CITY OF ROCHESTER, NH

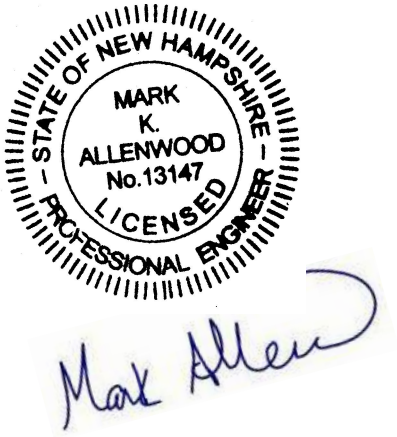
NEW ROUTE 125 PUMP STATION UPGRADE

NH DES CW SRF PROJECT NO. CS 330122-12

BID No. 14-27

ADDENDUM No. 1

JANUARY 23, 2014



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ROCHESTER, NH

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JANUARY 23, 2014

****

To be considered as part of the contract drawings and specification for the New Route 125 Pump Station Upgrade Project.

SPECIFICATIONS

TABLE OF CONTENTS

DELETE Page 4 and **REPLACE** with the attached Page 4.

SECTION A-3 BID

DELETE Pages A-3.5 and A-3.6 in their entirety and **REPLACE** with Pages A-3.5 and A-3.6 attached. The purpose of this modification is to include all three base bid items in the total base bid.

SECTION B – WAGE RATES

ADD the attached page B-11.1 following page B-10.

DELETE Heavy Wage Rate, Pages 1 through 3, with date of 9/27/2013and **REPLACE** with the attached Heavy Wage Rates, Pages 1 through 3, with the date of 1/3/2014.

DELETE Building Wage Rate, Pages 1 through 5, with date of 12/13/2013and **REPLACE** with the attached Building Wage Rates, Pages 1 through 5, with the date of 1/17/2014.

SECTION 16900 -

On Page 16900-3, **DELETE** paragraph 2.05.B.2 in its entirety and **REPLACE** with the following:

> "2. WWTF I&C SCADA head end programming, start-up, field testing, documentation, etc."

APPENDIX B

INSERT Appendix B, Geotechnical Report, attached, following Appendix A.

DRAWINGS

DRAWING S-1

Note B1
DELETE reference to "4 KIPS PER SQUARE FOOT" and **REPLACE** with "2 KIPS PER SQUARE FOOT".

After Note B7, **ADD** the following:

B8 – SEE "GEOTECHNICAL ENGINEERING REPORT, ROUTE 125 PUMP STATION, ROCHESTER, NEW HAMPSHIRE", PREPARED BY SOVEREIGN CONSULTING, INC., DATED 23 JANUARY 2014."

DELETE Note F6 and **REPLACE** with the following:

F6 SEISMIC LOAD

(A) EARTHQUAKE DESIGN FACTORS	Ss – 0.325
	S1 – 0.08
(B) Site Class "E"	Fa – 2.26
	Fv – 3.5
(C) MCE SPECTRAL RESPONSE ACCELERATION	SMs – 0.73
	SM1 – 0.28
(D) SEISMIC DESIGN CATEGORY	SDs – 0.49, CATEGORY "C"
	SD1 – 0.187, CATEGORY "C"

(E) SEISMIC COEFFICIENTS:
ORDINARY PRECAST SHEAR WALLS
NO HEIGHT LIMIT
R=3, Ωo=2.5, Cd=3

DELETE Note F7 and **REPLACE** with the following:

F7 LATERAL EARTH LOADS (EQUIVALENT FLUID DENSITY)
(A) WALLS (AT REST) – 60 PCF IN GRANULAR SOIL, 66 PCF IN SILTY SOIL.
(B) RETAINING WALL (ACTIVE) – 40 PCF IN GRANULAR SOIL, 50 PCF IN SILTY SOIL.
(C) PASSIVE PRESSURE – 360 PCF IN GRANULAR SOIL, 205 PCF IN SILTY SOIL

Note F8
DELETE reference to "4.0 KSF ASSUMED" and **REPLACE** with "2 KSF"

Note F9
DELETE reference to "0.45" and **REPLACE** with "0.55 ON STRUCTURAL FILL OR CRUSHED STONE, 0.30 ON SILTY CLAY"

END OF ADDENDUM 1

BY ORDER CITY OF ROCHESTER, NH

DIVISION 16 – ELECTRICAL

APPENDICES

BID SCHEDULE

BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the following unit prices or lump sum:

BIDS shall include sales tax and all other applicable taxes and fees.

PRICES WRITTEN IN WORDS SHALL GOVERN AND UNIT PRICES SHALL GOVERN OVER EXTENDED TOTALS WHEN DISCREPANCIES OCCUR.

Bid Item No.	**Estimated Quantity**	**Bid Item Description** (Unit Price in Words)	**Unit Price in Figures** (Dollars)	**Extended Total in Figures** (Dollars)
1	Lump Sum	Construct New Route 125 Pump Station Upgrade complete in accordance with the plans and specifications FOR THE LUMP SUM of: _____ _____ _____ _____ _____ _____Dollars	_____ Lump Sum	_____ Lump Sum
2	Lump Sum	Furnish and install the EOS Research Limited SCADA System complete as shown on the drawings and as specified in Division 16, Section 16900, paragraph 2.05 FOR THE LUMP SUM of: _____ _____ _____ _____ _____Dollars	_____ Lump Sum	_____ Lump Sum
3	Lump Sum	Labor, fringe and administrative costs to meet the requirements of the Davis-Bacon Wage Act requirements, FOR THE LUMP SUM of: _____ _____ _____ _____ _____Dollars	_____ Lump Sum	_____ Lump Sum

TOTAL BID(Bid Items 1, 2 and 3) _____
(In Figures Only)

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B-11.1

WAGE RATES

A. The heavy and building wage rates following this page shall be used for this project.

B. The building wage rates shall be used for all work associated with the construction of the generator building and shall include all items related to the building contained within an envelope extending 5 feet outward from the face of the foundation in all directions.

C. The heavy wage rates shall be used for all other construction not covered in Paragraph B.

For work performed under the "Heavy" category, General Wage Decision NH14 dated 1/3/2014:

- Skilled trade classifications: the minimum that may be proposed is $27.11 + $7.68 fringe or a total rate of $34.79 an hour.
- Equipment operator classifications: the minimum that may be proposed is $27.11 + $7.68 fringe or a total rate of $34.79 an hour.

For work performed under the "Building" category, General Wage Decision NH17 dated 01/17/2014

- Skilled trade classifications: the minimum that may be proposed is $27.02 + $11.69 fringe or a total rate of $38.71 an hour.
- Equipment operator classifications: the minimum that may be proposed is $21.27 + $7.63 fringe or a total rate of $28.90 an hour.

