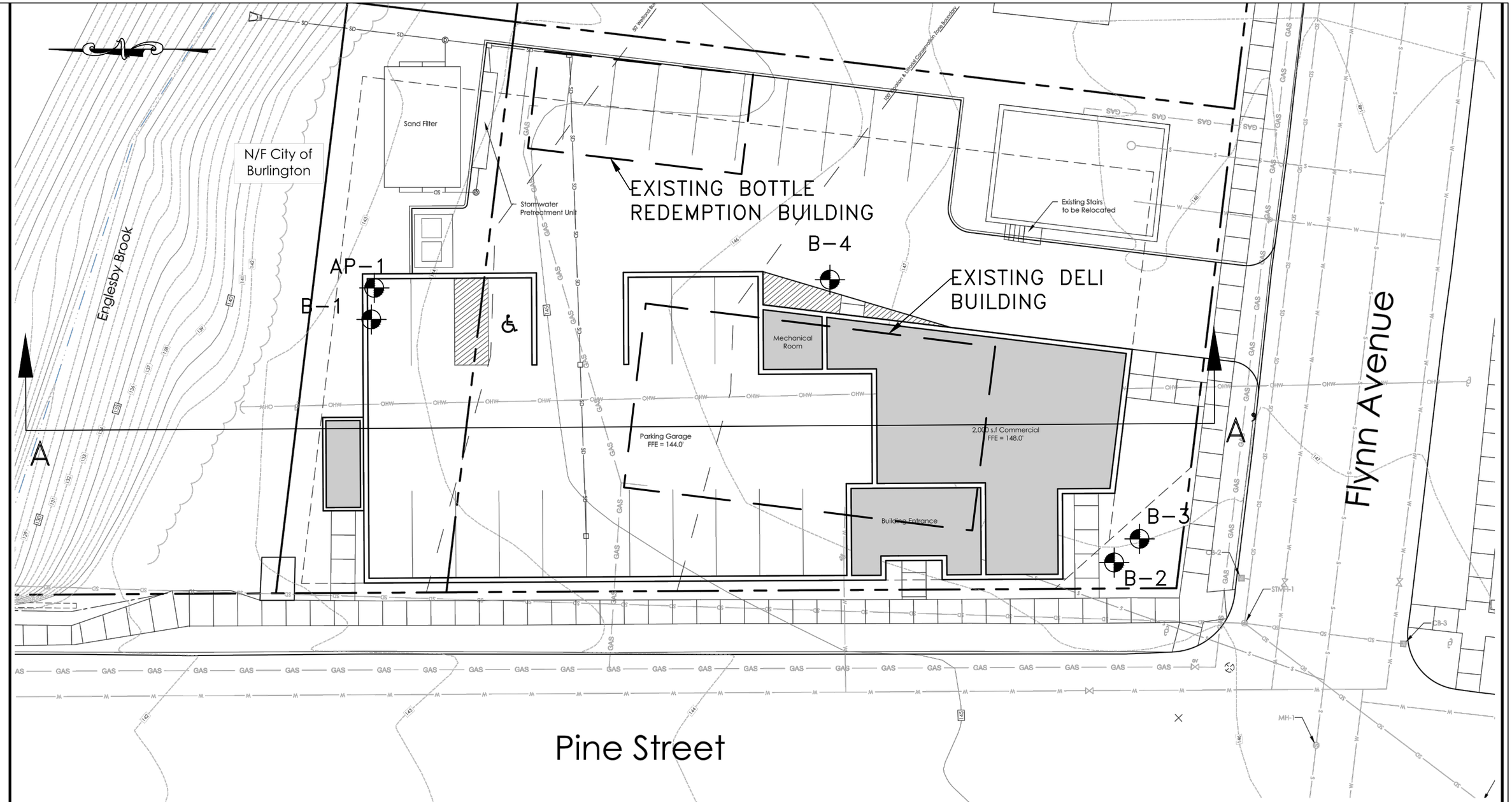
Geo**Design**, Inc.

FOR:

Jason A. Gaudette, P.G., LEED AP
Associate

Ulrich LaFosse, P.E.
Senior Principal

Attachments: Exploration Location Plan (Figure 1); Generalized Subsurface Profile (Figure 2); Soil Boring Logs; Report Limitations.



NOTES:

1. Exploration Location Plan derived from an electronic site plan titled, "C9.02 - Site Concept Plan", by Engineered Solutions PC and dated February 1, 2011.
2. B-Series soil boring and AP-1 auger probe shown were performed by Specialty Drilling and Investigation and observed and logged in the field by Geo **Design** personnel on February 17, 2011.
3. All exploration locations shown are approximate, based on taped measurements take by Geo **Design** personnel in the field from existing features. Locations shown should be considered accurate only to the degree implied by the method of location used.

GEODESIGN INCORPORATED
GEOTECHNICAL ENGINEERS AND ENVIRONMENTAL CONSULTANTS
54 MAIN STREET POST OFFICE BOX 699
WINDSOR, VERMONT 05089-0699
TEL: (802) 674-2033 FAX: (802) 674-5943
E-MAIL: http://www.geodesign.net
MIDDLEBURY, CT BURLINGTON, VT

DRAWN BY: JFW | REVIEWED BY: JAG

EXPLORATION LOCATION PLAN
316 FLYNN AVENUE
BURLINGTON, VT

FILE NO. 1165-01

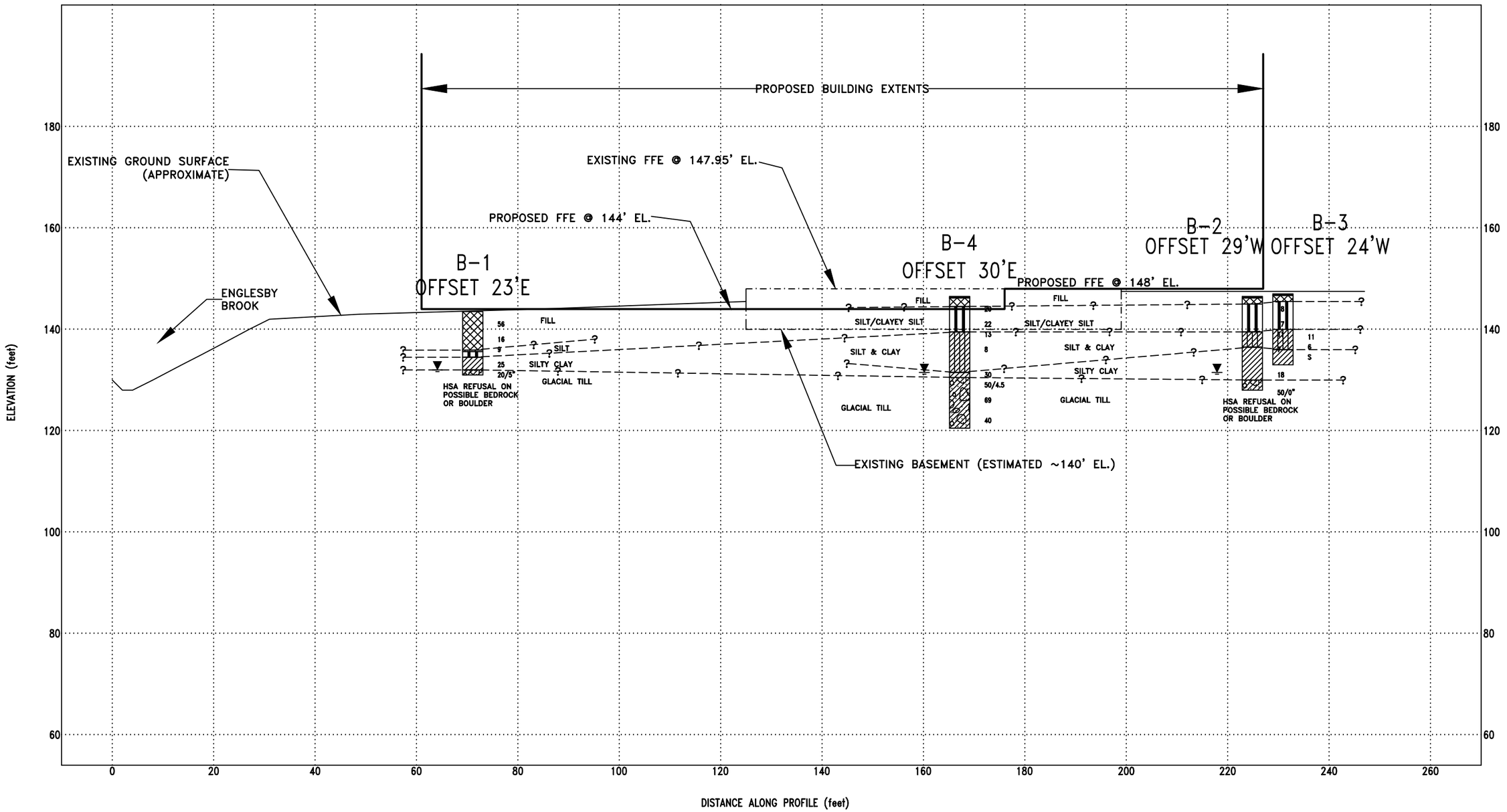
SCALE IN FEET
1" = 20'
0 10 20 40

DATE: 02/18/2011

FIGURE NO. 1

CAD FILE No. M:\CI\1165-Alvanos Property Mngmt\1165-01 Pine Street Deli\CAD\ELP.dwg

A North South A'



GEODESIGN INCORPORATED

Geotechnical Engineers/Environmental Consultants/Construction Engineers

P.O. Box 699
Windsor, VT 05089
Phone: 802-674-2033/Fax: 802-674-5943

1233 Shelburne Rd. Ste. 360
So. Burlington, VT 05403
Phone: 802-652-5140

0 20

Horizontal Scale (feet)

Vertical Exaggeration: 1x

Notes:
1. Data concerning the various strata have been interpreted at boring locations only. The stratigraphy between borings may vary from that shown.
2. Refer to plan view for subsurface profile location. For strata details and symbol legend, see Subsurface Profile Legend and boring logs appended to this report.
3. Numbers displayed beside boring(s) represent SPT "N" values corresponding to their respective sampling interval. Where coring was performed, numbers represent Recovery and RQD values.

Date: 2/21/11 | Drawn By: JFW | Reviewed By: JAG

SUBSURFACE PROFILE A-A'

316 Flynn Avenue

Burlington, VT

File No.: 1165-01 | Figure No.: 2

11X17 N-S PROFILE BOREHOLE OFFSET 1165-01.GPJ FBNWNL01.GDT 2/21/11

EXPLANATION OF THE FORM - BORING LOG

The following provides an explanation of the various fields on the Boring Log form.

BORING LOG HEADING

Project and Boring Details
Within the upper portion of the Boring Log, details with regards to the Project Name and Location, Boring Number, and Geo**Design**'s file number are provided. In addition, within the upper section of the Boring Log, the Drilling Company's name, and their representative, together with the name of Geo**Design**'s representative, are presented. Details with regards to the dates when the boring was drilled, its coordinates or other location references and the corresponding surface elevation may also be provided. Where applicable, the Datum used is provided in the text of the Report.

Casing and Sampler
This section provides a summary of the typical size of samplers and casings used, together with the type of drilling rig. See below for a description of samplers.

Groundwater Observations
Water levels typically indicated on the Boring Log are levels measured in the boring at the times indicated. In permeable materials, the indicated levels may reflect the location of groundwater. In low permeability soils and/or due to effects of the casing, the accurate determination of groundwater levels may not be possible with only short term observations.

CENTRAL PORTION OF BORING LOG

DEPTH
This column gives the depth scale of the boring, in feet or meters.

CASING BLOWS
Indicates the number of blows per foot (0.3 m) required to advance the casing, using a 136 kg (300-pound) hammer.

SAMPLE INFORMATION
The initial columns provide the sample number, sample type, penetration, recovery and sample depth. The Sample Type Coding is as follows:

A - Auger Sample	PS- Undisturbed Piston - 3" (76 mm)	SSL - Large Split-Barrel - 3" (76 mm)	V - Vane Test
C - Core - Diamond Bit - NX double tube, unless otherwise noted.	SS - Split-Barrel (Split-Spoon)	ST - Shelby Tube - 3" (76 mm)	

Blows / 6 inch (0.15 meter) Interval
Representative soil samples were obtained in the boring by split-barrel sampling procedures in general accordance with ASTM D 1586. The split-barrel sampling procedure utilizes a standard 51 mm (2") outside diameter split-barrel sampler that is driven into the bottom of the boring with a 63.5 kg (140-pound) hammer falling a distance of 0.76 m (30"). The number of blows required to advance the sampler in 0.15 m (6") increments is recorded as part of the Standard Penetration Test (SPT). These values are indicated at their depth of occurrence.

The number of blows required to advance the split-barrel sampler the middle two - 0.15 m (6") increments of a 0.61 m (24") penetration is recorded as the Standard Penetration Resistance Value ("N").

Where the sampler advanced by Weight of Rods or Weight of Hammer, the designation WOR and WOH, respectively, was used. In the case of PS or ST samples, the designation PUSH was used.

Coring Time
This column provides the rate in minutes at which the core barrel was advanced into the bedrock (or boulder) in one foot (0.3 m) intervals.

PID Reading - Where Applicable
This column provides results for samples which were screened in the field with a photoionization detector for the presence of volatile organic compounds (including certain petroleum constituents) calibrated relative to benzene in air standard.

Moisture Content (%) - Where Applicable
This column provides moisture content determination results for the samples tested.

SAMPLE DESCRIPTION
This column provides a description of the soil and bedrock units, based on visual observation of the samples, sometimes in conjunction with field and laboratory tests. Each sample was generally described according to the following classification and terminology. In general, description of the soil units followed the Burmister classification system.