The Contractor shall include the applicable wage decision(s), Federal Labor Standards Provisions and the guidance provided above in all subcontracts.

>

General Decision Number: NH140017 01/03/2014 NH17

Superseded General Decision Number: NH20130017

State: New Hampshire

Construction Type: Heavy

County: Strafford County in New Hampshire.

HEAVY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/03/2014

* ELEC0490-003 09/01/2013

	Rates	Fringes
ELECTRICIAN	$ 27.75	18.03

SUNH2011-013 02/22/2011

	Rates	Fringes
LABORER: Common or General	$ 19.90	1.49
LABORER: Landscape	$ 15.23	1.81
OPERATOR: Excavator	$ 27.11	7.68
OPERATOR: Loader	$ 26.18	7.13
TRUCK DRIVER	$ 20.43	6.87

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted

because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

==========

END OF GENERAL DECISION

>

General Decision Number: NH140014 01/17/2014 NH14

Superseded General Decision Number: NH20130014

State: New Hampshire

Construction Type: Building

County: Strafford County in New Hampshire.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Modification Number	Publication Date
0	01/03/2014
1	01/17/2014

ASBE0006-004 09/01/2012

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR	$ 24.85	15.40

CARP0118-006 10/01/2013

	Rates	Fringes
CARPENTER (Acoustical Ceiling Installation, Drywall Hanging, Form Work and Floor Layer Including Carpet, Hardwood and Resilient)	$ 25.71	17.95

ELEC0490-004 09/01/2013

	Rates	Fringes
ELECTRICIAN		
Electrician	$ 27.75	18.03
Low Voltage Wiring Installer	$ 20.06	15.40

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* ELEV0004-002 01/01/2014

	Rates	Fringes
ELEVATOR MECHANIC	$ 52.32	26.785+a+b

a. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, Christmas Day and the Friday after Thanksgiving.

b. VACATION: Employer contributes 8% of basic hourly rate for 5 years or more of service; 6% of basic hourly rate for 6 months to 5 years of service as vacation pay credit.

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* IRON0007-007 09/16/2013

	Rates	Fringes
IRONWORKER (Reinforcing and Structural)	$ 22.57	19.75

LABO0976-002 06/01/2013

	Rates	Fringes
LABORER: Concrete Worker (removing forms, demolition and removal of concrete, pouring and leveling of concrete)	$ 19.71	16.42

LABO0976-003 06/01/2013

	Rates	Fringes
LABORER: Common or General (including Carpenter Tender)	$ 19.71	16.42

SHEE0017-013 01/01/2013

	Rates	Fringes
SHEET METAL WORKER (HVAC Duct Work Only)	$ 28.35	23.52

SUNH2011-010 02/22/2011

	Rates	Fringes
BRICKLAYER	$ 29.00	2.81
CARPENTER (Drywall Finishing/Taping Only)	$ 27.02	11.69
CARPENTER, Excludes Acoustical Ceiling Installation, Drywall Finishing/Taping, Drywall Hanging, and Formwork	$ 25.61	10.23
CEMENT MASON/CONCRETE FINISHER	$ 20.91	0.00
GLAZIER	$ 20.23	4.71
LABORER: Mason Tender - Brick	$ 17.00	2.06
OPERATOR: Backhoe	$ 19.30	6.52
OPERATOR: Excavator	$ 21.27	7.63
OPERATOR: Loader	$ 22.03	0.95

PAINTER: Brush and Roller.....$ 16.15 0.00

PLUMBER/PIPEFITTER, Includes
HVAC Pipe Work.....$ 25.02 4.48

ROOFER.....$ 17.55 3.25

SPRINKLER FITTER (Fire
Sprinklers).....$ 24.91 5.74

TRUCK DRIVER.....$ 20.47 6.70

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

==========

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interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

==========

END OF GENERAL DECISION

APPENDIX B
Geotechnical Report

January 23, 2014

Mr. Robert Lie
Lin Associates, Inc.
2001 Beacon Street #300
Brighton, MA 02135

Re: **GEOTECHNICAL ENGINEERING REPORT**
Route 125 Pump Station
Rochester, New Hampshire
Sovereign Project No. NH039

Dear Mr. Lie:

Sovereign Consulting Inc. (Sovereign) has completed our geotechnical engineering services for the above referenced project. Services were performed in general accordance with our revised proposal dated January 16, 2014 and your subsequent authorization. This geotechnical engineering report presents the results of the subsurface explorations and provides geotechnical recommendations concerning earthwork and the design and construction of the replacement culvert for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
SOVEREIGN CONSULTING INC.

Scott M. Carter, PE
Project Manager

Michael A. Ciance, PE
Senior Engineer

smc/NH039

TABLE OF CONTENTS

1.0 INTRODUCTION

This report presents the results of our geotechnical engineering services performed for the proposed modifications to the sanitary pump station located off of Route 125 in Rochester, New Hampshire. Our geotechnical engineering scope of services included advancing two (2) test borings within the proposed project area. Borings were advanced to depths of approximately 22 feet to 32 feet below the existing ground surface. A Site Locus Map and Subsurface Exploration Location Plan are included as **Figure 1** and **Figure 2**, respectively. Test boring logs are included in **Attachment A.**

The purpose of our services is to provide information and geotechnical engineering recommendations related to the following:

- Subsurface soil conditions
- Foundation design and construction
- Seismic design considerations
- Groundwater conditions
- Earthwork construction

2.0 PROJECT INFORMATION

2.1 Site Location and Description

Location	The project site is located west of Route 125, approximately 0.4 miles north of the intersection of Route 125 (Gonic Road) and Gear Road in Rochester, New Hampshire.
Existing improvements	The existing pump station is comprised of a concrete wet well, 4-foot diameter steel wet well, electrical panel and meter, and generator within an approximate 40 ft by 54 ft fenced compound. Access to the pump station is from an existing paved drive extending from Route 125.
Existing topography (1)	Topography at the site gently slopes from east to west from approximately El 502 feet to El 498 feet. The existing pump station is near El 500 feet.
Notes: 1. Ground surface elevations based on contours depicted on an undated plan entitled "Proposed Site Plan, C2" developed by Brown and Caldwell of Andover, Massachusetts.	

2.2 Project Description

Structures	The project consists of installing a new generator building, precast valve vault, approximately 40 feet of new forcemain and metering manhole; and modifications to the existing wet well and concrete top slab.
Maximum Allowable Settlement	*Total*: 1-inch (assumed) *Differential*: ½-inch over 40 feet (assumed)
Grading / Cut and Fill Slopes	Based on our understanding of the project, grade changes are not anticipated.