SOIL PROPERTIES & DESCRIPTIONS

TEXTURE*

Component	Size (mm)
CLAY	< 0.002 mm
SILT	< #200 Sieve (0.075 mm)
SAND	#200 to #4 Sieve (0.075 mm to 4.75 mm)
Fine	#200 to #40 Sieve (0.075 mm to 0.425 mm)
Medium	#40 to #10 Sieve (0.425 mm to 2.00 mm)
Coarse	#10 to #4 Sieve (2.00 mm to 4.75 mm)
GRAVEL	#4 Sieve to 3 in (4.75 mm to 76 mm)
Fine	#4 Sieve to 3/4 in (4.75 mm to 19 mm)
Coarse	3/4 in to 3 in (19 mm to 76 mm)
COBBLES	3 in to 12 in (76 mm to 305 mm)
BOULDERS	> 12 in (305 mm)

*textural classification as determined by sieve and hydrometer analyses

COMPOSITION
Principal Component in Upper Case i.e. >50%
CLAY, SILT, SAND, GRAVEL, COBBLES, BOULDERS
Minor Component Upper and Lower Case i.e.<50%
Clay, Silt, Sand, Gravel, Cobbles, Boulders

DESCRIPTIVE ADJECTIVE	PERCENTAGE REQUIREMENT
trace	<10 %
little	10 - 20 %
some	20 - 35 %
and	35 - 50 %

MOISTURE CONDITION

Dry	Absence of moisture, dusty
Moisture	Damp but no visible water
Wet	Visible free water

COHESIVE SOILS

ESTIMATED CONSISTENCY CLASSIFICATION ***	"N" Value
Very Soft	< 2
Soft	2 - 4
Medium	4 - 8
Stiff	8 - 15
Very Stiff	15 - 30
Hard	> 30

*** empirical relationship

COHESIONLESS SOILS

ESTIMATED COMPACTNESS DESCRIPTION ***	"N" Value
Very Loose	< 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

PLASTICITY - Burmister

Degree of Plasticity	Soil Type	Smallest Diameter of Thread**
Non-Plastic	SILT	None
Slight	Clayey SILT	1/4" (6 mm)
Low	SILT & CLAY	1/8" (3 mm)
Medium	CLAY & SILT	1/16" (1.6 mm)
High	Silty CLAY	1/32" (0.8 mm)
Very High	CLAY	1/64" (0.4 mm)

** moisture at or near optimum

STRUCTURE

Stratified,	>6 mm (1/4")
Laminated,	< 6 mm (1/4")
Parting,	0 to 1.6 mm (1/16")
Seam,	1.6 to 13 mm (1/2")
Layer,	13 to 305 mm (12")
Stratum,	> 305 mm (12")

BEDROCK PROPERTIES & DESCRIPTIONS

RECOVERY AND ROCK QUALITY DESIGNATION (RQD)

Recovery is defined as the length of core obtained expressed as a percentage of the total length cored.

RQD is defined as the total length of sound core pieces, 4 inches (100 mm) or greater in length, excluding drilling breaks, expressed as a percentage of the total length cored. RQD provides an indication of the integrity of the rock mass and relative extent of seams and bedding planes.

Classification	RQD %
Very Poor Quality	0 - 25
Poor Quality	25 - 50
Fair Quality	50 - 75
Good Quality	75 - 90
Excellent Quality	90 - 100

HARDNESS

TYPICAL ROCK TYPES		Moh's Hardness Scale
Hard	Cannot be scratched with knife	> 5.5
Moderately Hard	Can scratch with knife but not fingernail	5.5 - 2.5
Soft	Can be scratched with fingernail	< 2.5
SANDSTONE		
Well Cemented	Capable of scratching a knife blade	5.5 - 2.5
Cemented	Can be scratched with knife	< 2.5
Poorly Cemented	Can be broken apart easily with fingers	

WEATHERING

Fresh	No visible signs of weathering
Slightly Weathered	Slight discoloration of parent material in joints and seams
Moderately Weathered	Less than 35% of rock material is decomposed. Fresh or discolored rock is present.
Highly Weathered	More than 35% of rock material is decomposed. Fresh or discolored rock is present.
Extremely Weathered	All rock material is decomposed to soil. Rock mass structure may still be intact.

SPACING OF DISCONTINUITIES

Bedding	Jointing	Spacing (inches)	Spacing (mm)
Very Thick Bedded	Very Wide	>80	>2000
Thick Bedded	Wide	24 - 80	600 - 2000
Medium Bedded	Moderate	8 - 24	200 - 600
Thin Bedded	Close	2.4 - 8	60 - 200
Very Thin Bedded	Very Close	0.8 - 2.4	20 - 60
Laminated	Shattered	0.24 - 0.8	6 - 20
Thinly Laminated	Fissured	<0.24	<6

When classification of rock materials has been estimated from disturbed samples, core samples and petrographic analysis may reveal other rock types.

SYMBOL
This column provides a graphical representation of the soil and bedrock units, and inferred geological contacts. See Subsurface Profile Legend.

STRATA DESCRIPTION (ELEVATION/DEPTH)
This column gives the elevation and depth of inferred geological contacts together with a general description of the respective soil and bedrock units. Stratification lines represent approximate boundaries between material types, transitions may be gradual.

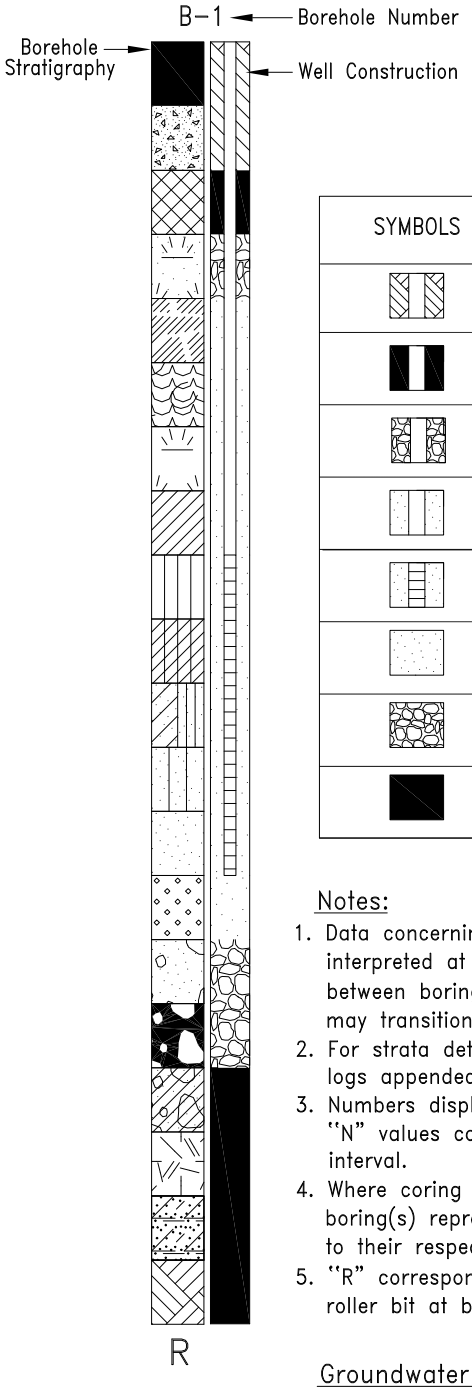
BORING LOG FOOTER

The lower portion of the log provides additional drilling notes within the Remarks section together with additional General Notes.

STRATIGRAPHY SYMBOLS

SYMBOLS	TYPICAL DESCRIPTIONS OF PREDOMINENT MATERIAL TYPE
	ASPHALT
	CONCRETE
	FILL
	TOPSOIL
	SUBSOIL
	ORGANIC SILT OR CLAY WITH SHELLS
	PEAT
	CLAY
	SILT
	CLAY/SILT MIXTURE
	CLAY/SILT/SAND MIXTURE
	SILT/SAND MIXTURE
	POORLY-GRADED SAND
	WELL-GRADED SAND
	SAND/GRAVEL MIXTURE
	BOULDERS AND/OR COBBLES
	GLACIAL TILL
	DECOMPOSED BEDROCK
	SANDSTONE
	BEDROCK

EXPLANATION OF BORING



WELL SYMBOLS

SYMBOLS	TYPICAL DESCRIPTIONS
	CEMENT SEAL: 1 PIPE
	BENTONITE SEAL: 1 PIPE
	SLOUGH BACKFILL: 1 PIPE
	FILTER PACK: 1 PIPE
	SLOTTED PIPE WITH FILTER PACK: 1 PIPE
	FILTER PACK AT BOTTOM OF HOLE
	SLOUGH AT BOTTOM OF HOLE
	BENTONITE AT BOTTOM OF HOLE

Notes:

1. Data concerning the various strata have been interpreted at boring locations only. The stratigraphy between borings may vary from that shown, and may transition more gradually within borings.
2. For strata details, see Report and boring logs appended to this report.
3. Numbers displayed beside boring(s) represent SPT "N" values corresponding to their respective sampling interval.
4. Where coring was performed, numbers displayed beside boring(s) represent Recovery and RQD values corresponding to their respective sampling interval.
5. "R" corresponds to refusal of sampler, casing and/or roller bit at bottom of boring.

Groundwater Observations (where applicable)

▽ Water Level Reading at time of drilling.

▼ Water Level Reading after completing drilling.

GEODESIGN INCORPORATED

GEOTECHNICAL ENGINEERS • ENVIRONMENTAL CONSULTANTS
54 MAIN STREET, P.O. BOX 677 • WINDSOR, VERMONT 05089
TELEPHONE: (802)674-2033 FACSIMILE: (802)674-5943

SUBSURFACE PROFILE LEGEND

ACAD FILE No. M:\TEMPLATES\BORINGS\LEGEND.DWG

GEODESIGN INCORPORATED
Geotechnical Engineers-Environmental Consultants-Construction Engineers
P.O. Box 699
Windsor, VT 05089
Phone: 802-674-2033/Fax: 802-674-5943
1233 Shelburne Rd., Suite 360
So. Burlington, VT 05403
Phone: 802-652-5140

BORING LOG

Project Name

316 Flynn Avenue

Burlington, VT

Boring No.: **AP-1**
Page No.: 1 of 1
File No.: 1165-01
Checked By: JAG

Boring Company:	Specialty Drilling & Investigation		
Foreman:	Chris Aldrich		
GeoDesign Rep.:	Jacob Wimett		
Date Started:	February 17, 2011	Date Finished:	February 17, 2011
N. Coordinate:	4875	E. Coordinate:	6657
Ground Surface Elevation (feet):	143.5		
Station:		Offset:	ft

	Casing:	Sampler:
Type:	H.S.A.	N/A
I.D.:	4.25 in.	in.
Hammer Wt.:	NA	
Hammer Fall:	NA	
Rig Type:	Simco 2800 Truck	
Hammer Type:		

Groundwater Observations			
Date	Depth (ft)	Elev. (ft)	Notes
▼ 2/17/11, 10:00			None observed
▼			
▼			
▼			

Depth (ft)	Casing Blows/ft	Sample Information: Number	Type	Penetration (inches)	Recovery (inches)	Depth (ft)	Blows / 6 inch Interval: 0 - 6	6 - 12	12 - 18	18 - 24	Coring Time (min./ft)	Moisture Content (%)	Strata Description (Depth & Elevation(feet))	Symbol	Sample Description (Classification System:)
													Fill (Inferred from B-1)		
5													7.6		
													Silt 135.9 (Inferred from B-1)		
10													10		
													Silty Clay 133.5 (Inferred from B-1)		
													11.5		
													Glacial Till 132.0 (Inferred from B-1)		
													13		
		S1	SS	0	0	13	25/0"						Bottom 130.5 of Exploration at 13.0 ft		S6) Refusal, no recovery.
15															
20															
25															
30															

Remarks

1) Ground surface elevation estimated by GeoDesign from a topographic site plan provided by Engineered Solutions PC titled "C9.02 - Site Conceptual Design" dated February 1, 2011.
2) AP-1 was performed ~7' east of B-1. Sampling was attempted only upon refusal on inferred bedrock. Lithology shown is inferred from Boring B-1.
3) Encountered hollow stem auger refusal at 13' deep. Noted reddish colored rock powder on the cutting head.

Notes:

1) Stratification Lines Represent Approximate Boundary Between Material Types, Transitions May Be Gradual.
2) Water Level Readings Have Been Made At Times And Under Conditions Stated, Fluctuations Of Groundwater May Occur Due To Other Factors Than Those Present At The Time Measurements Were Made. A.C. = After coring; N.R. = Not Recorded.
3) Sample Type Coding: A=Auger; C=Core; D=Driven; G=Grab; PS=Piston Sampler; SS=Split Barrel (Split Spoon); ST=Shelby Tube; Geo=GeoProbe V=Vane; WOR/H=Weight of Rod/Hammer
4) Proportions Used: Trace = 1-10%; Little = 10-20%; Some = 20-35%; And = 35-50%
5) Stratification lines represent approximate boundary between material types, transitions may be gradual.

Boring No.: **AP-1**

GEODESIGN INCORPORATED
Geotechnical Engineers-Environmental Consultants-Construction Engineers
P.O. Box 699
Windsor, VT 05089
Phone: 802-674-2033/Fax: 802-674-5943
1233 Shelburne Rd., Suite 360
So. Burlington, VT 05403
Phone: 802-652-5140

BORING LOG

Project Name

316 Flynn Avenue

Burlington, VT

Boring No.: **B-1**
Page No.: 1 of 1
File No.: 1165-01
Checked By: JAG

Boring Company:	Specialty Drilling & Investigation				
Foreman:	Chris Aldrich				
GeoDesign Rep.:	Jacob Wimett				
Date Started:	February 17, 2011	Date Finished:	February 17, 2011		
N. Coordinate:	4869	E. Coordinate:	6656		
Ground Surface Elevation (feet):	143.5				
Station:		Offset:	ft		

	Casing:	Sampler:
Type:	H.S.A.	SS
I.D.:	4.25 in.	1.38 in.
Hammer Wt.:	NA	140 lbs
Hammer Fall:	NA	30 in.
Rig Type:	Simco 2800 Truck	
Hammer Type:	Wireline Safety	

Groundwater Observations

Date	Depth (ft)	Elev. (ft)	Notes
▼ 2/17/11, 8:16	11.5	132.0	Wet sample
▼			
▼			
▼			

Depth (ft)	Casing Blows/ft	Sample Number	Sample Type	Penetration (inches)	Recovery (inches)	Sample Depth (ft)	Blows / 6 inch Interval 0 - 6	6 - 12	12 - 18	18 - 24	Coring Time (min./ft)	Moisture Content (%)	Strata Description (Depth & Elevation(feet))	Symbol	Sample Description (Classification System: Burmister)
													Fill		
		S1	SS	24	18	2	31	40	16	15		13.4			S1) Very dense, reddish brown with black fine to coarse SAND, little (+) Silt, trace Silt & Clay, trace Coal Slag, trace fine Gravel, frozen.
5															
		S2	SS	24	5	5	9	10	6	6		9.9			S2) Medium dense, reddish brown fine to medium SAND, little (+) Silt, trace Silt & Clay, trace (-) fine Gravel, moist.
		S3	SS	24	17	7	7	4	5	12		17.1	7.6 Silt 135.9		S3) Loose,
						7.6 8						38.9 22.7	9		S3A - Top 7": Reddish brown fine to coarse SAND, little Silt, trace fine Gravel, moist.
10													Silty Clay 134.5		S3B - Middle 3": Brown-gray Clayey SILT, trace fine Sand, trace Root Fibers, moist.
		S4	SS	24	17	10	6	9	16	18		36.0	11.5 ▼		S3C - Bottom 7": Light brown-gray SILT, trace fine Sand, moist.
		S5	SS	5	3	12	20/5"					13.5	Glacial Till 132.0 12.5		S4) Very stiff, reddish brown mottled with gray Silty CLAY, trace (+) fine Sand (concentrated in 1/2" layer at spoon tip), moist to wet.
													Bottom of Exploration at 12.5 ft 131.0		S5) Refusal, reddish brown fine to medium SAND and SILT, little (+) fine Gravel, wet.
15															
20															
25															
30															

Remarks

1) Ground surface elevation estimated by GeoDesign from a topographic site plan provided by Engineered Solutions PC titled "C9.02 - Site Conceptual Design" dated February 1, 2011.
2) Augered to 2' deep through frozen soils prior to sampling.
3) Driller noted increase in drilling resistance at 9' deep at inferred strata change.
4) Sample S5 at 12' deep refused at 12.4' deep after 10 blows with no movement and spoon observed to be bouncing on inferred bedrock or boulder.
5) Heavy auger grinding observed beginning at 12.4' deep. Hollow stem auger refusal at 12.5' deep. Note reddish colored rock flour on the cutting bit.