3.0 SUBSURFACE CONDITIONS

3.1 Typical Subsurface Profile

Based on the results of the explorations, subsurface conditions can be generalized as follows:

Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Description	Density / Consistency
Bituminous Pavement	0.3	Black bituminous pavement	---
Fill	2.0 to 5.5	Varies from coarse to fine SAND, trace Gravel and Silt to SILT, some medium to fine Sand.	Loose Medium Dense
Glaciolacustrine Deposit	>22.0 to 26.5	Silty CLAY with frequent partings and seams of Clayey SILT and fine SAND. Changing to fine SAND trace silt with depth.	Very Soft to Medium Stiff or Very Loose
Glaciofluvial Deposit (1)	>32.0	Fine SAND, trace Silt.	Loose to Medium Dense

Notes:
1. Glaciofluvial sand was encountered beneath the lacustrine deposit in SB-1 at a depth of approximately 26.5 feet.

Visual soil classifications and conditions encountered at each exploration location are indicated on the individual test boring logs. Stratification boundaries on the logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. Details for each of the explorations can be found on the test boring logs in **Attachment A**. A discussion of field sampling procedures is also included in **Attachment A**.

3.2 Groundwater

Groundwater was generally observed at depths of approximately 11.0 and 10.0 feet below existing grade in borings SB-1 and SB-2, respectively. Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the explorations were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

4.0 EVALUATION OF SUBSURFACE CONDITIONS

Based on a review of project drawings "Existing Wetwell and New Vault Plan, M1" and "Sections, M2" developed by Brown and Caldwell of Andover, Massachusetts, the new valve vault has plan dimensions of 10'-10" by 17'-4" and is 7 feet deep. Based on an existing site

elevation of El 500 feet, the valve vault is anticipated to bear near El 492 feet. We recommend the proposed valve vault bear on a minimum 6-inch thick layer of compacted crushed stone placed above the glaciolacustrine clay. The use of crushed stone will help facilitate dewatering (if necessary) and provide a stable working surface. Crushed stone should be underlain by a geotextile separation fabric such as Mirafi 140N or equivalent.

Consideration for buoyancy, or uplift, should be included in the design of the valve vault. We recommend using the 100-year flood elevation as a minimum for design. Resistance to uplift can be provided by backfill above foundations as well as from anchors and hold downs.

The proposed generator and electrical building can be supported by conventional spread footing foundations bearing on proof-rolled existing fill or proof-rolled glaciolacustrine deposit; or compacted structural fill or crushed stone placed above these materials. If unsuitable fill or other unsuitable materials are encountered at design subgrade elevation, they should be over-excavated from the footing bearing zone (defined as the area beneath 1 horizontal to 1 vertical [1H:1V] lines extending outward and downward from footing edges) and replaced with compacted structural fill or crushed stone.

Based on the information discussed above, maximum excavation depths are anticipated to be on the order of 8 feet, corresponding to approximately El 492 feet. Groundwater was encountered at depths of 10 to 11 feet below existing grade, corresponding to approximately El 490 and 488 feet. Excavations deeper than the maximum anticipated depth of 8 feet will likely require shoring and bracing due to the water table and the potential for loose fine sands at the bottom of the excavation, as depicted on the test boring logs. Additionally, the loose non-cohesive soil encountered is anticipated to be susceptible to vibrationally induced settlement. If sheeting is considered for excavation support, consideration should be given to leaving the sheeting in place to reduce the risk of settlement of the proposed valve vault during sheet extraction. Sheeting and shoring design should take into consideration the subsurface conditions at the site including groundwater, loose sand, and vibration sensitivity.

Geotechnical engineering recommendations for foundation systems and other earth-connected phases of the project are outlined below. The recommendations contained in this report are based upon the results of field testing, engineering analyses and our current understanding of the proposed development.

5.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

Geotechnical engineering recommendations for foundation systems and other earth-connected phases of the project are outlined below. The recommendations contained in this report are based upon the results of field testing, engineering analyses and our current understanding of the proposed development.

5.1 Foundations

The proposed valve vault and generator building can be supported on conventional mat or spread footing foundations. Design recommendations for shallow foundations for the proposed structures and related structural elements are presented in the following paragraphs.

5.1.1 Design Recommendations

Foundation Type	Mat	Spread Footing
Bearing materials	Proof-rolled existing fill or glaciolacustrine clay; or compacted structural fill or crushed stone placed above these materials. (1)	
Net allowable bearing pressures (2)	2,500 psf	2,000 psf
Minimum bearing width	10 feet	16 inches
Minimum footing embedment below finished grade for frost protection	48 inches	48 inches
Total estimated settlement (3)	<1 inch	<1 inch
Estimated differential settlement (3)	< ½-inch	< ½-inch
Ultimate Coefficient of Friction, tanδ		
Concrete on silty clay:	0.30	
Concrete on structural fill or crushed stone:	0.55	

1. Crushed stone, if used, should be separated from subgrade soil using a geotextile separation fabric such as Mirafi 140N, or equivalent.
2. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. Assumes unsuitable fill or soft soil, where present, will be replaced with compacted structural fill or crushed stone.
3. Foundation settlement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the footing, the thickness of compacted fill, and the quality of the earthwork operations.

The allowable foundation bearing pressures apply to dead loads plus design live load conditions. The design bearing pressure may be increased by one-third when considering total loads that include transient loads such as wind or seismic conditions. The weight of the foundation concrete below grade may be neglected in dead load computations.

5.1.2 Construction Considerations

Excavation in cohesive soil should be conducted using a smooth-edged bucket to reduce disturbance to subgrades. Although not anticipated, if soft or unsuitable soils are encountered at design footing grade, they should be over-excavated from the footing bearing zone and replaced with compacted structural fill or crushed stone. Crushed stone, if used, should be placed in loose lifts not exceeding 8 inches thick and compacted with a minimum of 4 passes of a vibratory plate compactor in perpendicular directions. Crushed stone should be separated

from soil subgrades, excavation sidewalls, and soil backfill with a geotextile separation fabric such as Mirafi 140N, or equivalent.

Soil subgrades should be reviewed by the geotechnical engineer of record (GER) and proof-rolled as described herein. If over-excavation is required, the over-excavation below foundations should extend horizontally to incorporate the foundation bearing zone. Fill placed to achieve design footing grade should be placed in loose lifts not exceeding 12 inches for vibratory rollers, or 8 inches for vibratory plate compactors and compacted to at least 95 percent of the material's maximum dry density as determined by ASTM D-1557.

Foundation excavations and subgrade soil should be observed by the GER. If the soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required.

5.2 Seismic Design Considerations

Code Used	*International Building Code* 2009 (1)
Site Class	E (2)
Maximum considered earthquake ground motions (5 percent damping)	0.325g (0.2 second spectral response acceleration) S_s
	0.080g (1.0 second spectral response acceleration) S_1
Liquefaction potential in event of an earthquake	Does not appear to be susceptible to liquefaction.