Notes:

1) Stratification Lines Represent Approximate Boundary Between Material Types, Transitions May Be Gradual.
2) Water Level Readings Have Been Made At Times And Under Conditions Stated, Fluctuations Of Groundwater May Occur Due To Other Factors Than Those Present At The Time Measurements Were Made. A.C. = After coring; N.R. = Not Recorded.
3) Sample Type Coding: A=Auger; C=Core; D=Driven; G=Grab; PS=Piston Sampler; SS=Split Barrel (Split Spoon); ST=Shelby Tube; Geo=GeoProbe V=Vane; WOR/H=Weight of Rod/Hammer
4) Proportions Used: Trace = 1-10%; Little = 10-20%; Some = 20-35%; And = 35-50%
5) Stratification lines represent approximate boundary between material types, transitions may be gradual.

Boring No.: **B-1**

GEODESIGN INCORPORATED
Geotechnical Engineers-Environmental Consultants-Construction Engineers
P.O. Box 699, Windsor, VT 05089, Phone: 802-674-2033/Fax: 802-674-5943
1233 Shelburne Rd., Suite 360, So. Burlington, VT 05403, Phone: 802-652-5140

BORING LOG

Project Name: 316 Flynn Avenue, Burlington, VT

Boring No.: **B-2**
Page No.: 1 of 1
File No.: 1165-01
Checked By: JAG

Boring Company:	Specialty Drilling & Investigation		
Foreman:	Chris Aldrich		
GeoDesign Rep.:	Jacob Wimett		
Date Started:	February 17, 2011	Date Finished:	February 17, 2011
N. Coordinate:	4818	E. Coordinate:	6810
Ground Surface Elevation (feet):	146.5		
Station:		Offset: ft	

	Casing:	Sampler:
Type:	H.S.A.	SS
I.D.:	4.25 in.	1.38 in.
Hammer Wt.:	NA	140 lbs
Hammer Fall:	NA	30 in.
Rig Type:	Simco 2800 Truck	
Hammer Type:	Wireline Safety	

Groundwater Observations

Date	Depth (ft)	Elev. (ft)	Notes
▼ 2/17/11, 10:50	15.0	131.5	Wet sample

Depth (ft)	Casing Blows/ft	Sample Number	Sample Type	Penetration (inches)	Recovery (inches)	Sample Depth (ft)	Blows / 6 inch Interval 0 - 6	6 - 12	12 - 18	18 - 24	Coring Time (min./ft)	Moisture Content (%)	Strata Description (Depth & Elevation (feet))	Symbol	Sample Description (Classification System: Burmister)
													Asphalt 146.2		
													1.5 Fill		
		S1	SS	24	24	2	10	8	10	10		28.4	Silt/Clay 145.0		S1) Very stiff, olive brown mottled with gray and occasional orange occasionally parted Clayey SILT, little fine Sand seams up to 1/8" thick, frozen to moist.
5															
		S2	SS	24	24	5	5	7	10	14		27.3			S2) Medium dense, olive brown mottled with gray SILT, some (+) Clayey Silt, trace fine Sand, moist. Overall slight plasticity.
		S3	SS	24	24	7	4	5	6	8		34.6			S3) Stiff, olive brown with occasional gray CLAY & SILT, trace (-) fine Sand in one 1/4" thick seam, moist. Observe old Root Pinholes throughout sample.
10													10		
		S4	SS	24	24	10	2	3	4	7		44.2	Silty Clay 136.5		S4) Medium, reddish brown Silty CLAY, trace fine to coarse Sand, trace fine Gravel, very moist.
15													▼		
		S5	SS	24	24	15	2	9	9	45		41.8	16.5		S5)
						16.5						11.1	Glacial Till 130.0		S5A - Top 18": Very stiff, gray Silty CLAY, trace fine to coarse Sand, trace fine Gravel, wet.
													18.5		S5B - Bottom 6": Purplish gray SILT and fine to coarse SAND, some (+) Silty Clay, little fine Gravel, wet.
		S6	SS	0	0	18.5	50/0"						Bottom of Exploration at 18.5 ft 128.0		S6) Refusal, no recovery.
20															
25															
30															

Remarks

1) Ground surface elevation estimated by GeoDesign from a topographic site plan provided by Engineered Solutions PC titled "C9.02 - Site Conceptual Design" dated February 1, 2011.
2) Augered to 2' deep through frozen soils prior to sampling.
3) Driller noted possible granular soils at 1.5' deep based on drilling resistance.
4) Noted increase in drilling resistance with frequent rig chatter and auger grinding beginning at 16.5' deep.
5) Driller noted increase in drilling resistance within the glacial till soils beginning at 17.5' deep. Hollow stem auger refusal at 18.5' deep.

Notes:
1) Stratification Lines Represent Approximate Boundary Between Material Types, Transitions May Be Gradual.
2) Water Level Readings Have Been Made At Times And Under Conditions Stated, Fluctuations Of Groundwater May Occur Due To Other Factors Than Those Present At The Time Measurements Were Made. A.C. = After coring; N.R. = Not Recorded.
3) Sample Type Coding: A=Auger; C=Core; D=Driven; G=Grab; PS=Piston Sampler; SS=Split Barrel (Split Spoon); ST=Shelby Tube; Geo=GeoProbe V=Vane; WOR/H=Weight of Rod/Hammer
4) Proportions Used: Trace = 1-10%; Little = 10-20%; Some = 20-35%; And = 35-50%
5) Stratification lines represent approximate boundary between material types, transitions may be gradual.

Boring No.: **B-2**

GEODESIGN INCORPORATED
Geotechnical Engineers-Environmental Consultants-Construction Engineers
P.O. Box 699
Windsor, VT 05089
Phone: 802-674-2033/Fax: 802-674-5943
1233 Shelburne Rd., Suite 360
So. Burlington, VT 05403
Phone: 802-652-5140

BORING LOG

Project Name

316 Flynn Avenue

Burlington, VT

Boring No.: **B-3**
Page No.: 1 of 1
File No.: 1165-01
Checked By: JAG

Boring Company:	Specialty Drilling & Investigation				Casing:	Sampler:	
Foreman:	Chris Aldrich			Type:	H.S.A.	SS	
GeoDesign Rep.:	Jacob Wimett			I.D.:	4.25 in.	1.38 in.	
Date Started:	February 17, 2011	Date Finished:	February 17, 2011	Hammer Wt.:	NA	140 lbs	
N. Coordinate:	4823	E. Coordinate:	6816	Hammer Fall:	NA	30 in.	
Ground Surface Elevation (feet):	147			Rig Type:	Simco 2800 Truck		
Station:		Offset:	ft	Hammer Type:	Wireline Safety		

Groundwater Observations

Date	Depth (ft)	Elev. (ft)	Notes
▼ 4/17/11, 13:30	11.0	136.0	Wet sample
▼			
▼			
▼			

Depth (ft)	Casing Blows/ft	Sample Number	Sample Type	Penetration (inches)	Recovery (inches)	Sample Depth (ft)	Blows / 6 inch Interval 0 - 6	6 - 12	12 - 18	18 - 24	Coring Time (min./ft)	Moisture Content (%)	Strata Description (Depth & Elevation (feet))	Symbol	Sample Description (Classification System: Burmister)
													Asphalt 146.7		
													1.5 Fill		
													Silt/Clay 145.5		
5															
		S1	SS	24	24	8	6	5	6	7		31.8			S1) Stiff, olive brown with occasional gray CLAY & SILT, trace (-) fine Sand in two 1/8" thick seams, moist. Observe old Root Pinholes throughout sample.
10															
		S2	SS	24	24	10	2	3	3	6		32.7	11 ▼		S2) Medium,
						11						37.9	Silty Clay 136.0		S2A - Top 12": Olive brown with occasional gray and orange finely parted CLAY & SILT, trace (-) fine Sand concentrated in occasional 1/16" partings. Observe old Root Pinholes.
		PS-1	PS	24	19	12	P	U	S	H					S2B - Bottom 12: Reddish brown Silty CLAY, trace fine to coarse Sand, very moist.
													14		PS-1) Reddish brown Silty CLAY, trace fine to coarse SAND, trace fine Gravel, moist. (As observed from the bottom of the tube).
15													Bottom 133.0 of Exploration at 14.0 ft		
20															
25															
30															

Remarks

1) Ground surface elevation estimated by GeoDesign from a topographic site plan provided by Engineered Solutions PC titled "C9.02 - Site Conceptual Design" dated February 1, 2011.
2) Augered to 8' prior to beginning sampling. Inferred upper 8' of strata from B-2.
3) Sample PS-1 was disturbed during sampling attempt due to stiff clay soils.

Notes:
1) Stratification Lines Represent Approximate Boundary Between Material Types, Transitions May Be Gradual.
2) Water Level Readings Have Been Made At Times And Under Conditions Stated, Fluctuations Of Groundwater May Occur Due To Other Factors Than Those Present At The Time Measurements Were Made. A.C. = After coring; N.R. = Not Recorded.
3) Sample Type Coding: A=Auger; C=Core; D=Driven; G=Grab; PS=Piston Sampler; SS=Split Barrel (Split Spoon); ST=Shelby Tube; Geo=GeoProbe V=Vane; WOR/H=Weight of Rod/Hammer
4) Proportions Used: Trace = 1-10%; Little = 10-20%; Some = 20-35%; And = 35-50%
5) Stratification lines represent approximate boundary between material types, transitions may be gradual.

GEODESIGN INCORPORATED
Geotechnical Engineers-Environmental Consultants-Construction Engineers
P.O. Box 699, Windsor, VT 05089, Phone: 802-674-2033/Fax: 802-674-5943
1233 Shelburne Rd., Suite 360, So. Burlington, VT 05403, Phone: 802-652-5140

BORING LOG

Project Name: 316 Flynn Avenue, Burlington, VT

Boring No.: **B-4**
Page No.: 1 of 1
File No.: 1165-01
Checked By: JAG

Boring Company:	Specialty Drilling & Investigation		
Foreman:	Chris Aldrich		
GeoDesign Rep.:	Jacob Wimett		
Date Started:	February 17, 2011	Date Finished:	February 17, 2011
N. Coordinate:	4877	E. Coordinate:	6752
Ground Surface Elevation (feet):	146.5		
Station:		Offset: ft	

	Casing:	Sampler:
Type:	H.S.A.	SS
I.D.:	4.25 in.	1.38 in.
Hammer Wt.:	NA	140 lbs
Hammer Fall:	NA	30 in.
Rig Type:	Simco 2800 Truck	
Hammer Type:	Wireline Safety	

Groundwater Observations

Date	Depth (ft)	Elev. (ft)	Notes
▼ 2/17/11, 3:00	15.0	131.5	Wet sample

Depth (ft)	Casing Blows/ft	Sample Number	Sample Type	Penetration (inches)	Recovery (inches)	Depth (ft)	Blows / 6 inch Interval 0 - 6	6 - 12	12 - 18	18 - 24	Coring Time (min./ft)	Moisture Content (%)	Strata Description (Depth & Elevation(feet))	Symbol	Sample Description (Classification System: Burmister)
													Asphalt 146.2		
													Fill		
													2		
		S1	SS	24	20	2	10	11	9	11		19.1	Possible Fill 144.5		S1) Medium dense, olive mottled with gray, orange, and brown parted SILT, trace fine Sand, trace Clayey Silt, frozen to moist. With old Root Pinholes.
5															
		S2	SS	24	24	5	6	11	11	16		25.3			S2) Medium dense/Very stiff, olive mottled with gray and brown occasionally parted SILT and Clayey SILT, trace fine Sand, trace Decomposed Root Fibers, moist.
													7		
		S3	SS	24	24	7	4	6	7	10		28.7	Silt/Clay 139.5		S3) Stiff, olive mottled with gray and orange SILT & CLAY, trace (-) fine Sand, moist. With old Root Pinholes.
10															
		S4	SS	24	24	10	2	3	5	7		32.1			S4) Medium, similar to S3.
													15 ▼		
		S5	SS	24	21	15	4	6	24	28		38.3	Silty Clay 131.5		S5)
						15.8						12.2	16 Glacial Till 130.5		S5A - Top 9": Very stiff, reddish brown Silty CLAY, trace fine Sand, moist.
		S6	SS	10.5	10.5	17	33	50/4.5				8.3			S5B - Bottom 12": Dense, purple SILT and fine to coarse SAND, some (-) fine Gravel, wet.
20															S6) Refusal, purple fine to coarse SAND, some Silt, little fine Gravel, moist.
		S7	SS	24	12	20	21	42	27	31		10.2			S7) Very dense, purple to gray fine to coarse SAND and SILT, little (+) fine Gravel, moist.
25		S8	SS	24	15	24	17	19	21	31		8.5			S8) Dense, purple gray fine to coarse SAND and SILT, some fine Gravel, trace Clayey Silt, moist.
													26		
													Bottom of Exploration at 26.0 ft 120.5		
30															

Remarks:
1) Ground surface elevation estimated by GeoDesign from a topographic site plan provided by Engineered Solutions PC titled "C9.02 - Site Conceptual Design" dated February 1, 2011.
2) Augered to 2' deep through frozen soils prior to sampling.
3) Driller noted increase in drilling resistance beginning at 16' deep.
4) Driller noted that glacial till soils below 20' deep are more difficult to drill through than those observed between 16' and 20' deep.
5) Borehole terminated at 26' with no refusal.

Notes:
1) Stratification Lines Represent Approximate Boundary Between Material Types, Transitions May Be Gradual.
2) Water Level Readings Have Been Made At Times And Under Conditions Stated, Fluctuations Of Groundwater May Occur Due To Other Factors Than Those Present At The Time Measurements Were Made. A.C. = After coring; N.R. = Not Recorded.
3) Sample Type Coding: A=Auger; C=Core; D=Driven; G=Grab; PS=Piston Sampler; SS=Split Barrel (Split Spoon); ST=Shelby Tube; Geo=GeoProbe V=Vane; WOR/H=Weight of Rod/Hammer
4) Proportions Used: Trace = 1-10%; Little = 10-20%; Some = 20-35%; And = 35-50%
5) Stratification lines represent approximate boundary between material types, transitions may be gradual.