1. In general accordance with the International Building Code 2009 (IBC); Site Class is based on the average characteristics of the upper 100 feet of the subsurface profile.
2. The IBC requires a site soil profile determination extending a depth of 100 feet for seismic site classification. The current scope does not include the required 100-foot soil profile determination. Borings extended to maximum depth of approximately 32 feet and this seismic site class definition considers that similar conditions continue below the maximum depth of the exploration.

5.3 Exterior Slabs (Unheated Building Slab)

Floor slabs for unheated buildings and exterior slabs may be designed as soil-supported slabs bearing directly on a minimum 12-inch-thick layer of free-draining structural fill or crushed stone, placed above proof-rolled existing soil. Slab subgrades should be proof-rolled, as discussed herein, before placing structural fill or crushed stone. Fill placed as backfill for utilities located below the slab (if any), should consist of compacted structural fill or suitable pipe bedding. A modulus of subgrade reaction (K_s) of 200 pounds per cubic inch may be assumed for design of soil supported slabs.

5.4 Lateral Earth Pressures

Reinforced concrete walls with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to those indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained. Active earth pressure is commonly used for design of free-standing cantilever retaining walls that are "free to rotate" which assumes wall movement (Yielding walls). The "at-rest" condition assumes no wall movement (Non-Yielding walls). The recommended design lateral earth pressures presented below do not include a factor of safety and do not include possible hydrostatic pressure on the walls.

Earth Pressure Conditions	Coefficient for Backfill Type	Equivalent Fluid Density (pcf)
Active (Ka)	Granular – 0.33	40
	Silty Clay – 0.49	50
At-Rest (Ko)	Granular – 0.50	60
	Silty Clay – 0.65	66
Passive (Kp)	Granular – 3.0	360
	Silty Clay – 2.0	205

Applicable conditions to the above include:

- For active earth pressure, wall must rotate about base, with top lateral movements of about 0.002 **H** to 0.004 **H**, where **H** is wall height
- For passive earth pressure to develop wall must move horizontally to mobilize resistance
- Soil backfill weight; a maximum of 125 pcf
- Loading from heavy compaction equipment not included
- No hydrostatic pressures acting on wall
- No dynamic loading
- Ignore passive pressure in frost zone
- Equivalent fluid densities **do not** include a factor of safety
- Surcharge loads should be considered where they are located within a horizontal distance equal to 1.5 times the height of the wall

For the granular values to be valid, the granular backfill must extend out from the base of the wall at angles of at least 45 and 60 degrees from vertical for the active and passive cases, respectively.
To calculate the resistance to sliding, the coefficients of friction provided in **Section 5.1** should be used for the material and subgrade conditions anticipated. The recommended minimum factor of safety against sliding and overturning is 1.5 and 2.0, respectively.

6.0 GENERAL CONSTRUCTION CONSIDERATIONS

The following presents recommendations for site preparation, excavation, subgrade preparation and placement of fill for the project. The recommendations presented for design and construction of earth-supported elements are contingent upon the recommendations outlined in this section.

Earthwork on the project should be evaluated by the GER. The evaluation of earthwork should include review of engineered fill, subgrade preparation, foundation bearing soils and other geotechnical conditions exposed during construction. The observation and testing of engineered fill should be accomplished by a qualified testing agency.

6.1 Subgrade Preparation

Excavation in cohesive soil should be conducted using a smooth-edged bucket to reduce disturbance to subgrades. Following the required stripping and excavation to design footing subgrade, and before placing new fill or constructing foundations, subgrades should be proof-rolled with at least six passes each way of a minimum 10-ton vibratory roller in open areas, or a 1-ton vibratory roller or large plate compactor in trenches. Excavations in silty clay soil near the water table should be proof-rolled statically to reduce the potential for disturbing the subgrade.

The GER or his/her representative should review the subgrade during the proof-rolling process. Soft or unsuitable bearing soil should be over-excavated from the foundation bearing zone. The over-excavation should be backfilled up to design subgrade elevation with compacted crushed stone. Crushed stone should be placed in loose lifts not exceeding 8 inches thick and compacted with at least passes of a large vibratory plate compactor in perpendicular directions. Crushed stone should be separated from soil subgrades and backfill with a geotextile separation fabric such as Mirafi 140N, or equivalent.

Following proof-rolling, structural fill or crushed stone (where required) may be placed and compacted to achieve design footing subgrade elevation. Where subgrades become wet, unstable and/or difficult to proof-roll, the use of crushed stone should be considered in lieu of structural fill. Crushed stone (if used) should be underlain with a geotextile separation fabric, such as Mirafi 140N or equivalent.

Silty clay subgrades will be sensitive to moisture and construction traffic and easily disturbed. Care must be taken by the contractor to avoid disturbance to subgrades by minimizing construction traffic (including foot traffic) to the extent practical. Subgrades disturbed by construction traffic should be over-excavated and replaced with suitable backfill material. Excavated subgrades should not be left exposed overnight unless the forecast calls for above-freezing and clear conditions.

6.2 Fill Materials and Placement

Fill materials should consist of mineral soil free of organics, debris or other deleterious materials. Frozen material should not be used and fill should not be placed on frozen subgrades. Recommended material property requirements for fills on the project, and their acceptable locations for placement, are as follows:

Imported Structural Fill:

Placement/Location	Material Properties
Recommended below footings, within footing bearing zones, and under settlement-sensitive structures.	Imported structural fill should meet the following gradation: **Sieve Size** — **Percent Passing by Weight** 8-inch — 100* 3-inch — 70 – 100** ¾-inch — 45 - 95 No. 4 — 30 - 90 No. 10 — 25 - 80 No. 40 — 10 - 50 No. 200 — 0 - 10 * Maximum particle size limited to 2/3 the loose lift thickness. ** Maximum 3-inch particle size within 12 inches of the underside of footings.

Crushed Stone:

Placement/Location	Material Properties
Recommended below footings, within footing bearing zones, and under settlement-sensitive structures.	Crushed stone shall be meet the requirements of a #4 Stone (Standard Stone Size) as specified in the *NHDOT Standard Specifications for Road & Bridge Construction, 2010*, Section 703, Table 1E.
Note: Crushed stone, if used, should be separated from subgrades and backfill soil (as appropriate) using a geotextile such as Mirafi 140N, or equivalent.	

Common Fill:

Placement/Location	Material Properties
May be used for site grading. Common fill should not be used under settlement sensitive structures.	The maximum particle size is recommended to be limited to 2/3 the lift thickness and no more than 30 percent by weight should pass the No. 200 sieve. Maximum 3-inch particle size within 12 inches of structure.

On-Site Soil:

Placement/Location	Material Properties
Excavated fill and glaciolacustrine silty clay may be selectively reused as common fill adjacent to and above proposed foundations.	To be suitable for reuse, excavated soil should be free of organic, frozen or other deleterious materials, stable, and able to be adequately compacted. The maximum particle size is recommended to be limited to 2/3 the lift thickness. Maximum 3-inch particle size within 18 inches of structure.

6.3 Compaction Requirements

The recommended compaction and moisture criteria for engineered fill materials follow:

Fill Lift Thickness	***Vibratory Rollers:***	12 inches or less in loose thickness
	Plate Compactors:	8 inches or less in loose thickness
Compaction Requirements (1,2)	***Structural Fill:***	95% maximum dry density
	Common Fill:	92% maximum dry density
Moisture Content – Granular Material	± 3% of the Optimum Moisture Content	

1. Maximum dry density as determined by ASTM D-1557, Method C (Modified Proctor).
2. Fill should be tested for moisture content and percent compaction during placement. If in-place density test results indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested, as required, until the specified moisture and compaction requirements are achieved.

6.4 Temporary Excavations / Grading and Drainage

Based on the information discussed above, maximum excavation depths are anticipated to be on the order of 8 feet, corresponding to approximately El 492 feet. Groundwater was encountered at depths of 10 to 11 feet below existing grade, corresponding to approximately El 490 and 488 feet. Excavations deeper than the maximum anticipated depth of 8 feet will likely require shoring and bracing due to the water table and the potential for loose fine sands at the bottom of the excavation, as depicted on the test boring logs. Additionally, the loose non-cohesive soil encountered is anticipated to be susceptible to vibrationally induced settlement. If sheeting is considered for excavation support, consideration should be given to leaving the sheeting in place to reduce the risk of settlement of the proposed valve vault during sheet extraction. Sheeting and shoring design should take into consideration the subsurface conditions at the site including groundwater, loose sand, and vibration sensitivity.

The individual contractor(s) is responsible for designing and constructing stable, temporary excavations or temporary bracing, as required, to maintain stability of the excavation sides and the excavation bottom. Instability in the form of slope raveling, caving, and sloughing should be expected in all excavations and trenches which extend into the granular materials with little

to no cohesion. Excavations should be sloped or shored in the interest of safety following local and federal regulations, including current OSHA excavation and trench safety standards.

Construction slopes should be reviewed for signs of mass movement. If potential stability problems are observed, work should cease and the geotechnical engineer should be contacted immediately. The responsibility for excavation safety and stability of temporary construction slopes should lie solely with the contractor.

Stockpiles should be placed well away from the edge of the excavation and their height should be controlled so they do not surcharge the sides of the excavation. Positive drainage should be provided during construction and maintained throughout the life of the development. Infiltration of water into utility trenches or foundation excavations should be prevented during construction.

Based upon the encountered subsurface conditions, subgrade soil exposed during construction may be sensitive to moisture and easily disturbed under construction traffic where moisture conditions are above the optimum moisture content. Stability of the subgrade will be affected by precipitation, repetitive construction traffic or other factors. If unstable conditions develop, replacement with granular materials may be necessary.

6.5 Dewatering

Based on observed groundwater depths and an anticipated maximum excavation depth of 8 feet, construction dewatering is not anticipated for construction of foundations. If dewatering becomes necessary, the contractor should be required to maintain a dewatered and stable subgrade during construction. Efforts should be made to prevent surface water runoff from collecting in excavations. Subgrade soil that becomes unstable should be replaced with crushed stone or structural fill as necessary. Crushed stone, if used, should be underlain with a geotextile to avoid separation of fines from the subgrade. Discharge of groundwater to surface water during construction may require permits from the New Hampshire Department of Environmental Services (NHDES).

7.0 GENERAL COMMENTS

Sovereign should be retained to review final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. The GER and an independent testing agency should also be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in

this report. This report does not reflect variations that may occur between borings, across the site or due to the modifying effects of weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication an environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, express or implied, are intended or made. Site safety, excavation support and dewatering requirements are the responsibility of others. In the event that changes in the nature, design or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Sovereign reviews the changes and either verifies or modifies the conclusions of this report in writing.