REPORT LIMITATIONS

Explorations

1. The analysis and recommendations submitted in this report are based in part upon the data obtained from widely spaced 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 reevaluate the recommendations of this report.

2. The generalized soil profiles described in the text are intended to convey trends in subsurface conditions based on preliminary subsurface data. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more erratic. For specific information, refer to the exploration logs.

3. Water level readings have been made in the drill holes at times and under conditions stated on the logs. These data have been reviewed and interpretations made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature and other factors occurring since the time measurements were made.

Review

4. In the event that any changes in the nature, design or location of the proposed facilities are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by Geo**Design**, Inc. It is recommended that this firm be provided the opportunity for a general review of final design and specifications in order that geotechnical engineering recommendations may be properly interpreted and implemented in the design and specifications.

Uses of Report

5. This preliminary report has been prepared for the exclusive use of **Alvanos|PMG** and their design team for specific application to the proposed **316 Flynn Avenue Mixed Commercial/Residential Building** in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

6. This preliminary geotechnical engineering report has been prepared for this project by Geo**Design**, Inc. This report is for preliminary purposes only and is not sufficient to prepare final construction documents or an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to design considerations only.

WILLIS CONSULTING ENGINEERS, INC. P.C.
Civil, Environmental, Geotechnical & Soil Laboratory Services

P.O. Box 5, Route 4
Taftsville, Vermont 05073

Phone 802-457-1246
Fax 802-457-4142

November 9, 2012

Mr. Michael Alvanos
JRMA Design
175 Summit Circle
Shelburne, VT 05482

Re: Geotechnical Report for
Pine Street Deli Site Development
Flynn and Pine St., Burlington, VT

Dear Mr. Alvanos,

As requested, I am hereby providing a summary of the field exploration results, geotechnical analysis and recommendations regarding the proposed three story mixed use commercial/residential structure associated with the above referenced project.

Site and Project Description

The site is located at the northeast corner of the intersection of Flynn St. and Pine St., Burlington, VT. The site slopes slightly to the northwest. There is a ravine to the north where Englesby Brook flows to the west providing the main drainage feature of the site. The existing site is predominated by a single story deli/restaurant at the south end and paved parking completely surrounding the existing building. (See Site Plan in Appendix). There appeared to be a substantial amount of existing fill placed at the top of the slope immediately south of the previously mentioned brook ravine. A stormwater filtration treatment system is proposed in the northeast corner of the site.
A previous geotechnical investigation and report was performed by GeoDesign, Inc., dated 3/18/11. Four borings were advanced to refusal in three of them. No rock coring was performed. This report has been reviewed and consideration of the findings and conclusions, have been included in this geotechnical analysis.

Subsurface Exploration

On 10/11/12, one rock coring effort (B-5) and one soil boring (B-6) were performed utilizing a truck mounted drill rig owned by Platform Drilling. The rock core was performed to confirm the nature of the refusal conditions encountered during the prior subsurface investigation. One additional boring was performed at the top of the northerly embankment in the vicinity of the northerly entrance driveway.
The **rock core** was advanced by driving casing and a lead roller bit to 22.5'. The rock core was advanced from 22'6" to 28'9"(75"). A dark, pinkish Monkton Quartzite competent bedrock was encountered. The rock quality designation (RQD) was 76% indicating a good quality rock material.
The **soil boring (B-6)** was advanced to 9' with continuous split spoon sampling (SPT). A loose sandy, silty fill material was encountered down to 7'. Below 7' a medium dense, native silt, with trace fine sand was found. A perched groundwater table was observed at approximately 7'.

Geotechnical Analysis

Discussions with James Baker, P.E., Structural Engineer, review of Geodesign's initial report and new boring and rock core data have formed the basis for the following geotechnical analysis. The additional boring (B-6) and rock core (B-5) performed on 10/11/12 were focused on investigating the fill materials beneath the road entrance and confirming seismic site class considerations respectively.

- The footings shall be **structurally reinforced, a minimum of 3' wide and shall utilize a net allowable soil bearing pressure of 2500 psf.** This assumes that the bottom of the footings are no greater than 6' below existing grade. Placement location of vapor barriers and immediate subbase material specifications beneath the slab will be specified by the structural engineer.
- Although groundwater was observed at 11' in the previous investigation in the area of the existing structure, a depth of 7' was observed in boring B-6 and seasonal high groundwater may be found higher depending upon the time of construction. A minimum of 6" of crushed stone should be placed beneath all footings to provide a stable working mat in these moisture sensitive soil conditions. **The footings excavation shall extend below any fill materials and shall bear on the crushed stone identified above.** Any overexcavated locations shall be backfilled with Crushed Stone or Granular Backfill for Structures (VAOT 704.08A) placed in maximum 12" lifts and compacted to 95% of the material's Modified Proctor (ASTM D1557) value.
- **IBC 2006 Seismic Site Classification (Table 1613.5.2) determination was made with the available data from the one rock core (B-5).** A 6'+ rock core sample of Monkton Quartzite was retrieved. The Rock Quality Designator (RQD) value for this rock sample was 76% indicating good quality. Based upon this available information, **the IBC 2006 Section 1613.5.2, Site Class "C" shall be utilized for design purposes.**
- Proposed excavated material appears to have potentially frost susceptible fine grained content and will therefore not be allowable for reuse for exterior foundation wall backfill. The **exterior backfill for the structure shall conform to Sand Borrow and Cushion (VAOT 703.03A) or Approved Filler (VAOT 704.06B) or approved equal and compacted to 95% of the material's Standard Proctor value (ASTM D698).** This backfill shall be installed a minimum of five feet horizontally and vertically away from the structure to minimize frost action and any potential for heaving. In the areas of building egress, insulation should also be considered. The **exterior foundation wall backfill material would have an active lateral soil pressure coefficient of 0.30.**

Northwest Entrance Drive

Boring B-6 was drilled in this specific entrance drive area to assess the long term subgrade stability for the road, given the fill slope immediately to the north. It is assumed that service and delivery trucks will utilize this entrance. Based upon the relatively soft, silty fill encountered within the wheel load influence zone, I would recommend augmenting this condition by overexcavation and inclusion of a couple of layers of geogrid with crushed gravel to reinforce this soil mass and strengthen the near slope face conditions. Once the geometry of the entrance road is designed the geogrid and subbase specifications may be provided.

Stormwater Filtration System

The northeast corner of the site has been designated as a sand filter treatment system for collected site stormwater. The present discharge is proposed to be subsurface below the filter. Based upon the assumed

soft, silty, insitu fills encountered along the same embankment to the west, it is strongly recommended that the discharge be piped to immediately above Englesby Brook to minimize any increased moisture contents to these insitu soils. Additional moisture will reduce effective internal friction angles of the native soils and further destabilize the adjacent fill slope, potentially causing erosion and localized slope failures.
An apron of 7" minus rock fill with geotextile material beneath should be provided at the outfall. The piped discharge should be set immediately above the design storm elevation of Englesby Brook at this location.