FIGURES

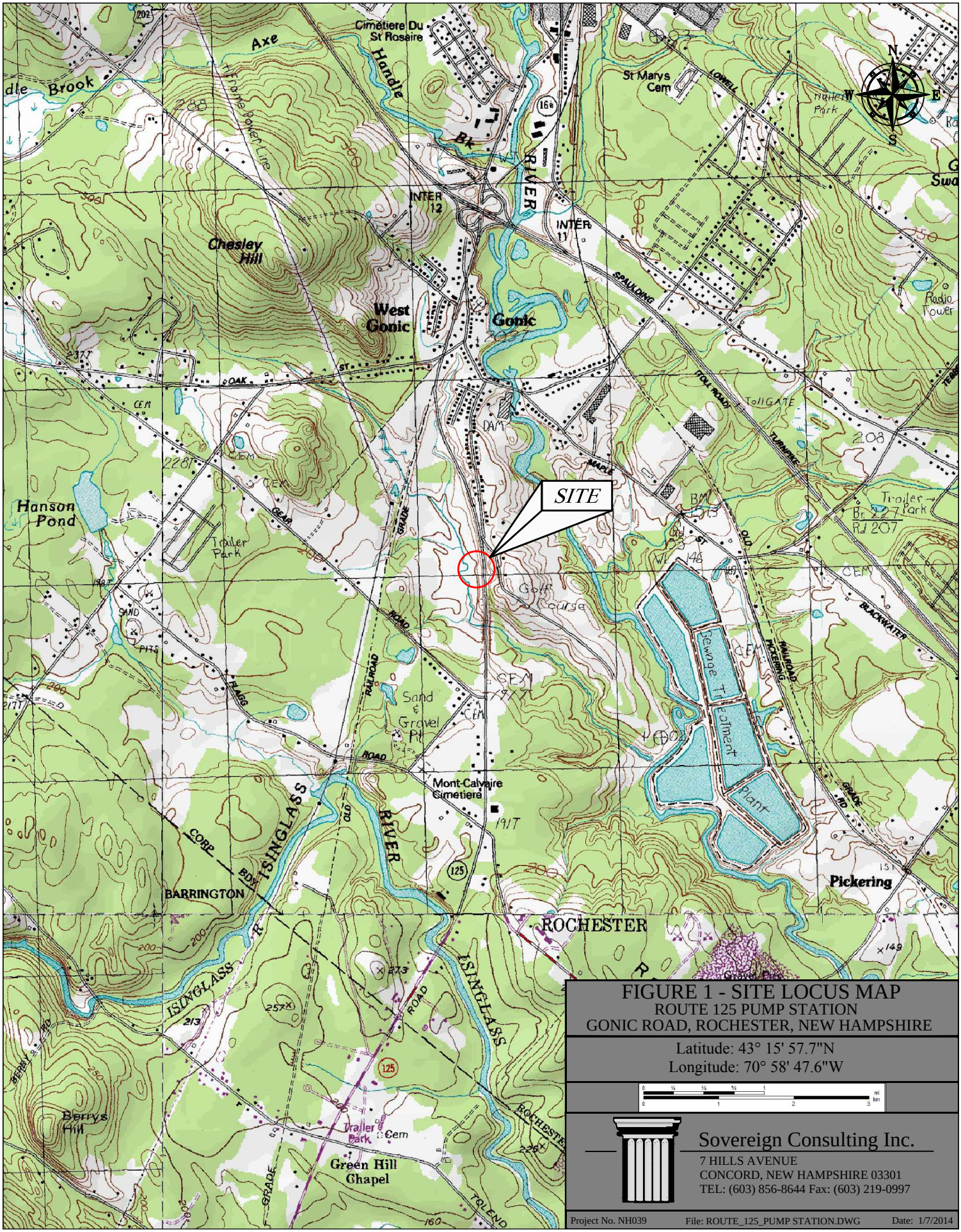


FIGURE 1 - SITE LOCUS MAP

ROUTE 125 PUMP STATION
GONIC ROAD, ROCHESTER, NEW HAMPSHIRE

Latitude: 43° 15' 57.7"N
Longitude: 70° 58' 47.6"W

Sovereign Consulting Inc.
7 HILLS AVENUE
CONCORD, NEW HAMPSHIRE 03301
TEL: (603) 856-8644 Fax: (603) 219-0997

Project No. NH039 | File: ROUTE_125_PUMP STATION.DWG | Date: 1/7/2014

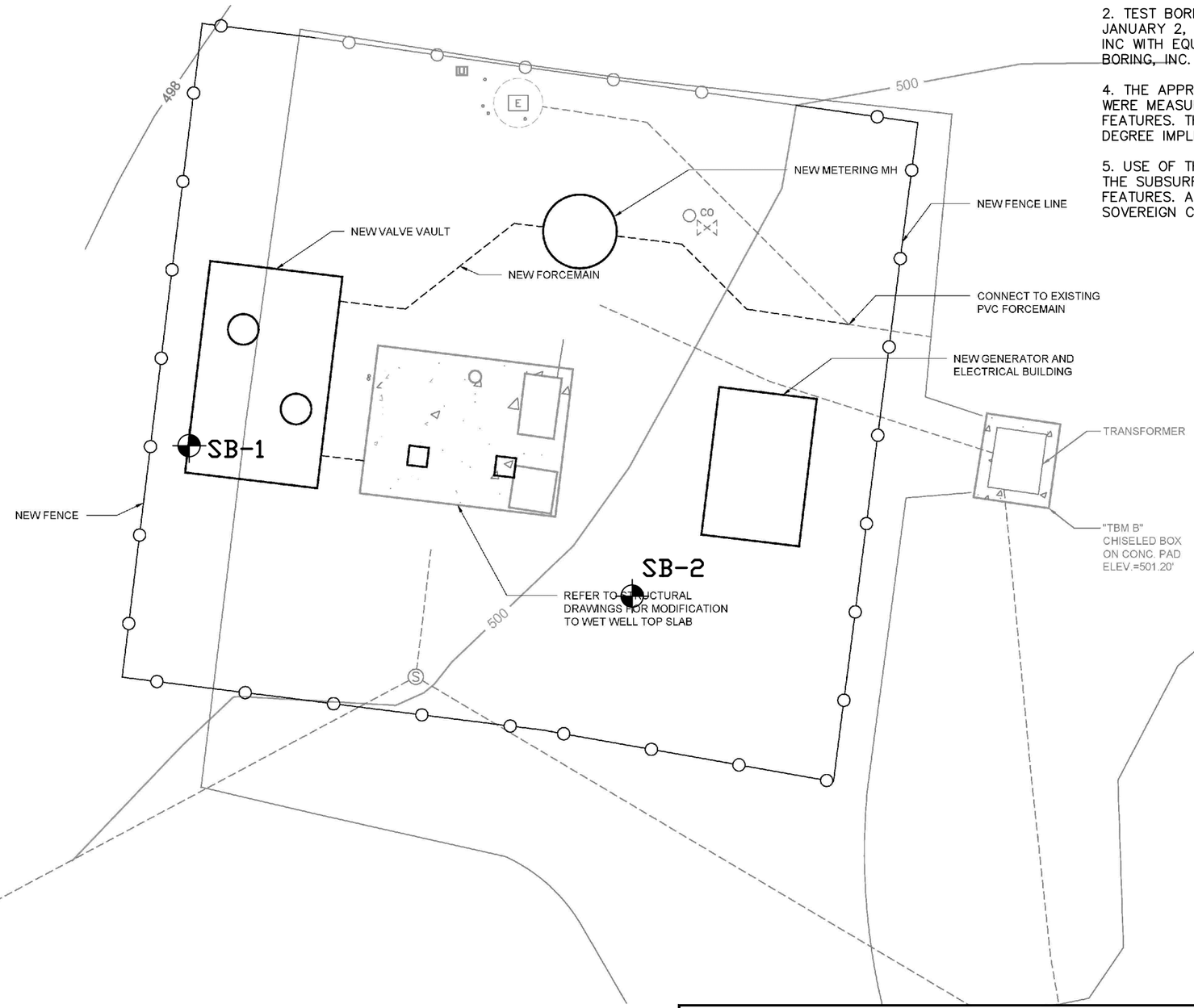
NOTES:

1. THIS PLAN WAS PREARED FROM A PLAN ENTITLED, "PROPOSED SITE PLAN C2" PROVIDED BY LIN ASSOCIATES, INC. OF BOSTON, MASSACHUSETTS.

2. TEST BORINGS SHOWN AS SB–1 AND SB–2 WERE ADVANCED ON JANUARY 2, 2014 UNDER THE DIRECTION OF SOVEREIGN CONSULTING, INC WITH EQUIPMENT OWNED AND OPERATED BY NORTHERN TEST BORING, INC. OF GORHAM, MAINE.

4. THE APPROXIMATE LOCATION OF THE SUBSURFACE EXPLORATIONS WERE MEASURED BY TAPE MEASUREMENT REFERENCING EXISTING SITE FEATURES. THE LOCATIONS SHOULD BE CONSIDERED ACCURATE TO THE DEGREE IMPLIED BY THE METHOD USED.

5. USE OF THIS PLAN IS LIMITED TO THE APPROXIMATE LOCATIONS OF THE SUBSURFACE EXPLORATIONS AND OTHER PERTINENT SITE FEATURES. ANY OTHER USE OF THIS PLAN WITHOUT PERMISSION FROM SOVEREIGN CONSULTING, INC. IS PROHIBITED.



LEGEND

SB-1 APPROXIMATE TEST BORING LOCATION

0 10

APPROXIMATE SCALE IN FEET

Sovereign Consulting Inc.

7 HILLS AVENUE
CONCORD, NEW HAMPSHIRE 03301
TEL: (603) 856-8644

Project No. NH039 File: ROUTE_125_PUMP STATION.DWG Date: 1/7/2014

FIGURE 2
SITE EXPLORATION
LOCATION PLAN

ROUTE 125 PUMP STATION
GONIC ROAD
ROCHESTER, NEW HAMPSHIRE

ATTACHMENT A

DESCRIPTION OF FIELD EXPLORATIONS

In total, two (2) test borings (SB-1 and SB-2) were drilled on January 2, 2014 to depths ranging from approximately 22 to 32 feet below the ground surface within the project area at the approximate locations shown on the attached Subsurface Exploration Location Plan.

Test borings were advanced by Northern Test Boring, Inc. of Gorham, Maine using track-mounted drilling equipment. Borings were advanced utilizing 4¼-inch inside-diameter hollow-stem augers and backfilled with soil cuttings upon completion. Soil samples were generally obtained nearly continuously from ground surface to a depth of 12 feet, and at 5-foot intervals thereafter using a standard 2-inch outside diameter split-barrel sampler. Standard Penetration Tests (SPTs) were performed in general accordance with industry standards. Density of soil samples are based on N-values, which is determined by the number of hammer blows required to advance the sampler from 6 to 18 inches.

An automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A greater efficiency is typically achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. Published correlations between the SPT values and soil properties are based on the lower efficiency cathead and rope method. This higher efficiency affects the standard penetration resistance blow count (N) value by increasing the penetration per hammer blow over what would obtained using the cathead and rope method. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

Visual classifications of soil are shown on test boring logs included in **Attachment A**. Groundwater conditions were evaluated in each exploration while drilling.

Borings were located in the field by measuring from existing site features. The accuracy of boring locations should only be assumed to the level implied by the method used.

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

S:	Split-Barrel sampler – 1-3/8" I.D., 2" O.D., unless otherwise noted	HSA:	Hollow Stem Auger
T:	Thin-Walled Tube - 3" O.D., unless otherwise noted	AP:	Auger Probe
C:	Diamond Bit Coring - 4", N, B	HA:	Hand Auger
BS:	Bulk Sample or Auger Sample	RB:	Rock Bit
		WB:	Wash Boring or Mud Rotary

The number of blows required to advance a standard 2-inch O.D. split-barrel sampler (SB) between 6 to 18 inches of the total 24-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value."

WATER LEVEL MEASUREMENT SYMBOLS:

WL:	Water Level	WS:	While Sampling	N/E:	Not Encountered
WCI:	Wet Cave in	WD:	While Drilling		
DCI:	Dry Cave in	BCR:	Before Casing Removal		
AB:	After Boring	ACR	After Casing Removal		

DESCRIPTIVE SOIL CLASSIFICATION:

Soils are visually classified using a modified Burmister system. The order of the visual-manual classification is as follows:

1. Density or Consistency
2. Color
3. Grain Size & Constituent percentages
4. Other pertinent descriptors

CONSISTENCY OF COHESIVE SOILS

Consistency	Standard Penetration Test or N-value (Blows/Ft.)	Unconfined Compressive Strength, Qu, (psf)
Very Soft	<2	< 500
Soft	2-4	500 – 1,000
Medium Stiff	4-8	1,000 – 2,000
Stiff	8-15	2,000 – 4,000
Very Stiff	15-30	4,000 – 8,000
Hard	>30	>8,000

RELATIVE DENSITY OF COHESIONLESS SOILS

Standard Penetration Test or N-value (Blows/Ft.)	Relative Density
0 – 4	Very Loose
4 – 10	Loose
10 – 30	Medium Dense
30 – 50	Dense
>50	Very Dense

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other Constituents	Percent of Dry Weight
Noun (major component)	≥ 50%
And	35 – 50%
Some	20 – 35%
Little	10 – 20%
Trace	1 – 10%
With	Amount not determined

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	≥ 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75 mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 Sieve (0.075mm)

PLASTICITY DESCRIPTION

Degree of Plasticity	General Soil Type
Non-plastic	SILT
Slightly	clayey SILT
Low	SILT, and Clay
Medium	CLAY, and Silt
Highly	silty CLAY
Very High	CLAY

TEST BORING LOG

SOVEREIGN CONSULTING INC.
ENVIRONMENTAL & GEOTECHNICAL ENGINEERING

Boring ID: **SB-1**

Client:	Lin Associates, Inc.
Project:	Route 125 Pump Station
Project No.:	NH039
Location:	Gonic Road
	Rochester, New Hampshire
Drilling Co.:	Northern Test Borng, Inc.
Drill Rig:	Diedrich D50 ATV
Drill Method:	HSA
Foreman:	M. Nadeau
Sovereign Inspector:	S. Carter
Start Date:	1/2/2014
Completion Date:	1/2/2014

CASING		SAMPLER	
Type:	HSA	Type:	Split-Barrel
Diameter:	4.25" ID	Diameter:	2" OD

HAMMER			
Type:	Auto	Size:	140 lb
Drop Method:	Auto	Fall:	30"

WATER LEVEL OBSERVATIONS

Date	Depth (ft.)	Duration
1/2/2014	11	ws
1/2/2014	11.5	20 min AB/BCR

Depth (ft)	Sample Information: Sample ID	Interval (ft.)	Blows/6"	N-value	Pen./Rec. (in.)	PID (ppmv)	Sample Description	Strata Change: Depth (ft)	Strata Change: Graphic	Notes
							Approx. Surface Elev.: **499 ft**			
	S1	0-2	5-4	8	24/12		Loose, light brown, medium to fine SAND, trace Silt			
2			4-4				[Fill]	2		
4										
6	S2	5-7	2-3	6	24/18		Medium stiff, gray-brown, silty CLAY, moist			
			3-4							
8										
10										
	S3	10-12	1-2	3	24/20			11		
12			1-2				Soft, gray, silty CLAY with frequent partings clayey SILT and fine SAND, wet			
14										
16	S4	15-17	2-1	2	24/16		Similar to S3			
			1-1							
18										
20							[Glaciolacustrine Deposit]			
	S5	20-22	1/12"	1	24/22		Very loose, gray, fine SAND, little to trace Silt, wet			
22			1-2							
24										

Notes:
ws - sampling
AB - after boring
BCR - before casing removal

Proportions Used: trace (1-10%), little (10-20%), some (20-35%), and (35-50%)

Cohesive Consistency (Blows/ft)		Cohesionless Relative Density (Blows/ft)	
very soft	0-2	very loose	0-4
soft	2-4	loose	4-10
medium stiff	4-8	medium dense	10-30
stiff	8-15	dense	30-50
very stiff	15-30	very dense	50+
hard	30+		

Remarks: 1) Stratification lines represent approximate boundaries between soil and rock types; in-situ the transition may be gradual.
2) Uncorrected N-values

Boring ID
SB-1

TEST BORING LOG

SOVEREIGN CONSULTING INC.
ENVIRONMENTAL & GEOTECHNICAL ENGINEERING

Boring ID: **SB-1**

Client:	Lin Associates, Inc.
Project:	Route 125 Pump Station
Project No.:	NH039
Location:	Gonic Road
	Rochester, New Hampshire
Drilling Co.:	Northern Test Borng, Inc.
Drill Rig:	Diedrich D50 ATV
Drill Method:	HSA
Foreman:	M. Nadeau
Sovereign Inspector:	S. Carter
Start Date:	1/2/2014
Completion Date:	1/2/2014

CASING		SAMPLER	
Type:	HSA	Type:	Split-Barrel
Diameter:	4.25" ID	Diameter:	2" OD

HAMMER			
Type:	Auto	Size:	140 lb
Drop Method:	Auto	Fall:	30"

WATER LEVEL OBSERVATIONS

Date	Depth (ft.)	Duration
1/2/2014	11	ws
1/2/2014	11.5	20 min AB/BCR

Depth (ft)	Sample Information: Sample ID	Interval (ft.)	Blows/6"	N-value	Pen./Rec. (in.)	PID (ppmv)	Sample Description (Approx. Surface Elev.: 499 feet)	Strata Change: Depth (ft)	Strata Change: Graphic	Notes
	S6	25-27	4-3	7	24/16		Loose, gray, silty fine SAND, wet			
			4-3				[Glaciolacustrine Deposit]	26.5		
27							Loose, brown, fine SAND, wet			
29										
31	S7	30-32	8-7	12	24/16		Medium dense, brown, fine SAND, trace Silt, wet			
			5-5				[Glaciofluvial Deposit]			
33							Bottom of Boring at 32 feet			
35										
37										
39										
41										
43										
45										
47										
49										

Notes:
ws - sampling
AB - after boring
BCR - before casing removal

Proportions Used: trace (1-10%), little (10-20%), some (20-35%), and (35-50%)

Cohesive Consistency (Blows/ft)		Cohesionless Relative Density (Blows/ft)	
very soft	0-2	very loose	0-4
soft	2-4	loose	4-10
medium stiff	4-8	medium dense	10-30
stiff	8-15	dense	30-50
very stiff	15-30	very dense	50+
hard	30+		

Remarks: 1) Stratification lines represent approximate boundaries between soil and rock types; in-situ the transition may be gradual.
2) Uncorrected N-values

Boring ID
SB-1

TEST BORING LOG

SOVEREIGN CONSULTING INC.
ENVIRONMENTAL & GEOTECHNICAL ENGINEERING

Boring ID: **SB-2**

Client:	Lin Associates, Inc.
Project:	Route 125 Pump Station
Project No.:	NH039
Location:	Gonic Road
	Rochester, New Hampshire
Drilling Co.:	Northern Test Borng, Inc.
Drill Rig:	Diedrich D50 ATV
Drill Method:	HSA
Foreman:	M. Nadeau
Sovereign Inspector:	S. Carter
Start Date:	1/2/2014
Completion Date:	1/2/2014

CASING		SAMPLER	
Type:	HSA	Type:	Split-Barrel
Diameter:	4.25" ID	Diameter:	2" OD

HAMMER			
Type:	Auto	Size:	140 lb
Drop Method:	Auto	Fall:	30"

WATER LEVEL OBSERVATIONS

Date	Depth (ft.)	Duration
1/2/2014	10	ws
1/2/2014	18	10 min AB/BCR

Depth (ft)	Sample Information: Sample ID	Interval (ft.)	Blows/6"	N-value	Pen./Rec. (in.)	PID (ppmv)	Sample Description (Approx. Surface Elev.: 500 ft)	Strata Change: Depth (ft)	Strata Change: Graphic	Notes
	S1	0.5-0.8	60/3"	+60	3/2		3" Bituminous Pavement	0.3		
							Very dense, coarse to fine SAND, trace Gravel, trace Silt, frost to 2 feet			
2										
	S2	2-4	6-6	11	24/10		Medium dense, gray-brown with orange, SILT, some medium to fine Sand, moist			
			5-4							
4										
	S-3	5-7	3-2	4	24/12		Loose, brown, coarse to fine SAND, trace Gravel, trace Silt, moist [Fill]	5.5		
6			2-1				Loose, gray, silty fine SAND, wet, bottom of sample contained thin seam buried topsoil with fine roots			
	S4	7-9	2-2	4	24/14		Medium stiff, gray-brown, silty CLAY, moist			
8			2-2							
10										
	S5	10-12	1-1/12"	<1	24/24		Very soft, gray, silty CLAY with frequent partings clayey SILT and fine SAND, wet			
12			1							
	S6	12-14	1-1	2	24/24		Similar to S5			
14			1-1							
								15		
16	S7	15-17	1/12"	<1	24/24		Very loose, gray, fine SAND, little Silt, wet.	16		
			1/12"				Very soft, gray, silty CLAY with frequent partings clayey SILT and fine SAND, wet			
18										
20								20		
	S8	20-22	woh/12"	1	24/16		Very loose, gray, fine SAND, little Silt, trace Clay, with frequent laminae silty CLAY, wet			
			1-2					21.5		
22							Very loose, brown, fine SAND, trace Silt, wet [Glaciolacustrine]			
							Bottom of Boring at 22 feet			
24										

Notes:
ws - sampling
AB - after boring
BCR - before casing removal

Proportions Used: trace (1-10%), little (10-20%), some (20-35%), and (35-50%)

Cohesive Consistency (Blows/ft)		Cohesionless Relative Density (Blows/ft)	
very soft	0-2	very loose	0-4
soft	2-4	loose	4-10
medium stiff	4-8	medium dense	10-30
stiff	8-15	dense	30-50
very stiff	15-30	very dense	50+
hard	30+		

Remarks: 1) Stratification lines represent approximate boundaries between soil and rock types; in-situ the transition may be gradual.
2) Uncorrected N-values

Boring ID
SB-2