Additional Recommendations

- The subgrade preparation for footings and slab areas should be performed with a smooth bladed bucket to minimize disturbance. Inside of the foundation walls, the existing soils shall be excavated down to proposed subgrade elevation and then statically proof rolled. Any fill, organic, deleterious, saturated or yielding subgrade materials extending below this level, shall be removed and replaced with interior structural fill **Granular Backfill for Structures (VAOT 704.08A)** or approved equal. These structural fill materials shall be installed in maximum 12" lifts and compacted to 95% of its Modified Proctor value (ASTM D-1557).
- All exterior slabs and building egress locations shall have non-frost susceptible design considerations to prevent heaving. The use of non- frost susceptible granular backfill and/rigid insulation shall be considered.
- Due to the sensitive nature of these fine grained soil types, vibration should be kept to a minimum. Preconstruction surveys of all adjacent structures should also be performed along with seismic monitoring during construction.
- The footings shall have a minimum of 5 foot of finished cover for frost protection or rigid insulation should also be considered.
- Given the subsurface characteristics encountered during the site investigations, Willis Consulting Engineers should be retained to verify the dewatering and excavation efforts, and the subgrade bearing conditions prior to the crushed stone placement, slab subbase material installation, and footing form installation.
- Footing subgrade(s) shall be maintained continuously and dewatered throughout the foundation construction until backfilling is substantially complete.
- VOSHA excavation safety standards shall be adhered to by the contractor.

If you should have any further questions, please do not hesitate to contact me.

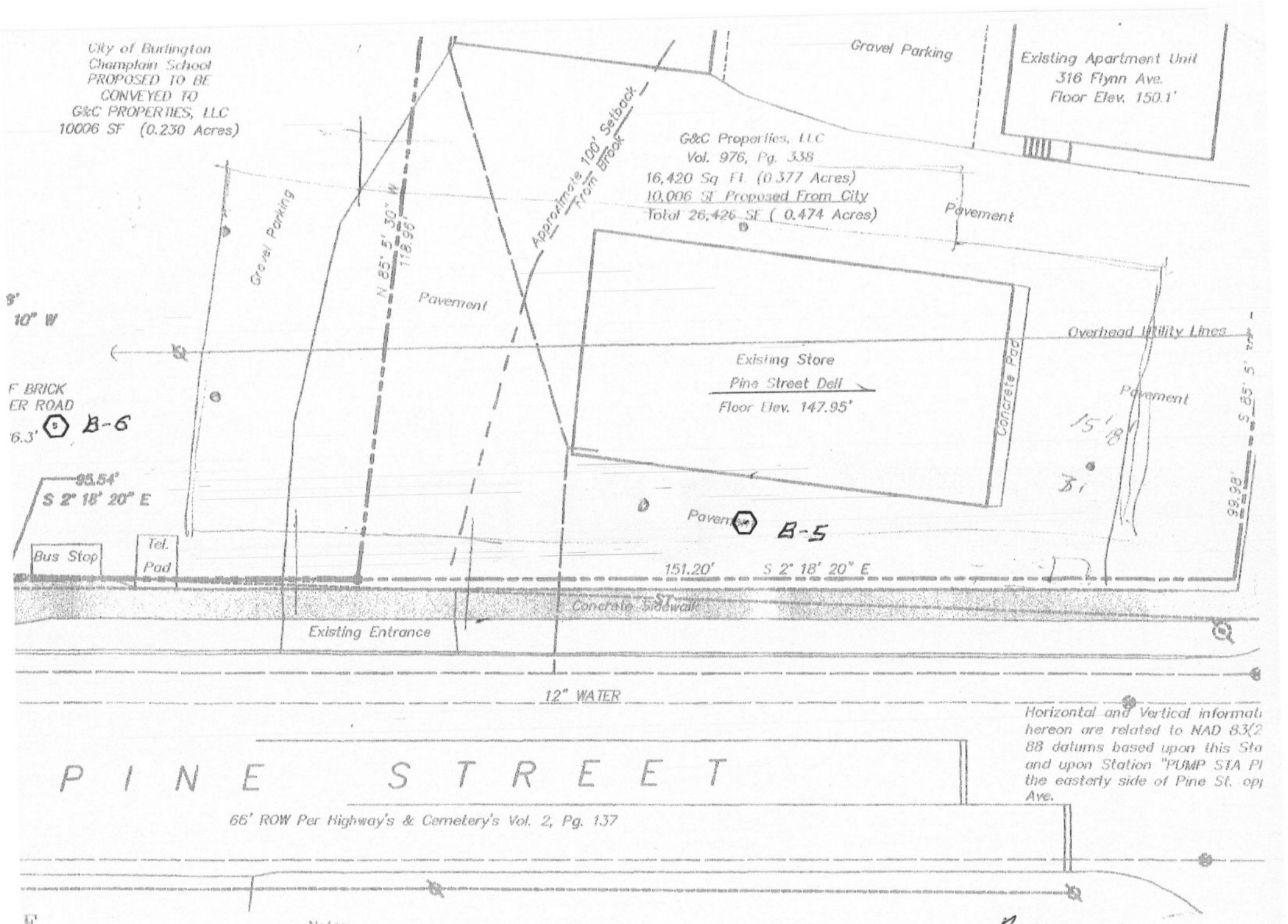
Sincerely,

Michael J. Willis, P.E.

Appendix

- Boring Location Plan

- Boring Log (B-6)



Notes:

It is noted that no site assessment of hazardous or other waste materials has been made and S.E. takes no responsibility for any materials or conditions that may exist on this site.

ALVANOS

PROJ. # 1224 11/9/12

OF

WILLIS CONSULTING ENGINEERS, INC. P.C
P.O. Box 5 - 402 Woodstock Road
Taftsville, Vermont 05073

Sheet: 1 OF 1 Line
Date: 10/26/2012 Sta.
Hole No. B6 Surf. Elev. EG

To: Address:
Project Name: ALVANOS Location: NW CORNER
Report Sent To:
Samples: Proj. No.: 1224

Date Performed: 10/11/2012 Boring Personnel:
Ground Water Observed At: At: Supervising Engineer: MJW

DEPTH	SAMPLE DEPTHS FROM-TO	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER		MOISTURE DENSITY OR CONSIST.	STRATA CHANGE ELEV.	FIELD SOIL IDENTIFICATION	SAMPLE No.	Pen	Recovery
	0-2	SS	4	5	DRY		ORGANIC SILTY SAND FILL	1	24	3
			3	3						
	2-4	SS	3	3	DRY		ORGANIC SANDY SILT FILL	2	24	20
5'			4	5						
	5-7	SS	4	6	MOIST		ORGANIC SANDY SILT FILL	3	24	15
			3	4						
	7-9	SS	5	6	DRY		SILT, TRACE FINE SAND	4	24	18
10'			7	9			NATIVE			
							GW PERCHING @ 7'			
15'										
20'										
25'										

Ground Surface to: Used: Casing Then: *NO CASING

Casing Type: N/A I.D.: N/A Core Bar. N/A 140 lb. wt. hammer X 30 " fall with a 2 " O.D. SS Sampler

Sample Type:	Proportions Used:	Cohesionless Dens.	Cohesive Consistency	summary
D - Dry C-Cored	trace 0 - 10%	0-10 loose	0-4 Soft	Earth Boring:
UP-Unfinished Piston	little 10 - 20%	10-30 med. Dense	4-8 Med. Stiff	Rock Coring:
TP-Test Pit W-Washed	some 20 - 35%	30-50 dense	8-15 Stiff	Samples:
A-Auger V-Vane Test	and 35 - 50%	50+ very dense	15-30 Very Stiff	
UT-Undisturbed Thinwall			30+ Hard	Hole No.: