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Transmittal

April 05, 2017

Bergmann Associates, P.C.
10B Madison Avenue Extension
Albany, New York 12203

Attn: Mr. Steven M. Boisvert, P.E., Principal

Re: Port of Albany Expansion Feasibility Project
Beacon Island Parcel
Town of Bethlehem, New York
CME Project No.: 27211-05

Gentlepeople:

Enclosed you will find….

Number of Copies	Report Number/Description
3	27211B-01-0417/Preliminary Geotechnical Evaluation and Interpretive Report

This report was emailed to Mr. Steven M. Boisvert at sboisvert@bergmannpc.com on 04/05/17.

Respectfully submitted,
CME Associates, Inc.

Anas N. Anasthas, P.E.
Geotechnical Engineer

AA.bmf

A New York State Certified Woman-Owned Business Enterprise (WBE)

Preliminary Geotechnical Evaluation and Interpretive Report

Port of Albany Expansion Feasibility Project
Beacon Island Parcel
Town of Bethlehem, New York

Prepared For: (Client)

Bergmann Associates, P.C.
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Prepared By: (Geotechnical Engineer)

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CME Report No.: 27211B-01-0417
April 05, 2017

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Preliminary Geotechnical Evaluation and Interpretive Report
Port of Albany Expansion Feasibility Project
Beacon Island Parcel
Town of Bethlehem, New York

1.0 INTRODUCTION

The Beacon Island Parcel in the Town of Bethlehem, Albany County, New York, is being considered for purchase and development by the Port of Albany for a future Port Expansion. Bergmann Associates, P.C. (Bergmann-Client) retained CME Associates, Inc. (CME) to provide a planning-level geotechnical investigation to assist them in their Site Evaluation and Feasibility Study. CME's Scope of Basic Services for this project has been provided pursuant to the written authorization of CME Proposal/Agreement Number: 05.5039R(1) by Client.

CME conducted a limited field exploration consisting of eight Test Borings spread across the 80± acre parcel, as directed by Bergmann. At the request of and as a courtesy to Client, three Groundwater Observation Wells were installed near three of the Test Borings for Client to collect water samples. A limited laboratory testing consisting of soil index testing was performed by CME on select soil samples retrieved from the Test Borings.

In addition to the field and laboratory test programs, CME reviewed the USDA Web Soil Survey, and the Phase I Environmental Site Assessment and Environmental Due Diligence – Port of Albany Memorandum, prepared by Bergmann.

This report presents the results of CME's evaluation of the above noted data and includes addressing the following items:

- A generalized characterization of the deposits and their affect and limitations with respect to the planned development of the parcel.
- Identify or outline the potential design or construction problems which may warrant further study.
- Present one or more potential satisfactory solutions for the major foundation design and construction problems identified.
- Present preliminary criteria for planning of the project foundations.
- Present general recommendations which may aid in the selection of an optimum arrangement for facilities on the site vis-à-vis the limitations of the subsurface conditions identified in the field program.
- Recommend additional exploration and testing which may be warranted to further reduce the risks and uncertainties present in work involving subsurface conditions.
- Recommend a Seismic Site Classification using the SPT results and the requirements of the 2015 (IBC) Building Code of New York State.

This report is not intended to address any of the myriad hazardous materials (HazMat) problems and conditions associated with the site's "solid waste landfill" classification by NYSDEC, any and all Recognized Environmental Conditions (REC) and/or any Unrecognized Environmental or HazMat Conditions, all of which conditions are specifically excluded from CME's scope for this preliminary geotechnical evaluation.

2.0 EXPLORATION METHODOLOGY

The exploration locations (Borings B-1 through B-8) were selected and staked in the field by Client, who provided the attached Exploration Location Plan, along with GPS Coordinates and Elevation at Grade for the exploration locations. Borings B-1, B-2, B-5 and B-7 were re-located in the field by CME due to access issues. GPS Coordinates and Elevations for these borings were obtained by CME, and are attached to this report. CME contacted Dig Safely New York (DSNY) at least three business days in advance of the exploration program.

Test Borings were advanced using a Central Mining Equipment Model 550x, ATV-mounted, rotary exploration drill rig, equipped with 3-¼" I.D. hollow stem augers and drive sampling tools. Soil Sampling and Standard Penetration Testing (SPT) were conducted using a 140-pound automatic hammer dropping through a distance of 30 inches to drive a 2" O.D. split barrel sampler in general conformance with ASTM Standard Practice D1586. Bedrock cores were obtained in general conformance with ASTM Standard Practice D2113. Upon completion, each borehole was backfilled with auger cuttings to grade to closely match existing grade.

The boring samples were logged and visually classified in the field by a CME Staff Geologist and/or the CME Drillers, and a portion of each soil sample was placed and sealed in a glass jar. Bedrock cores were placed and secured in a wooden box. Bedrock core photos are attached.

The field soil classifications were later reviewed by the undersigned engineer using a modified Burmister Soil Classification System, as practiced by CME and as described in the attached document entitled, *General Information & Key to Test Boring Logs*.

The Groundwater Observations Wells were installed within about 5 feet of Test Borings B-3, B-5 and B-4, and were labeled MW-1, MW-2 and MW-3, respectively. Depths of wells and screen details were given by Client. The Groundwater Observation Well Reports, labeled MW-1, MW-2 and MW-3 are attached.

After completion of the explorations, the drilling equipment and tools were decontaminated. The decontamination was done on grade using a pressure washer and Alconox detergent.

The undersigned engineer selected soil samples for laboratory testing in CME's AMRL[1] accredited East Syracuse Laboratory. The standard methods used and the test results are presented in the attached *Laboratory Test Summary Report*.

[1] **AMRL** – American Association of State Highway & Transportation Officials (AASHTO) Materials Reference Laboratory, a Federal Agency having jurisdiction to assess laboratory competency according to the Standards of the United States of America. CME East Syracuse accreditation includes testing of Portland Cement Concrete, Aggregate and Soil Materials. www.amrl.net.

3.0 SITE HISTORY & LOCAL GEOLOGY

3.1 History

The Beacon Island Parcel is located south of the existing Port of Albany facility, between Hudson River and an active railroad line east of and parallel to River Road (Route 144) in the Town of Bethlehem, New York. Please refer to the attached Historical Aerial Photographs and Historical Topographic Maps and the Boundary Survey for location of the Beacon Island Parcel and Site History. Normans Kill, an inlet to the Hudson River, borders the parcel to the north. A PSEG Power Facility borders the parcel to the south.

The original Beacon Island (natural island) used to be a strip of land completely surrounded by Hudson River. A branch of the Hudson River (i.e. Island Creek or Normans Kill) that once flowed west of this Island was completely filled in between the early 1890's and 1950's to make land by connecting the natural Island to surrounding man-made Lands. A second landfilling is reported to have occurred over historical landfills from approximately 1953 through the 1970's. The second landfill is reported to consist chiefly of coal ash, disposed by Albany Power and Niagara Mohawk. The site is classified by the NYSDEC as a "Solid Waste Landfill", as reported in Environmental Due Diligence Memorandum by Bergmann, dated 03/20/17.

3.2 Local Geology

The Beacon Island Site was once covered by Glacial Lake Albany which was a northward expanding proglacial lake that extended from Glens Falls to Long Island, NY and included Glacial Lake Hudson in the lower Hudson Valley. Lake Albany is recorded by sand and silt terraces, beaches, and deltas throughout the Hudson Lowlands. The lower lake stages are locally recorded by glaciofluvial[2] deposits or eroded terraces underlain by lacustrine[3] clay sediments overlying till[4] or striated bedrock. The Hudson Lowlands are underlain by Lower Paleozoic Shale and Sandstone. [condensed from the Field Trip Guidebook, AMQUA 1988, edited by Julie Brigham-Grette, Dept. of Geology and Geography at University of Massachusetts]

The Beacon Island site was once completely surrounded by water and exhibits more recent natural, near-surface deposits of alluvium, shoreline, and river bank or bottom type deposits associated with the Normans Kill Creek, the Hudson River and pre-existing frequently flooded areas of the Island.

4.0 SURFACE & SUBSURFACE CONDITIONS

The subsurface conditions presented herein have been generalized for simplicity and brevity by the undersigned CME Engineer from the actual data obtained from the limited Subsurface Exploration conducted for a feasibility study. Please refer to the CME Test Boring Logs for actual conditions encountered at the time, location and elevation of each sampling. Please note, only 8 Test Borings were advanced at this 80+ acre site for this feasibility study. Subsurface conditions between exploration locations and in or near current or formerly existing riparian and shoreline areas will vary from those expressed in this Report.

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[2] Glaciofluvial – of, relating to, or coming from streams deriving much or all of their water from the melting of a glacier.
[3] Lacustrine deposits are those sediments laid down in the relatively quiet waters of glacial lakes and typically show a high degree of uniformity.
[4] Glacial Till is an Unsorted Material deposited directly by glacial ice and showing no stratification.

4.1 Surface Conditions

The subject site is currently vacant and is partially forested. During CME's exploration the site was snow-covered. A Utility Corridor with overhead power lines exists along the western edge of the site. This corridor appears to be located within the footprint of the former Normans Kill Creek, which was filled in. A portion of the site near the southwest corner (west of the utility corridor) is a hill, which is over about 50 feet higher in elevation than the rest of the site. Bedrock outcrops were noted at the side and top of this hill. Woods, consisting of tall trees were noted primarily along and east of the power lines and along and west of the Hudson River. Occasional tall trees and brush were noted along the mid-section of the parcel. An abandoned railroad line traverses the site along the mid-section of the site, in the north-south direction. Also, abandoned railroad cars were noted in the central portion of the site.

4.2 Subsurface Profile

The limited number of Test Borings advanced across this relatively large site is insufficient to adequately describe the subsurface conditions. A brief summary of subsurface conditions identified in the 8 Test Borings advanced at this site are given herein to give a general idea of subsurface conditions expected at this site, for this feasibility study. A more detailed exploration program is warranted after a decision has been made to develop this parcel to better characterize the subsurface conditions.

The Test Borings penetrated a subsurface profile consisting of Existing Fill, underlain by Silt/Organic Silt, underlain by Sand, underlain by Clay, underlain by Glacial Till, underlain by Bedrock. Please refer to the attached Generalized Subsurface Profiles SP-1 and SP-2 for generalized subsurface conditions based on the interpretation of Test Boring Logs by the undersigned engineer. A brief description of each Stratum is given below.

Existing Fill: Existing Fill was present at grade at all Test Borings to depths ranging from 6 to 23 feet below existing grade. The Fill is characterized as a random landfill deposit containing natural and solid waste deposits such as, but not limited to, Foundry Sand waste, Sand, Silt, Coal Ash, Gravel, Organic Matter, etc.

A predominant component of the Fill in a majority of the CME Borings is Coal Ash, reported to have resulted from combustion of coal-fired power generation. Since CME's borings were not advanced within the utility corridor or the riparian (shoreline) areas which were filled to join the island to the mainland, the Existing Fill described here is not considered representative of the materials used to make land in the first mass fill event, described previously.

It is important to note that Existing Fills were likely deposited over unprepared pre-existing grades and vegetation present on-grade at that time. Therefore, it is likely that the interface between existing fill and the buried pre-existing natural grade is characterized by rotting or decomposed trees, brush, vegetation and organic-rich soils.

Silt/Organic Silt: Below Existing Fill, a Silt Stratum was penetrated to about 14 to 31 feet below grade. The upper several feet of this Stratum contains Organic Silt, Organic Clay and Organic Matter, indicative of possible former river bottom, flood zones and pre-existing natural grades. CME's Test Borings sampled materials represented by USCS symbols ML (Silt), CL-ML (Silty Clay), OH (Organic Silt) and OL (Organic Clay), which are slightly plastic to plastic. Based on SPT,[5] these deposits are very soft to medium stiff, in general.

Laboratory index testing conducted on samples retrieved indicates Organic Contents of 5.2% and 5.8%, and Natural Moisture Contents of 47.5% and 50.1%. It is expected that defined layers of Peaty and Mucky deposits are present, but were not sampled.

Glaciofluvial Sand: Below the Silt/Organic Silt Stratum, glaciofluvial Sand with minor Silt and/or Gravel content was sampled to about 28 to 45 feet below grade. The Sands are represented by USCS symbols SM (Silty Sands), SP (poorly graded Sand) and SP-SM (poorly graded Sand with Silt), which are non-plastic granular soils. Based on SPT, this Stratum has a relative density ranging from very loose to medium compact.

Lacustrine Clay: Below the Sand Stratum, Lacustrine Clay with variable Silt fraction was sampled to about 131, 82 and 48 feet below grade in Borings B-1, B-3 and B-4, respectively. In all other Borings, Clay was sampled to boring termination depth (50 feet). Soils in this Stratum are represented by USCS symbols CL (Lean Clay), CH (Fat Clay) and CL-ML (Silty Clay), which are slightly plastic to plastic. Based on SPT, this Stratum is very soft to medium stiff in consistency.

Based on laboratory testing, these glacial lakebed clay sediments exhibit Natural Moisture Content close to its Liquid Limit, indicative of a normally loaded[6] deposit, thus this clay deposit is subject to long-term consolidation behavior.

Glacial Till: Below Clay in Borings B-1, B-3 and B-4, a dense Stratum consisting of a heterogeneous mixture of Silt, Clay, Sand and Gravel was penetrated to about 149, 93 and 61 feet below existing grade, respectively, where sampler refusal was noted. This Stratum appears to have been compressed (preloaded) by pre-historic glacier, and is referred to as Glacial Till.

Bedrock: CME Test Borings B-3 and B-4 sampled Bedrock. Photographs, of Bedrock Cores extracted from these two borings, are attached to this report. Please refer to the Test Boring Logs B-3 and B-4 for Bedrock Classifications and the attached Key for nomenclature used to describe bedrock classifications.

A 5-foot rock core sample was obtained in Boring B-3 from 93.5 to 98.5 feet below grade. The core revealed Grey/Black Shale Bedrock of good quality, based on an RQD[7] value of 75%. This bedrock core is classified as weathered, medium hard, thinly bedded with high angle (up to about 60 degrees from horizontal) bedding and mechanical breaks. Also, calcite fillings and veins were noted.

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[5] SPT – Standard Penetration Testing
[6] A Stratum is said to be *normally loaded* if it has never been acted on by vertical pressures greater than those existing at present. [Foundation Engineering – Peck, Hanson & Thornburn, 1973]
[7] RQD – Rock Quality Designation

An attempt was made to obtain a 5-foot rock core in Boring B-4 from 63.5 feet below grade. However, core blockage was noted at 66 feet and 67.8 feet below grade, which reduced the length of the core and recovery. The rock cores indicate highly weathered to weathered, medium hard, thinly bedded Shale Bedrock with high angle (up to about 45 degrees with horizontal) bedding and mechanical breaks. An approximately 2" thick mud seam was noted at 66 feet below grade. The bedrock mass is rated to be of very poor to poor quality, based on RQD values of 0% and 27%.

Based on the New York State Geologic Mapping for the Hudson Valley, and CME's rock core samples, the Bedrock appears to be Normanskill Shale Formation.

Bedrock outcropping was noted on the sides and top of the existing hill near the southwest corner of the site. The top of that hill is approximately Elevation 70, and the bottom of Boring B-1 is approximately Elevation -130. There is over about a 200 feet drop from bedrock surface at top of the hill to top of bedrock surface (not confirmed) in Boring B-1 within about a 900-foot horizontal distance.

Based on a review of the attached Op-Tech Report excerpts, the Hudson River Bank slopes down from the existing stone retaining wall at approximately 2.5H:1V (approximately 22 degrees with horizontal) and the bottom of River is approximately elevation -37. It is possible that a bedrock cliff (with steep or near-vertical bedrock surface) exists between the River Bank and a line represented by Borings B-1, B-6 and B-3. The high angle bedding planes noted in the bedrock cores may possibly represent approximate bedrock surface angle, and support the possibility of a buried bedrock cliff. Additional exploration is warranted to further investigate this possibility.

4.3 Groundwater Observations

Groundwater level observations and measurements are made by the CME Drillers when groundwater accumulates in the borehole. The CME Drillers note water levels inside the boreholes during advancement and following casing removal. If the hole caves-in after casing removal, the depth of cave-in is noted on the CME Boring logs. The drillers also note whether samples retrieved are dry, moist, wet or saturated. The conditions and times of groundwater level observations are noted on the individual Test Boring Logs.

Groundwater was observed in the Borings at depths ranging from 1.5 to 13.7 feet below existing grade, corresponding to about elevation 14 to 3. Mean High Water Level of Hudson River is about elevation 5, as reported in the attached Op-Tech Report excerpt.

Groundwater fluctuations should be expected to occur at this site depending on several factors such as rainfall, seasonal changes, prevailing climate, ambient weather conditions, adjacent construction operations, and Hudson River Level, among other factors.

5.0 CHARACTERIZATION OF DEPOSITS

While this report and engineer do not address any of the myriad environmental contamination and potential HazMat issues with respect to this current development project, it is important for the reader to understand that typically existing HazMat conditions cannot be considered separately and/or distinctly from the structural and geotechnical characteristics of the site's subsurface materials.

For example, petroleum contaminated soils excavated from a trench for a new underground pipeline may be satisfactory geotechnically for re-use as backfill of the pipe trench, but may fail the re-use criteria given in NYSDEC STARS 1.

This section characterizes the soil deposits in terms of their importance, effect and limitations on the proposed development of the parcel as a heavy industrial port facility.

Existing Fill (Landfill): The existing Landfill is variable in composition, extent and depth. Unimproved Existing Fill has no bearing capacity and cannot reliably support any buildings, structures or pavements. Existing Fill is not trafficable in some areas and is not a suitable bearing Stratum for any new construction.

New York State has beneficial use laws and rules for allowing limited use of coal combustion products in certain construction materials, such as flowable fill, concrete, and mineral filler in asphalt pavements. Coal Ash is also used as soil stabilization additive and in structural fills. A specific study and analysis is required to ascertain the possible beneficial uses of the Existing Landfill Material.

The characterization of the first filling event to "make land" where water previously existed was not investigated by CME, as no test borings were located in these areas.

Silt/Organic Silt/Buried Organics: As mentioned previously, the two Filling Events likely deposited the fill materials over pre-existing natural grades either above or below then-existing creek and river water levels and in areas subject to frequent flooding. The Organic-rich soils and existing topsoil horizon were likely buried. Buried organic deposits have no bearing capacity and can settle and/or compress excessively when loaded by new improvements. Therefore, Buried Organic Layers are not a suitable bearing stratum for any new construction or improvements. Depending on depth and groundwater levels, buried organic-rich layers may be removed and replaced with controlled engineered structural fills. This procedure is refed to as a "Subgrade Replacement". Alternatively, the materials can sometimes be pre-loaded with a temporary surcharge to achieve desired compression; then, after surcharge removal, new construction can occur. Depending on thickness and makeup of the organic deposits, surcharging can take many months. Also, where buried organics are located near and above the groundwater table, there is an ongoing future risk of continued decomposition manifested in compression causing settlement and distress to the new permanent structures.

Glaciofluvial Sand: The glaciofluvial sand deposits are not uniform in composition, thickness, relative density or extent and were encountered below observed river and groundwater levels. The sands do not represent a reliable bearing stratum, except for lightly loaded structures supported by friction piles, deriving their capacity from skin friction and improvement of the sand stratum by driving displacement piles such as timber piles.

Lacustrine Clay: The Lacustrine clay sediments appear to be normally loaded based on Atterberg Limits testing. The clay varies from about 25 feet thick at CME Boring B-4 to over 90 feet thick at CME Boring B-1. The clay may be considered to contribute capacity to friction piles of low to moderate capacity. Long-term settlements of structural fills due to consolidation of the clay must be evaluated on a case-by-case basis.

Glacial Till: A relatively thin mantle of Till overlies bedrock based on two out of eight borings which were advanced completely through Till. Till may be absent from the soil profile in areas of the parcel. Till may represent a competent bearing stratum for end-bearing piles.

Shale Bedrock: Shale bedrock was contacted at CME Boring B-4 at about elevation -51 and at CME Boring B-3 at about elevation -75. Bedrock outcropping is noted in the hill located near the southwest corner of the parcel. Rock core samples indicate high angle bedding planes of 60 to 45 degrees. CME's exploration program is inconclusive as to the direction(s) of bedding and dip or slope of the rock surface; however, the rock surface appears to dip severely easterly toward the Hudson River. It is possible that this site is on the edge or margin of a buried valley exhibiting near-vertical or reverse slope subsurface cliffs. It is also possible that the bedrock bedding dips severely east. Specific project exploration and testing is warranted to define these in-situ bedrock conditions.

Shale bedrock represents competent bearing for heavily loaded structures and high capacity deep foundation elements such as piles and drilled shafts.

Water Table: The site exhibits shallow perched and fluctuating water table conditions. Excavations made below the water table will require advance planning for dewatering, sheeted cofferdams or cutoff walls, and special provisions for discharge of water which may be contaminated with hazardous materials or substances and/or which is sediment-laden.

6.0 ENGINEERING EVALUATION

6.1 Geotechnical Summary

The Beacon Island Parcel site occupies a position near a margin within a floodplain and floodway where prehistoric glacial waters cut and filled the pre-existing soft glacial lakebed sediments, within a deep buried valley. Relatively soft sedimentary bedrock was gouged out or eroded by glaciers, leaving undefined, erratic bedrock surfaces forming the valley walls. Add to that 100 years of landfilling, industrial and commercial activity including man-made land formation, and the result is a site where prudence dictates there are no rules of thumb and where few, if any, presumptions should be made with respect to what is buried there and its effect on any planned development and improvements.

CME recommends that as individual projects develop, each new phase, structure and associated infrastructure be planned in concert with a geotechnical investigation and engineering evaluation tailored to the specific project or phase. A broad brush approach is not applicable to the Beacon Island Parcel Site.

6.2 Planning Foundations

Conventional shallow foundations consisting of footings and mats should not be planned for new buildings and structures. Conventional foundation systems should be considered only in combination with a prerequisite form of ground improvement, subgrade replacement and/or preload (temporary surcharge) of the site.

Deep foundation and structural grade-level slab systems which utilize driven piles represent an economical and time efficient solution for lightly to moderately loaded structures planned for this site. Friction piles may provide up to about 40 tons and end-bearing piles on Till or Bedrock over 40 tons axial capacity each.

Where one or more feet of new fill is to be placed on site near or in travelled ways, a temporary preload/surcharge may be appropriate to reduce abrupt elevation changes from pile-supported structures to on-grade pavements, aprons and walkways.

Foundations subject to frost action should be provided with 4'-6" of cover measured from final exterior grade to bottom of foundation element.

6.3 General Recommendations

In light of the subsurface conditions and limiting conditions thereof, CME recommends the following recommendations be considered:

A. Locate and designate a permanent spoil area for unsuitable and unusable excavated materials.
B. Plan on deep foundation and structural grade-level slab systems combined with temporary surcharge/preloading procedures.
C. Minimize footprints – go vertical.
D. Consider on-grade parking underneath structures to eliminate the structural grade-level floor and associated piles needed to support floor.
E. Minimize Fills above existing grade.
F. Plan on long periods of rest and settlement monitoring for areas which will require fills in excess of a couple of feet.
G. Implement an investigation and testing program for determining best beneficial use of the coal ash landfill material. Consider using the coal ash waste as controlled fills that may be needed on-site.
H. Consider using premium cost Lightweight Aggregate Products (e.g. Solite, Norlite, expanded shale and pumice products) for structural backfills to mitigate post-construction settlements.
I. Install roadway embankments, stormwater facilities, and handstands early, with temporary surcharges to allow for settlement and consolidation of the subsoils.
J. Consider centrally located sanitary sewer pump station(s) with short gravity sewer services to buildings, or individual building sanitary pump station and force main to public system.
K. Locate stormwater collection and management ponds in areas where existing grade is already low.

7.0 SEISMIC SITE CLASS

Based on a computational analysis using CME Test Borings and the 2015 New York Amended International Building Code (IBC), Section 1613, which references Chapter 20 of ASCE 7-10, the subject project site in the Town of Bethlehem, New York is defined as a "Soft Soil Profile," representative of a Seismic Site Class "E." The Test Borings did not sample soils which, in CME's professional opinion, are vulnerable to liquefaction, sudden collapse or failure under seismic loading conditions, such as liquefiable soils, quick or highly sensitive clays and weakly cemented soils. However, CME notes that such soils may exist at this site.

8.0 CLOSING COMMENTS

CME has endeavored to conduct the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the geotechnical engineering profession currently practicing in the same locality and under similar conditions as this project. No warranty, either express or implied, is made or intended by CME's proposal, contract, and written and oral reports, all of which warranties are hereby expressly disclaimed. CME shall not be responsible for the acts or omissions of Client, its contractors, agents and consultants. CME has relied upon information supplied by Client, its contractors, agents and consultants, or information available from generally accepted reputable sources, without independent verification, and CME assumes no responsibility for the accuracy thereof.

No other representations, expressed or implied, are intended or made with respect to the information provided herein, and including but not limited to, its suitability for use by others.

In accordance with CME's Terms and Conditions for Geotechnical Services, CME will dispose of all unconsumed samples thirty (30) days after submission of this report. All consumed samples were disposed of immediately after test completion. If you would like to keep the unconsumed samples, please email a request to do so, within five (5) business days from the date of this report to Brianna Fraone, bfraone@cmeassociates.com.

Please do not hesitate to contact our office if you have any questions regarding this report, its conclusions, its recommendations, or its application to actual field conditions revealed during construction.

Respectfully Submitted,
CME Associates, Inc.

Anas N. Anasthas, P.E.
Geotechnical Engineer

Reviewed By,
CME Associates, Inc.

Marcus A. Rotundo, P.E.
Senior Principal Engineer

Attachment Listing:

Historical Aerial Photographs (9 of 9)
Historical Topographical Maps (5 of 5)
Excerpts from Sediment Characterization Report by Op-Tech (8 of 8)
Boundary Survey (1 of 1)
CME Exploration Location Plan, EX-1 (1 of 1)
Generalized Subsurface Profiles, SP-1 and SP-2 (2 of 2)
GPS Coordinates and Elevations (2 of 2)
Bedrock Core Photographs (2 of 2)
Laboratory Test Summary Report (4 of 4)
CME Subsurface Exploration – Test Boring Logs, B-1 through B-8 (23 of 23)
Groundwater Observation Well Logs, MW-1 through MW-3 (3 of 3)
General Information & Key to Test Boring Logs (4 of 4)


Subject Property
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YEAR: 2011
= 500'
N
EDR


Subject Property
INQUIRY #: 4818228.12
YEAR: 2009
= 500'
N
EDR


Subject Property
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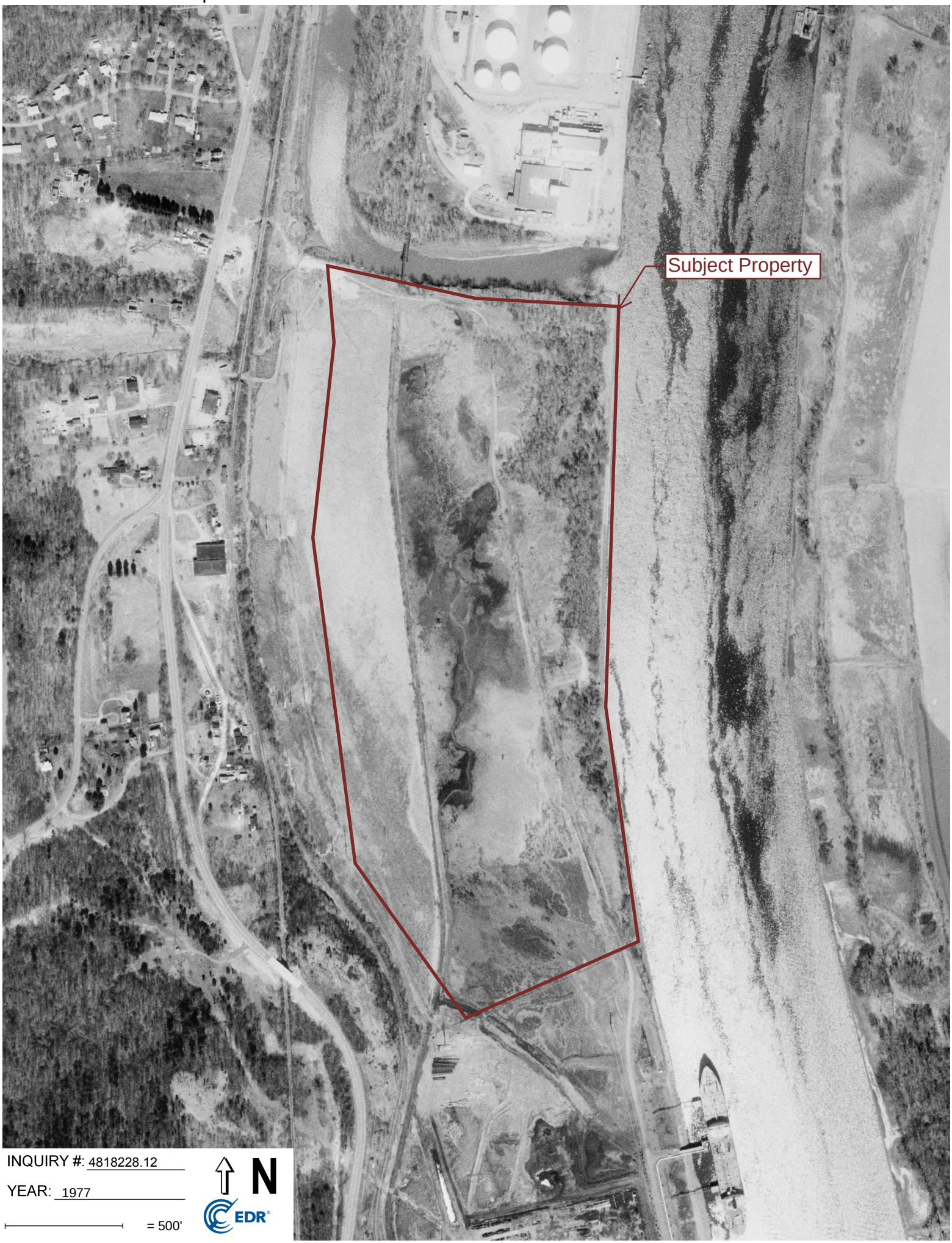
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Subject Property
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= 500'
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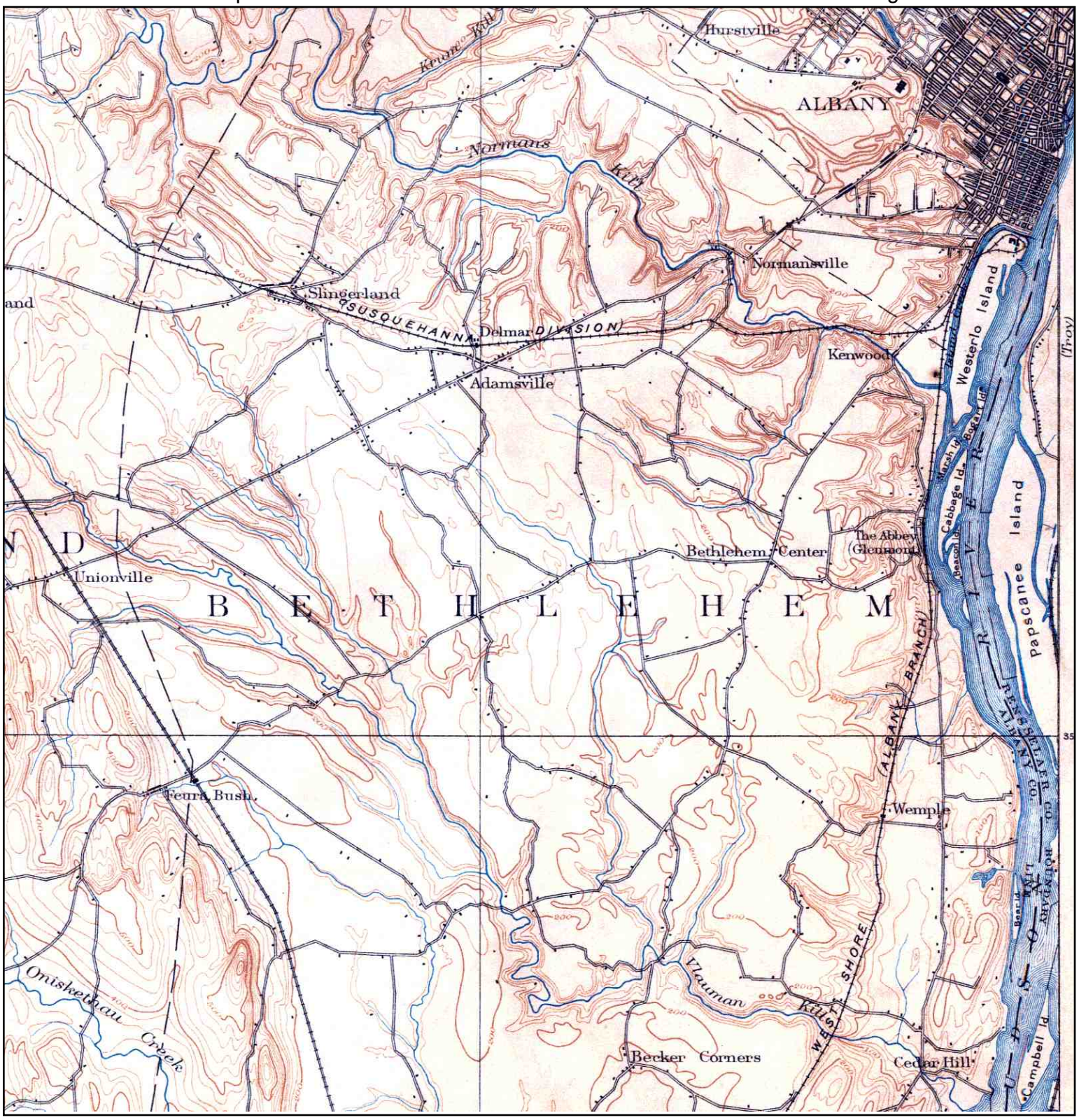
EDR

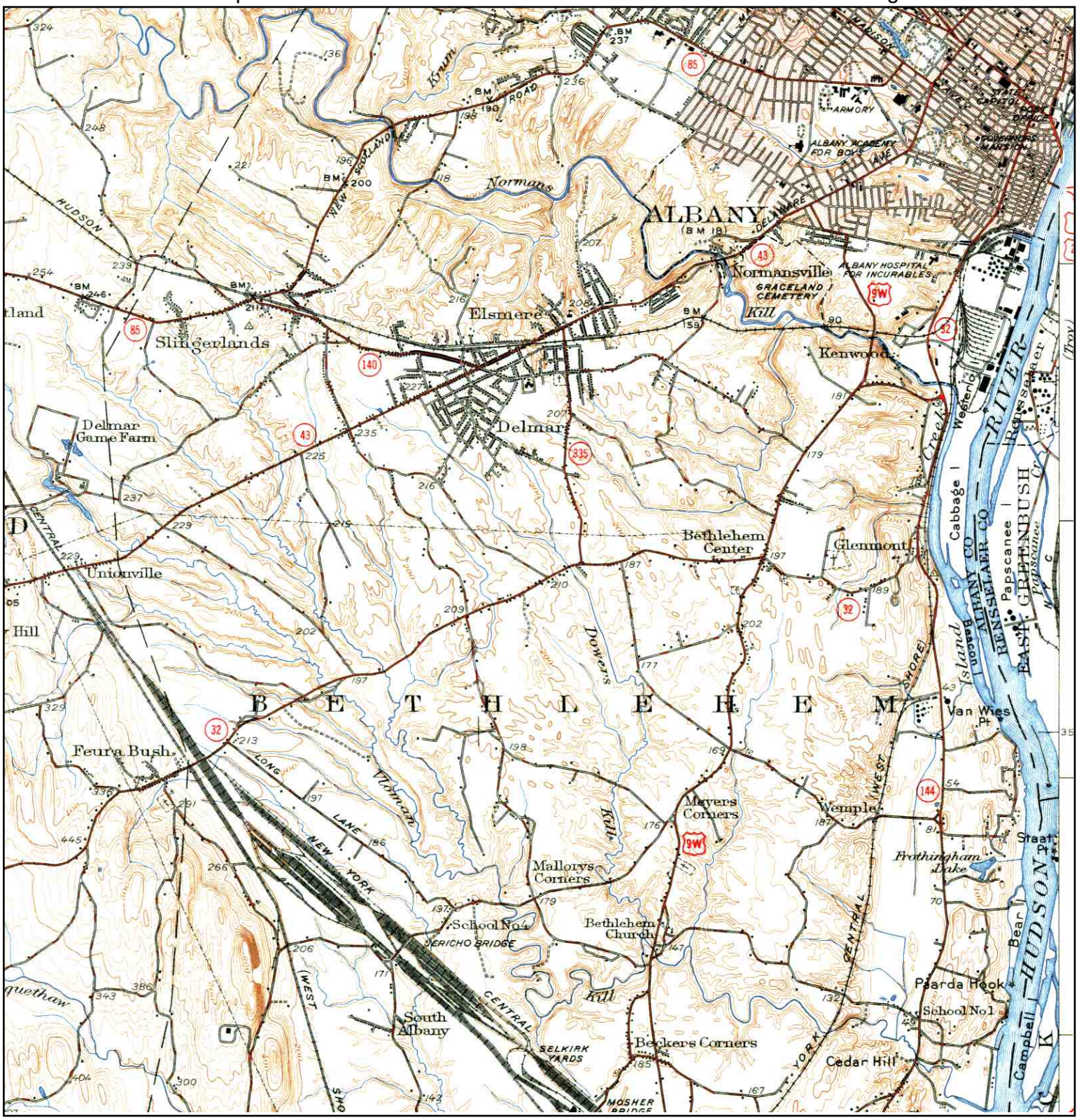
Historical Topographic Map



N	TARGET QUAD NAME: ALBANY MAP YEAR: 1898 SERIES: 15 SCALE: 1:62500	SITE NAME: Beacon Harbor ADDRESS: River Road Glenmont, NY 12077 LAT/LONG: 42.6012 / -73.7646	CLIENT: Empire Zero CONTACT: Phil Holloway INQUIRY#: 3310051.4 RESEARCH DATE: 04/25/2012

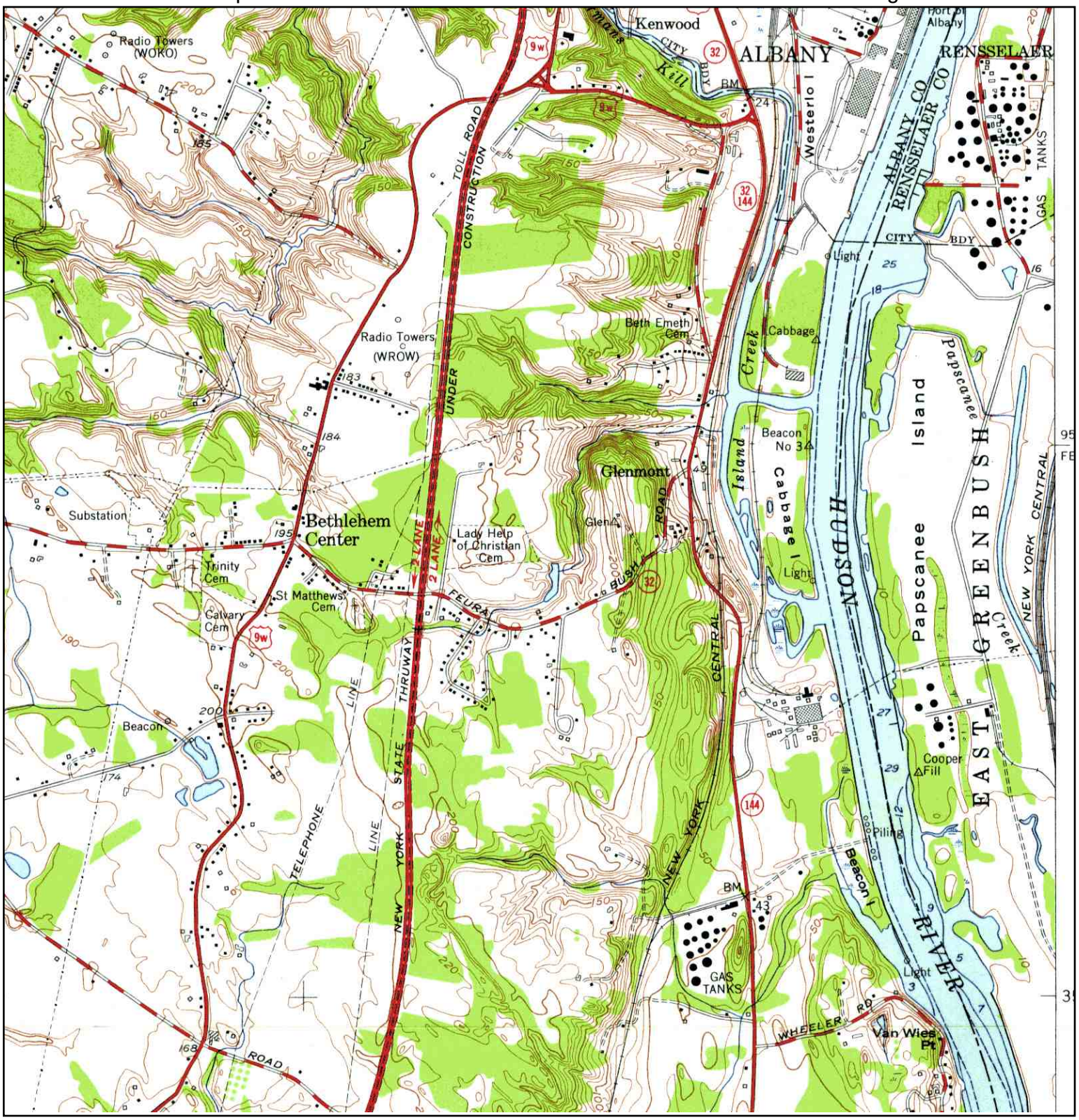
N	TARGET QUAD NAME: ALBANY MAP YEAR: 1927 SERIES: 15 SCALE: 1:62500	SITE NAME: Beacon Harbor ADDRESS: River Road Glenmont, NY 12077 LAT/LONG: 42.6012 / -73.7646	CLIENT: Empire Zero CONTACT: Phil Holloway INQUIRY#: 3310051.4 RESEARCH DATE: 04/25/2012

Obtained from Phase I ESA Report by Bergmann, Dated 01-27-17



N	TARGET QUAD NAME: ALBANY MAP YEAR: 1950 SERIES: 15 SCALE: 1:62500	SITE NAME: Beacon Harbor ADDRESS: River Road Glenmont, NY 12077 LAT/LONG: 42.6012 / -73.7646	CLIENT: Empire Zero CONTACT: Phil Holloway INQUIRY#: 3310051.4 RESEARCH DATE: 04/25/2012

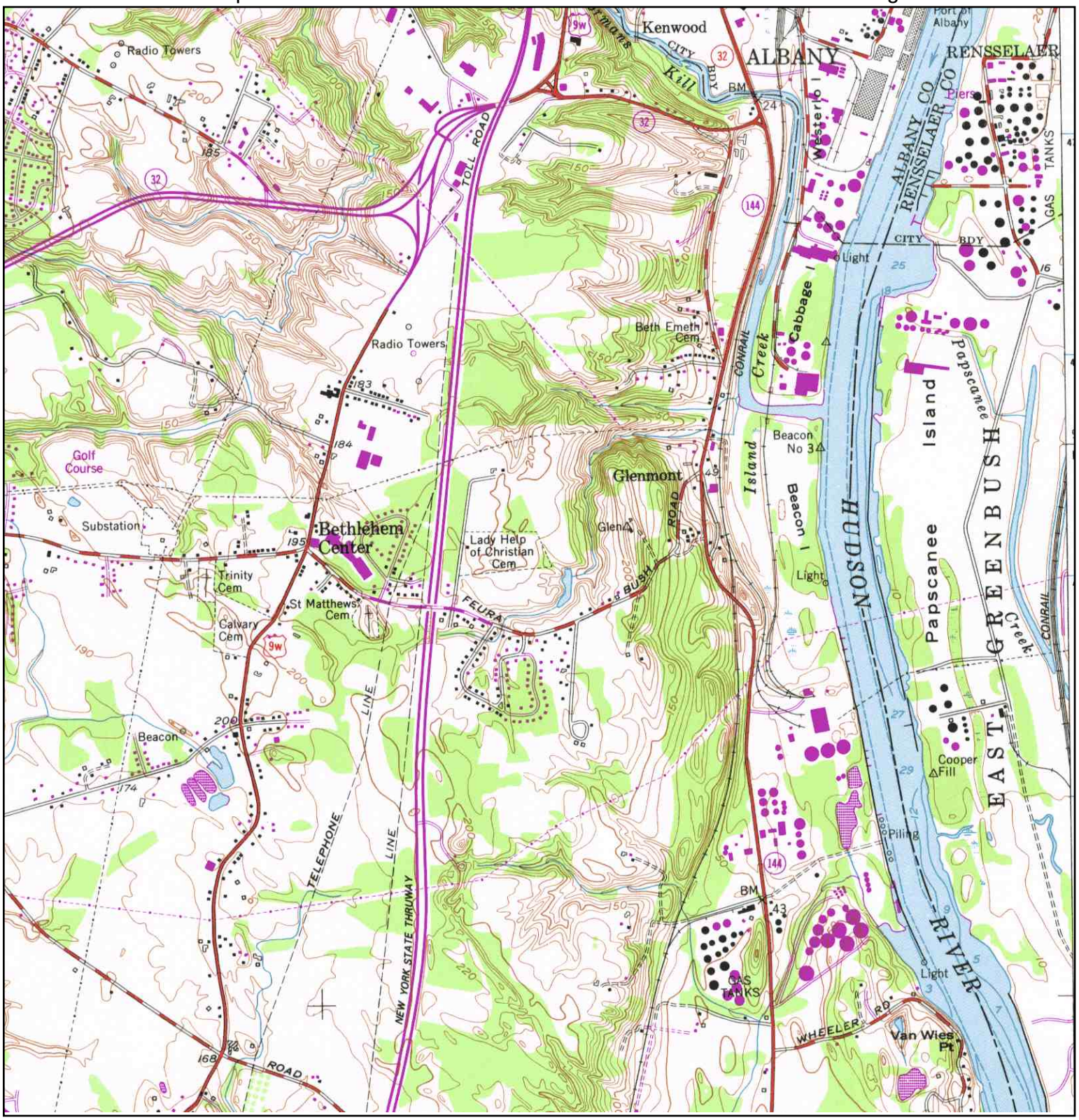
Historical Topographic Map



N	TARGET QUAD NAME: DELMAR MAP YEAR: 1953 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Beacon Harbor ADDRESS: River Road Glenmont, NY 12077 LAT/LONG: 42.6012 / -73.7646	CLIENT: Empire Zero CONTACT: Phil Holloway INQUIRY#: 3310051.4 RESEARCH DATE: 04/25/2012

Obtained from Phase I ESA Report by Bergmann, Dated 01-27-17

Historical Topographic Map



N	TARGET QUAD NAME: DELMAR MAP YEAR: 1980 PHOTOREVISED FROM :1953 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Beacon Harbor ADDRESS: River Road Glenmont, NY 12077 LAT/LONG: 42.6012 / -73.7646	CLIENT: Empire Zero CONTACT: Phil Holloway INQUIRY#: 3310051.4 RESEARCH DATE: 04/25/2012

Obtained from Phase I ESA Report by Bergmann, Dated 01-27-17

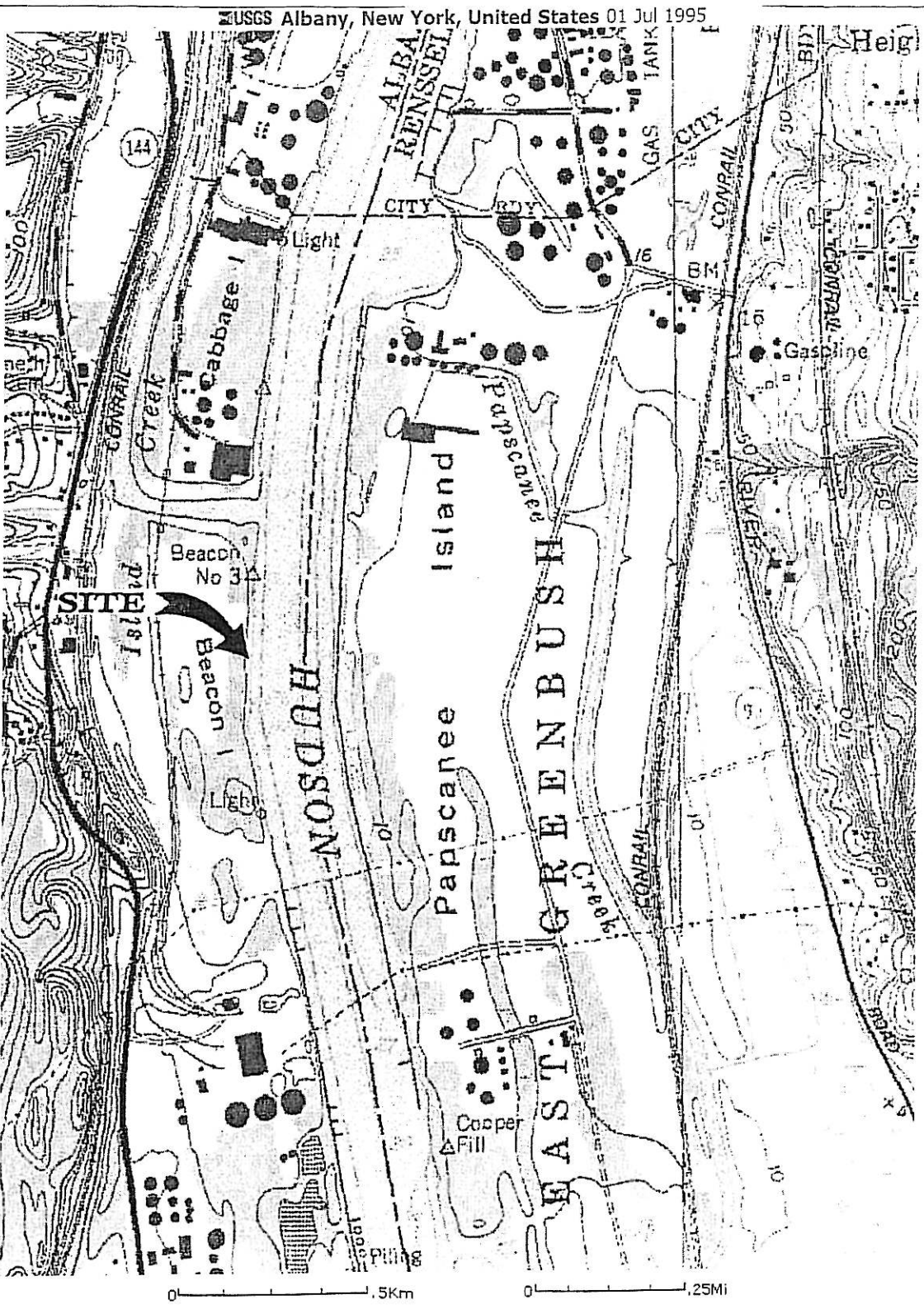
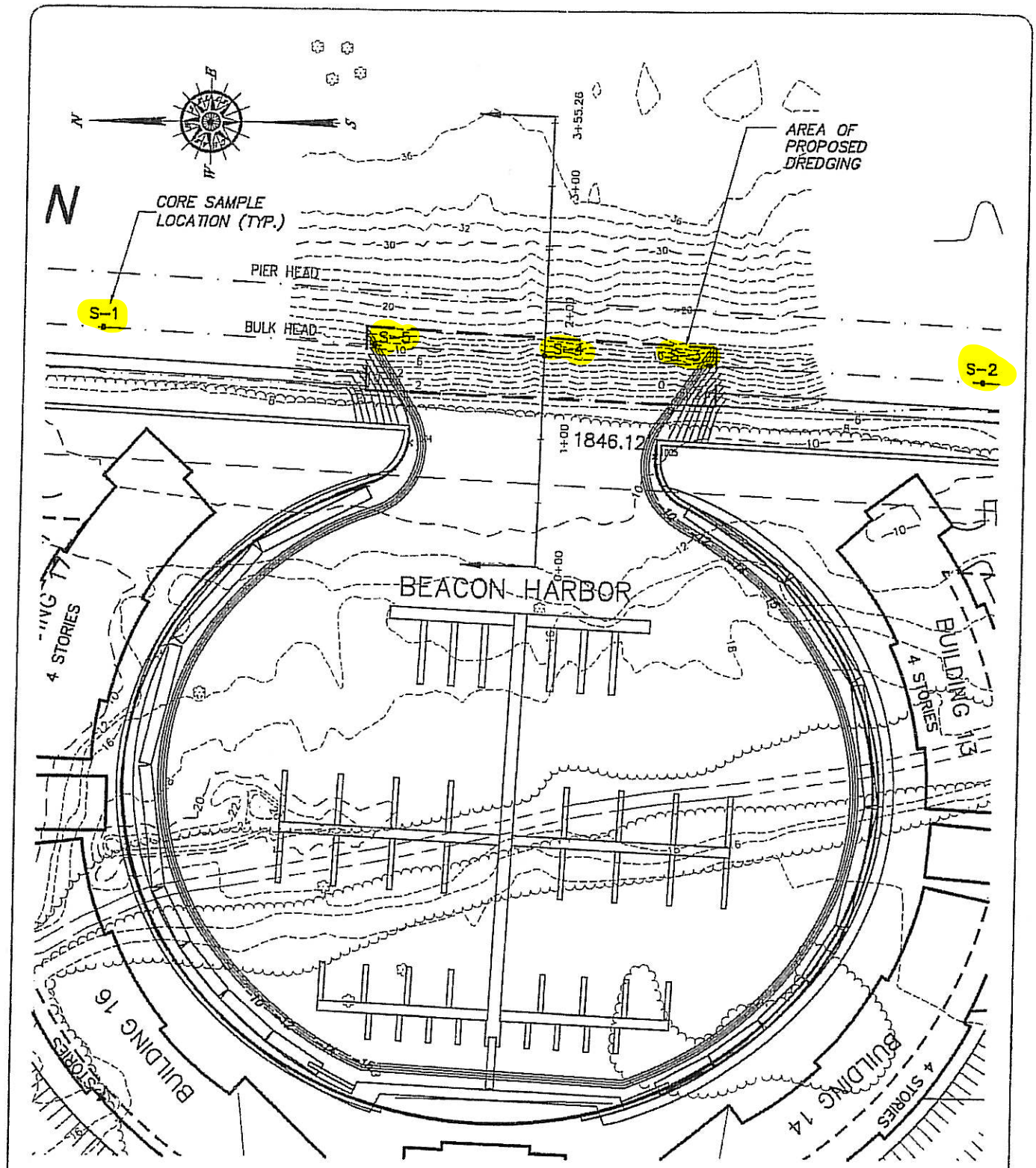


Image courtesy of the U.S. Geological Survey

OP-TECH Environmental Services, Inc.	
Beacon Harbor Site Location Map Bethlehem, NY	Date: June 2007 FIGURE 1



CHAS. H. SELLS, INC.
Consulting Engineers, Surveyors & Photogrammetrists
CIVIL, STRUCTURAL AND TRANSPORTATION ENGINEERING
7 WASHINGTON SQUARE
ALBANY, NEW YORK 12205
518-452-3545 FAX 518-452-3755

Unauthorized alteration or addition to this map is a violation of section 7209, sub-division 2 of the New York State Education Law. Only copies from the original of this map bearing an original signature and the embossed seal of the preparer shall be considered to be true and valid copies.

N.Y.S. Lic. No. 49,454
Michael I. Groff, P.L.S.

BEACON HARBOR

ROUTE 144

TOWN OF BETHLEHEM • ALBANY COUNTY • NEW YORK

CORE SAMPLE LOCATION

Date: August 7, 2007 | Scale: 1" = 100' | Cadd: coresample.dwg

OP-TECH ENVIRONMENTAL SERVICES

10 Walker Way
Albany, New York 12205

Sediment Core 1

Location:	15-ft from shoreline stake Beacon Harbor Bethlehem, New York	Drill Rig:	Geoprobe	Bore Hole/Well Data Diam. (in.): 2	Water Depth 10
		Drill Method:	FLUSH CASING	Depth (ft): 16	
		Driller:	Zebra		
		Logged By:	P. Holloway		
	73° 45' 48.1"	Sample Type:	2-inch Macrocore		
Coordinates	**42° 36' 11.0"**	Date: 8/29/07	Weather: Sunny 80	Boring Number: 1	DTW (ft):

Depth Below Mudline	P.I.D. Readings (ppm)	Recovery (%)	Field Description of Soil:	Drillers Remarks:
0				Core pushed 0 ft to 4.0 ft
				(top of mudline was coverd with boulders)
			Gray medium sand; some fine sand tr silt;	
4		80%	laminated	
				laminations
8		75%	Same; with tr fine gravel	
12		75%	Same	
16		100%	Same	
				Samples submitted for analysis composite from 0 to 12 feet

OP-TECH ENVIRONMENTAL SERVICES

10 Walker Way
Albany, New York 12205

Sediment Core S-2

Location:	15-ft from shoreline stake Beacon Harbor Bethlehem, New York	Drill Rig: Geoprobe Drill Method: FLUSH CASING Driller: Zebra Logged By: P. Holloway Sample Type: 2-inch Macrocore Date: 8/29/07 Weather: Sunny 80	Bore Hole/Well Data Diam. (in.): 2 Water Depth 14 Depth (ft): 16 Boring Number: 2 DTW (ft):
Coordinates	73° 45' 47.2" 42° 36' 3.6"		

Depth Below Mudline	P.I.D. Readings (ppm)	Recovery (%)	Field Description of Soil:	Drillers Remarks:
0				Core pushed 0 ft to 4.0 ft
				(top of mudline was coverd with boulders)
			Gray medium sand; some fine sand tr silt;	
4		100%	laminated	
				laminations
8		80%	Same; with tr fine gravel	
12		100%	Same; tr fine gravel	
16		50%	Same	lost some of sample from retrieval
				Samples submitted for analysis composite from 0 to 12 feet

OP-TECH ENVIRONMENTAL SERVICES

10 Walker Way
Albany, New York 12205

Sediment Core S-3

Location:	15-ft from shoreline stake Beacon Harbor Bethlehem, New York	Drill Rig: Geoprobe Drill Method: FLUSH CASING Driller: Zebra Logged By: P. Holloway Sample Type: 2-inch Macrocore Date: 8/29/07 Weather: Sunny 80	Bore Hole/Well Data Diam. (in.): 2 Water Depth 12 Depth (ft): 16 Boring Number: 3 DTW (ft):
Coordinates	73° 45' 47.8" 42° 36' 5.2"		

Depth Below Mudline	P.I.D. Readings (ppm)	Recovery (%)	Field Description of Soil:	Drillers Remarks:
0				(top of mudline was clear)
4		75%	Gray medium sand; some fine sand tr silt; laminated	laminations
8		100%	Same;	
12		90%	Same	laminations
16		75%	Same; tr fine gravel	Samples submitted for analysis composite from 0 to 12 feet (Duplicate S-3d)

OP-TECH ENVIRONMENTAL SERVICES

10 Walker Way
Albany, New York 12205

Sediment Core S-4

Location:	15-ft from shoreline stake Beacon Harbor Bethlehem, New York	Drill Rig:	Geoprobe	Bore Hole/Well Data Diam. (in.):	2 Water Depth 14
		Drill Method:	FLUSH CASING	Depth (ft):	16
		Driller:	Zebra		
		Logged By:	P. Holloway		
	73° 45' 48.1"	Sample Type:	2-inch Macrocore		
Coordinates	**42° 36' 7.1"**	Date: 8/29/07	Weather: Sunny 80	Boring Number:	4 DTW (ft):

Depth Below Mudline	P.I.D. Readings (ppm)	Recovery (%)	Field Description of Soil:	Drillers Remarks:
0				(top of mudline was with some boulders)
			Gray medium sand; some fine sand tr silt;	
4		75%	laminated; tr fine gravel	laminations
8		75%	Same;	
12		100%	Same; tr fine gravel	laminations
16		100%	Same; tr fine gravel	Samples submitted for analysis composite from 0 to 12 feet

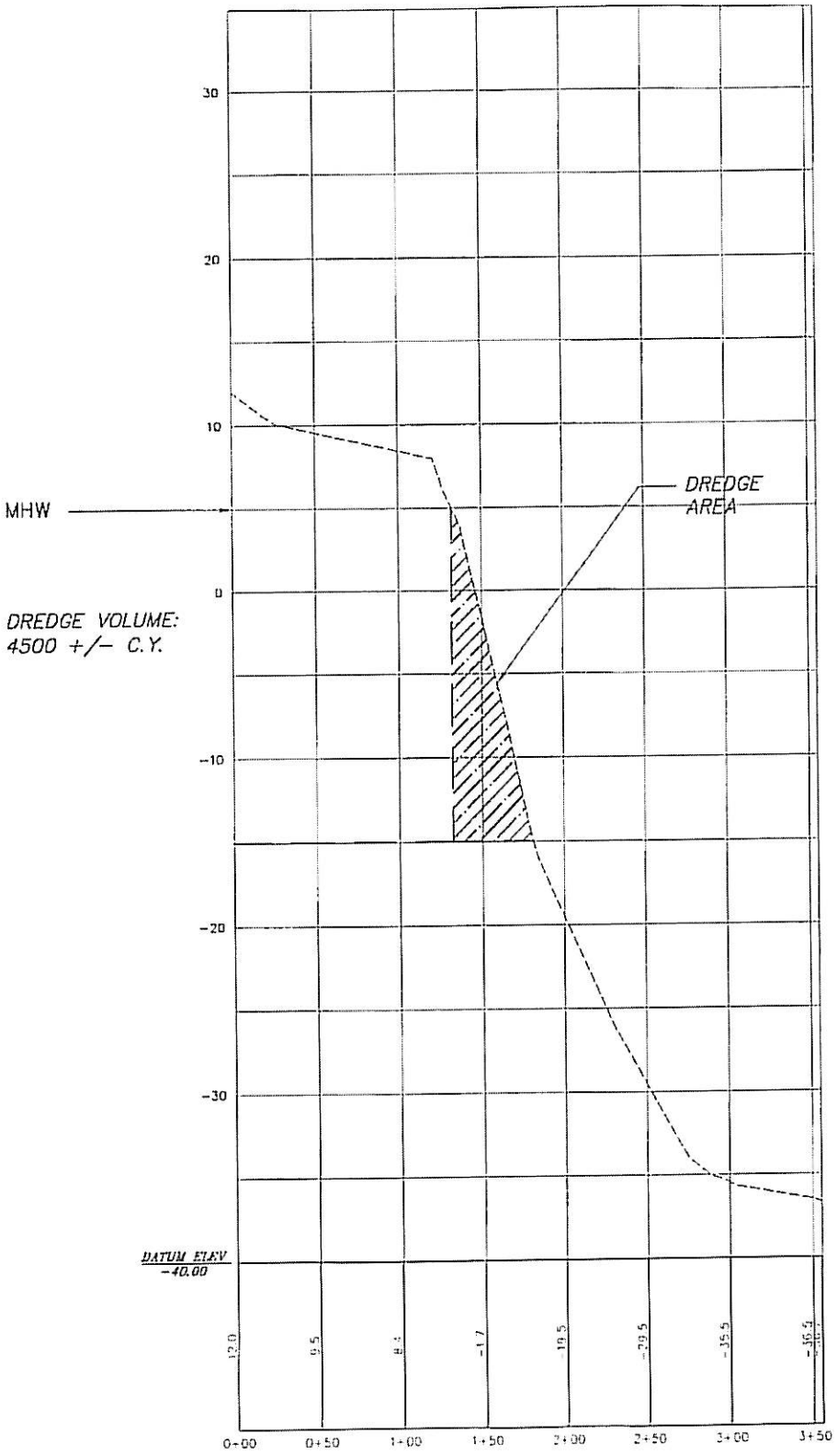
OP-TECH ENVIRONMENTAL SERVICES

10 Walker Way
Albany, New York 12205

Sediment Core S-5

Location:	15-ft from shoreline stake Beacon Harbor Bethlehem, New York	Drill Rig: Geoprobe Drill Method: FLUSH CASING Driller: Zebra Logged By: P. Holloway Sample Type: 2-inch Macrocore Date: 8/29/07 Weather: Sunny 80	Bore Hole/Well Data Diam. (in.): 2 Water Depth 8 Depth (ft): 16 Boring Number: 5 DTW (ft):
Coordinates	73° 45' 48.2" 42° 36' 8.9"		

Depth Below Mudline	P.I.D. Readings (ppm)	Recovery (%)	Field Description of Soil:	Drillers Remarks:
0				(top of mudline was covered with boulders)
			Gray medium sand; some fine sand tr silt;	
4		100%	laminated; tr fine gravel	laminations
8		100%	Same;	
12		100%	Same;	laminations
16		75%	Same; tr fine gravel	Samples submitted for analysis composite from 0 to 12 feet



DREDGING AREA PROFILE

CHAS. H. SELLS, INC.
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Michael L. Groff, P.L.S.

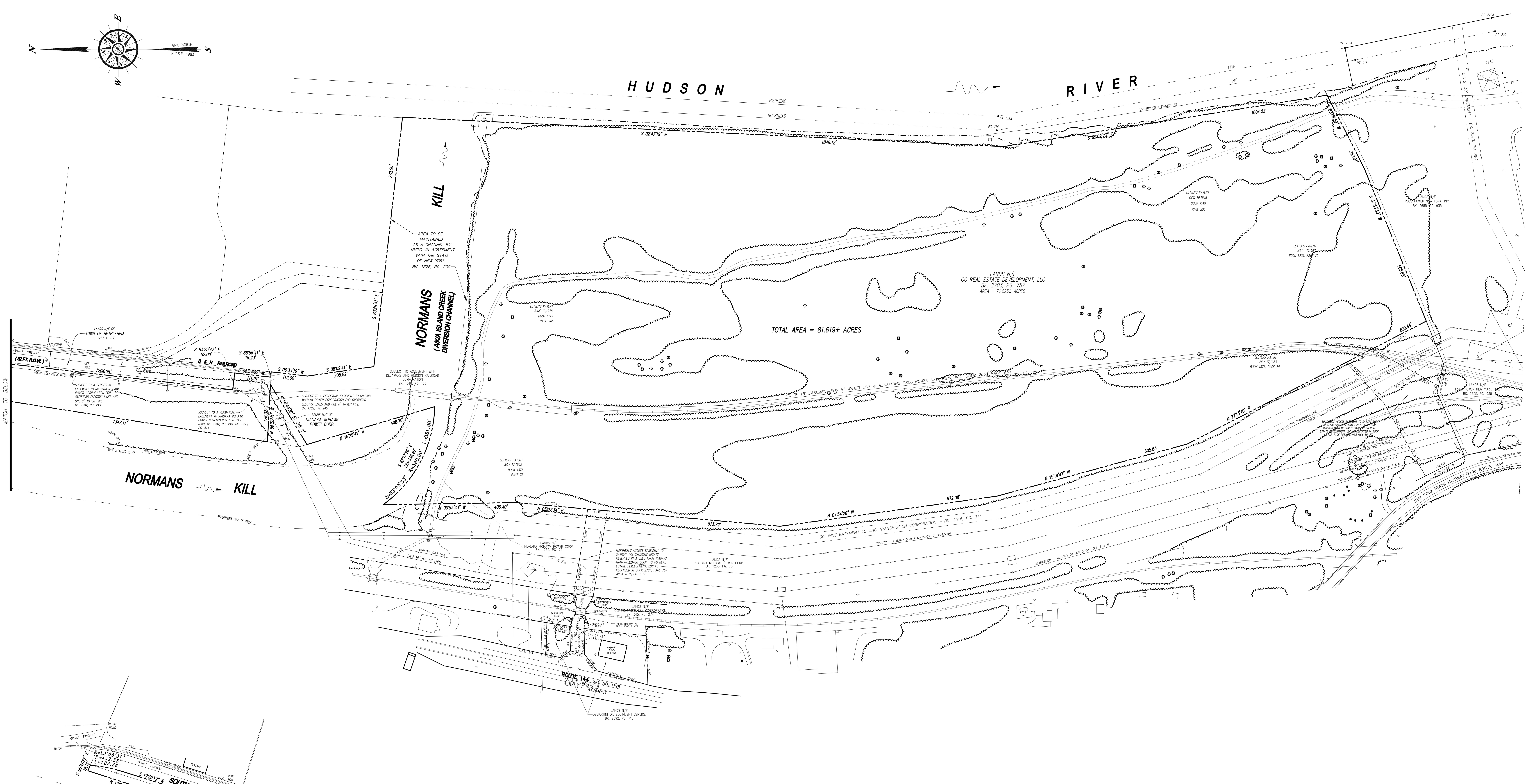
BEACON HARBOR

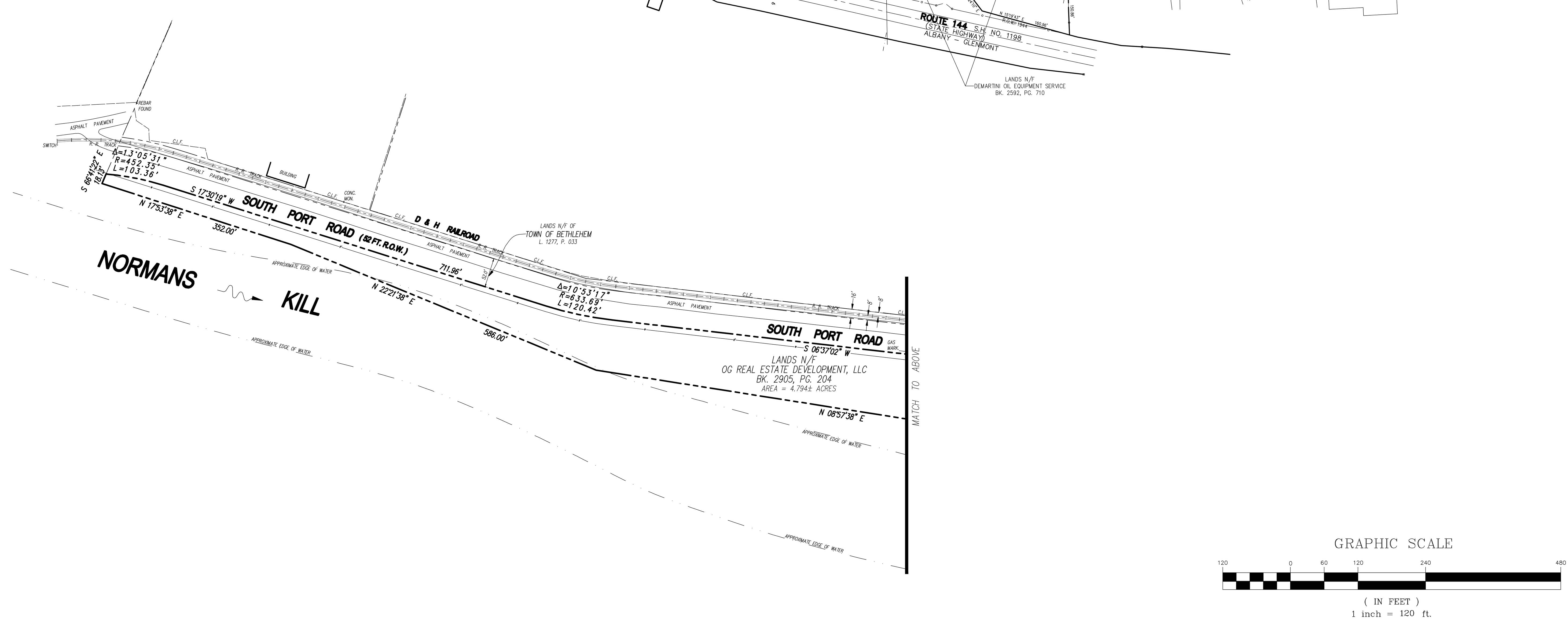
ROUTE 144

TOWN OF BETHLEHEM • ALBANY COUNTY • NEW YORK

PROPOSED DREDGING AREA

Date: August 7, 2007 | Scale: 1" = 100' | Cadd: prelim2





NOTES:

1. UNDERGROUND UTILITIES SHOWN HEREON BASED ON UTILITY EVIDENCE VISIBLE AT GROUND SURFACE AND RECORD DRAWINGS AND ARE SUBJECT TO FIELD VERIFICATION BY EXCAVATION.

2. UTILITIES SHOWN DO NOT PURPORT TO CONSTITUTE OR REPRESENT ALL UTILITIES LOCATED UPON OR ADJACENT TO THE SURVEYED PREMISES.

3. THE OFFSETS OR DIMENSIONS SHOWN HEREON, FROM THE PROPERTY LINES TO THE STRUCTURES, ARE FOR A SPECIFIC PURPOSE AND USE; THEREFORE, THEY ARE NOT INTENDED TO MONUMENT THE PROPERTY LINES OR TO GUIDE THE ERECTION OF FENCES, ADDITIONAL STRUCTURES, OR ANY OTHER IMPROVEMENT.

4. EASEMENTS AND/OR SUBSURFACE STRUCTURES RECORDED OR UNRECORDED ARE NOT GUARANTEED UNLESS PHYSICALLY EVIDENT ON THE PREMISES AT THE TIME OF THE SURVEY.

5. SUBJECT TO ALL RIGHTS, EASEMENTS, COVENANTS AND RESTRICTIONS OF RECORD.

6. FIRST AMERICAN TITLE INSURANCE COMPANY OF NEW YORK CERTIFICATE OF TITLE INSURANCE NO. 852-A-09965 USED TO PROVIDE RECORD INFORMATION REGARDING TITLE FOR THIS PROPERTY.

7. TAX MAP DESIGNATION: 98.00-2-10.023 & 98.01-2-1

MAP REFERENCES:

1. OGS MAP NO. 1916, A MAP OF A SURVEY OF A PORTION OF LANDS TO BE CONVEYED BY NIAGARA MOHAWK POWER CORP. NORTH OF THE ALBANY STEAM STATION, TOWN OF BETHLEHEM, ALBANY COUNTY, NY, DATED DECEMBER 26, 2001.

2. EXISTING CONDITIONS HARBOR AT BEACON POINTE, LANDS OF OG REAL ESTATE DEVELOPERS, LLC, TOWN OF BETHLEHEM, ALBANY COUNTY, NEW YORK, DATED JANUARY 15, 2003, PREPARED BY INGALLS SMART ASSOCIATES.

3. FLOOD INSURANCE RATE MAP PANEL NUMBERS 361540 0011 B & 361540 0013 B, EFFECTIVE DATE JUNE 15, 1983.

4. BOUNDARY AND PARTIAL TOPOGRAPHY SURVEY LANDS NOW OR FORMERLY OF CIBRO BETHLEHEM LAND CORP., TOWN OF BETHLEHEM, ALBANY COUNTY, NEW YORK, DATED OCTOBER 29, 2007, PREPARED BY CHAS. H. SELLS, INC.

CERTIFICATIONS INDICATED HEREON SIGNIFY THAT THIS SURVEY WAS PREPARED IN ACCORDANCE WITH THE EXISTING CODE OF PRACTICE FOR LAND SURVEYORS ADOPTED BY THE N.Y. STATE ASSOCIATION OF PROFFESSIONAL LAND SURVEYORS. SAID CERTIFICATIONS SHALL RUN ONLY TO THE PERSON FOR WHOM THE SURVEY IS PREPARED, AND ON BEHALF TO THE TITLE COMPANY, GOVERNMENTAL AGENCY AND LENDING INSTITUTION LISTED HEREON, AND TO THE ASSIGNEES OF THE LENDING INSTITUTION. CERTIFICATIONS ARE NOT TRANSFERABLE TO ADDITIONAL INSTITUTIONS OR SUBSEQUENT OWNERS.

- OG REAL ESTATE DEVELOPMENT, LLC
- BERKSHIRE BANK, ITS SUCCESSORS AND/OR ASSIGNS
- FIRST AMERICAN TITLE INSURANCE COMPANY OF NEW YORK
- LAWYERS TITLE INSURANCE CORPORATION

DATE	REVISIONS	BY	DATE	REVISIONS	BY

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1 Columbia Circle • Albany, NY 12203 • 518.452.3545
www.wspsells.com

N.Y.S. Lic. No. 49,454

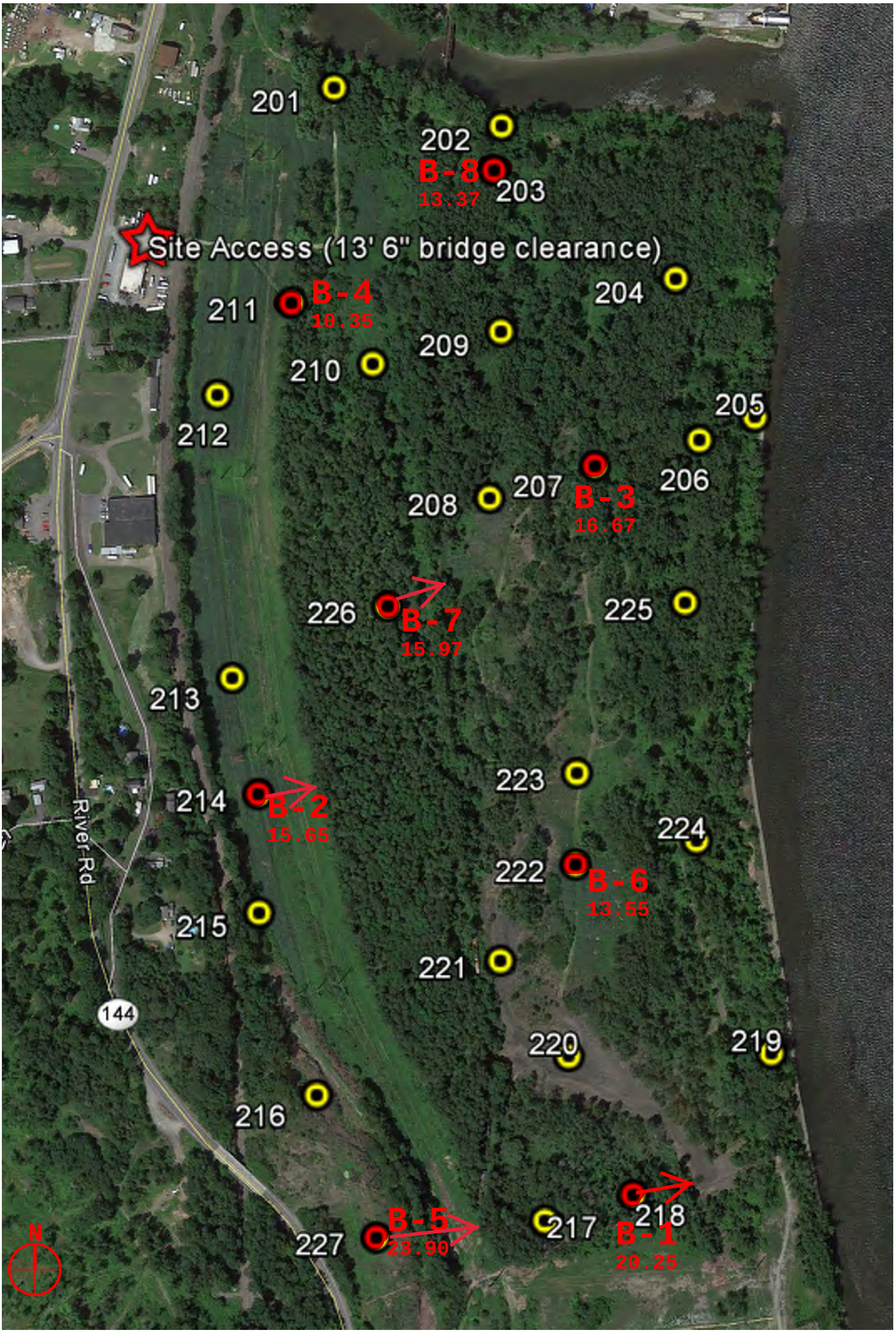
Michael I. Groff, P.L.S.

BOUNDARY SURVEY
SHOWING LANDS N/F OF
OG REAL ESTATE DEVELOPMENT, LLC
TOWN OF BETHLEHEM * ALBANY COUNTY * NEW YORK

Date: September 16, 2009 | Scale: 1" = 120' | Cadd: Harbor Survey

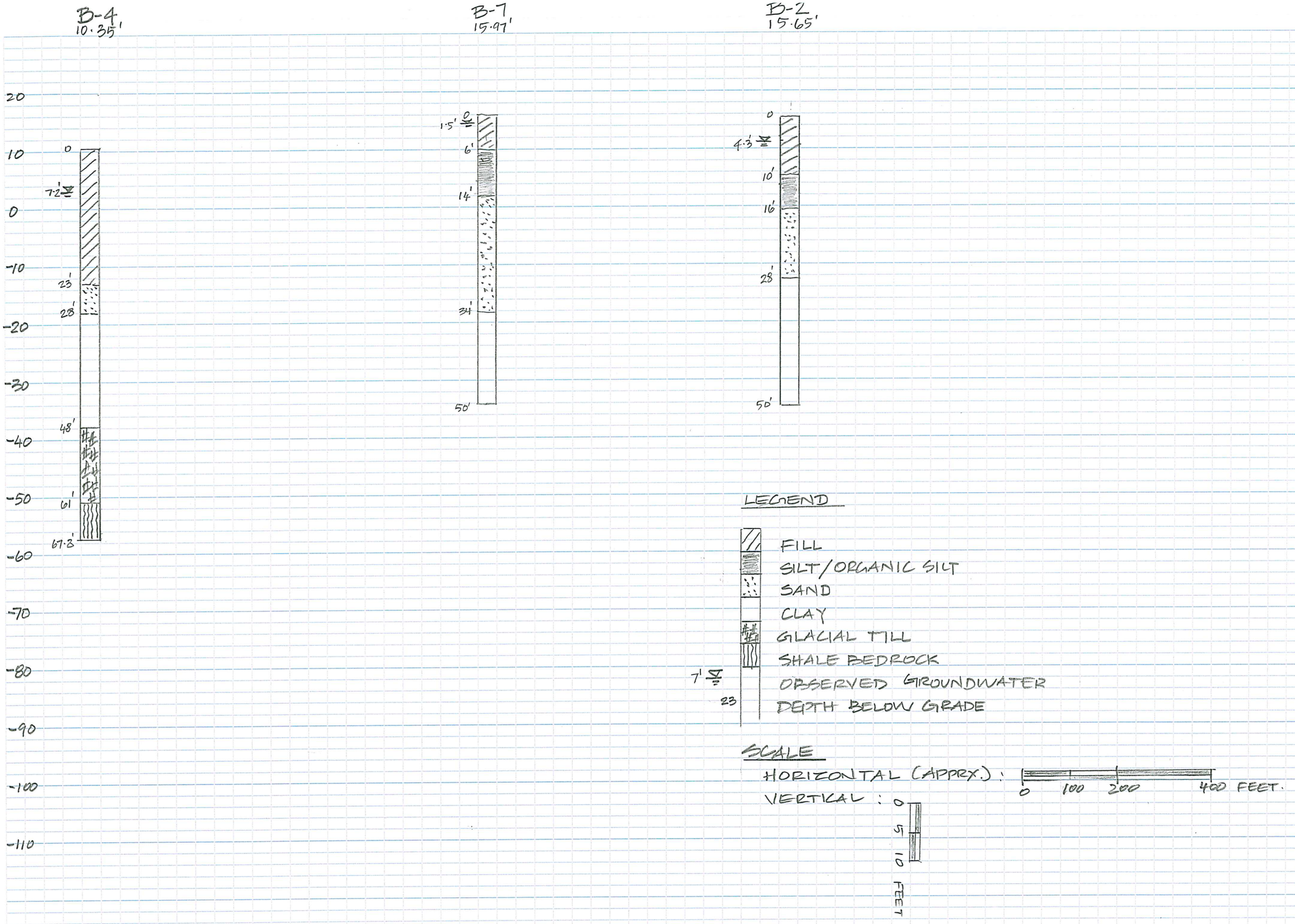
Sheet: 1

Attachment to CME Report Number: 27211B-01-0417

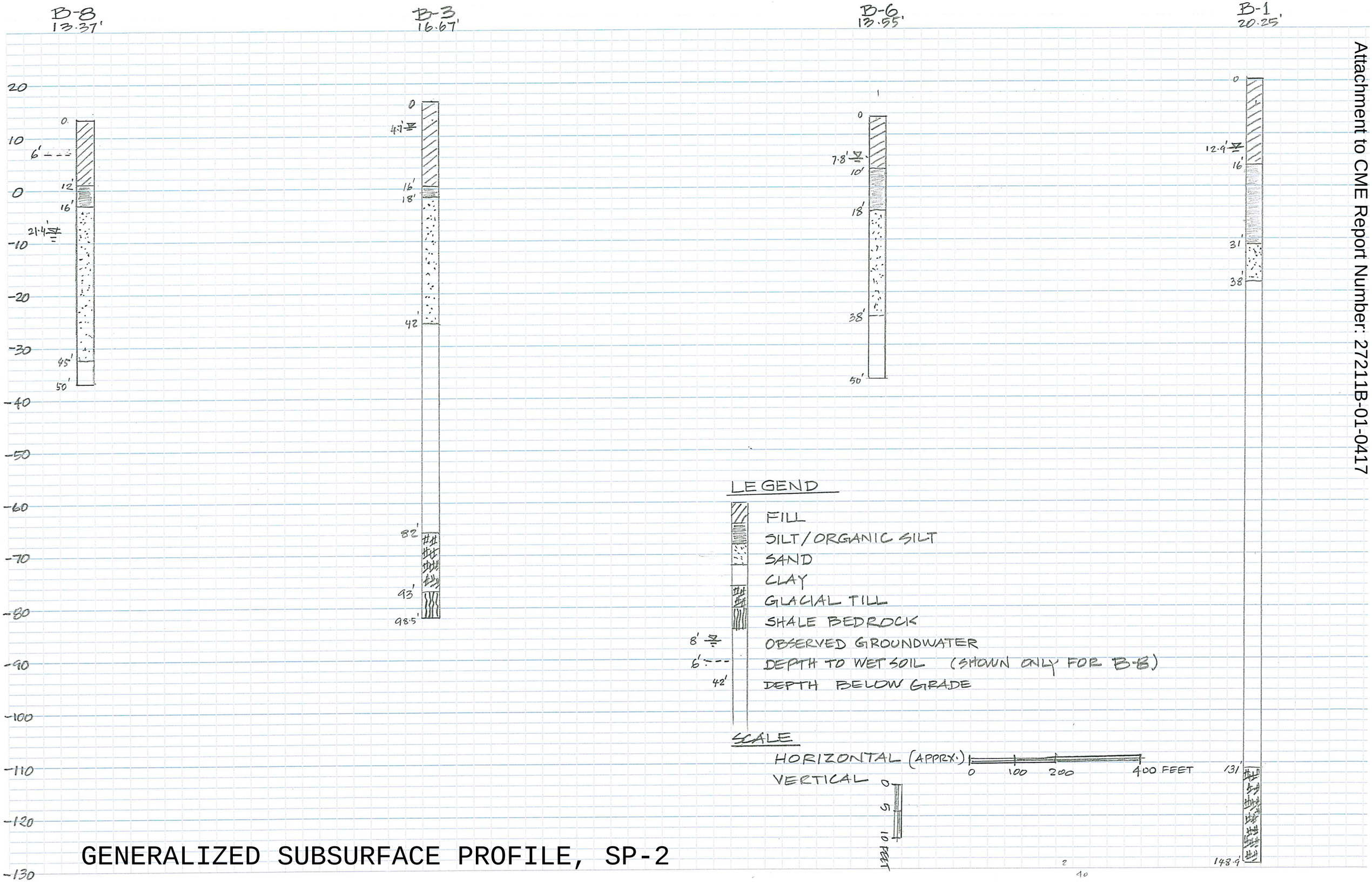


Notes:
1. Boring locations were selected and staked in the field by Bergmann. Please see GPS Coordinates and Elevations Page 1 of 2 for GPS Coordinates and Elevations for Boring locations staked by Bergmann.
2. Boring locations B-1, B-2, B-5 and B-7 were relocated by CME due to assess issues. GPS Coordinates and Elevations for these Borings at the new locations were obtained by CME and given on GPS Coordinates and Elevations Page 2 of 2.

CME EXPLORATION LOCATION PLAN, EX-1 04-01-17



GENERALIZED SUBSURFACE PROFILE, SP-1



GENERALIZED SUBSURFACE PROFILE, SP-2

GPS Coordinates and Elevations

GPS Coordinates and Elevations for original exploration locations staked by Bergmann:

201,1375701.829,689373.031,9.69,TEST PIT
202,1375607.845,689802.825,16.27,SEDIMENT SAMPLE
203,1375494.562,689784.426,13.37,BORE HOLE B-8
204,1375221.355,690252.066,6.78,TEST PIT
205,1374870.439,690457.544,6.99,SEDIMENT SAMPLE
206,1374810.186,690316.155,9.53,TEST PIT
207,1374742.024,690049.050,16.67,BORE HOLE B-3
208,1374657.416,689780.077,11.90,TEST PIT
209,1375082.705,689805.643,17.34,TEST PIT
210,1374997.451,689477.864,10.87,TEST PIT
211,1375151.398,689268.213,10.35,BORE HOLE B-4
212,1374914.513,689080.967,11.41,TEST PIT
213,1374192.404,689125.264,13.46,TEST PIT
214,1373896.974,689194.429,12.53,BORE HOLE B-2
215,1373594.071,689199.319,14.07,TEST PIT
216,1373130.500,689351.124,46.31,TEST PIT
217,1372815.711,689937.463,15.62,TEST PIT
218,1372883.648,690162.477,16.03,BORE HOLE B-1
219,1373247.333,690513.421,11.40,SEDIMENT SAMPLE
220,1373235.646,689994.651,13.86,TEST PIT
221,1373477.204,689817.789,13.33,TEST PIT
222,1373724.330,690007.888,13.55,BORE HOLE B-6
223,1373957.560,690009.580,13.48,TEST PIT
224,1373788.328,690317.516,13.75,TEST PIT
225,1374394.799,690282.696,14.19,TEST PIT
226,1374379.295,689521.551,12.16, BORE HOLE B-7
227,1372769.184,689506.553,70.81,BORE HOLE B-5

GPS Coordinates and Elevations

GPS Coordinates and Elevations for the following Borings were obtained by CME, after relocating from the original locations staked by Bergmann.

B-7
N 42.60359699
E -73.76583635
Elev. 15.97

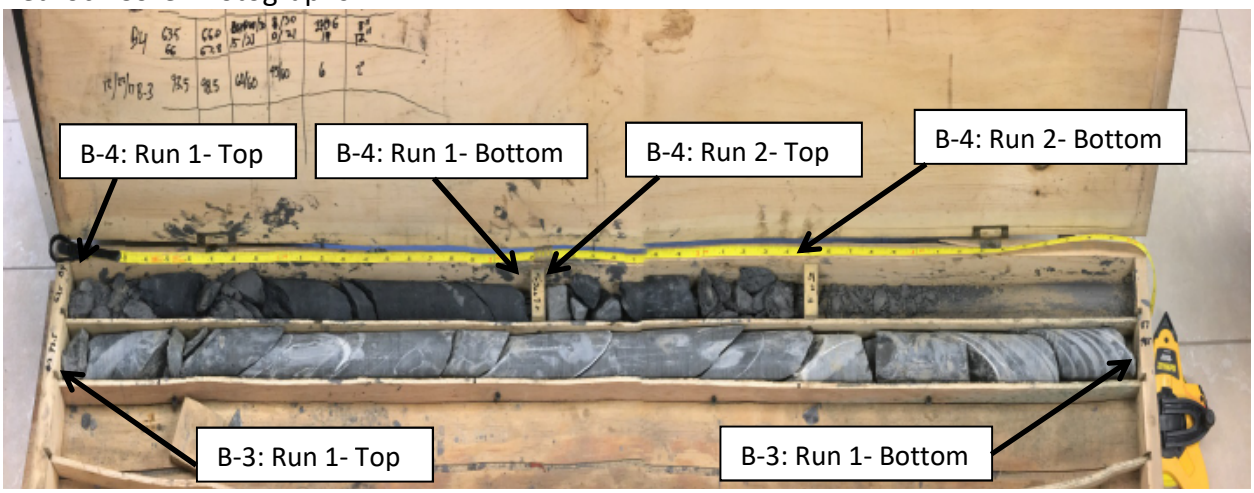
B-1
N 42.59980617
R -73.76390149
Elev. 20.25

B-5
N 42.59933693
E -73.76583477
Elev. 23.90

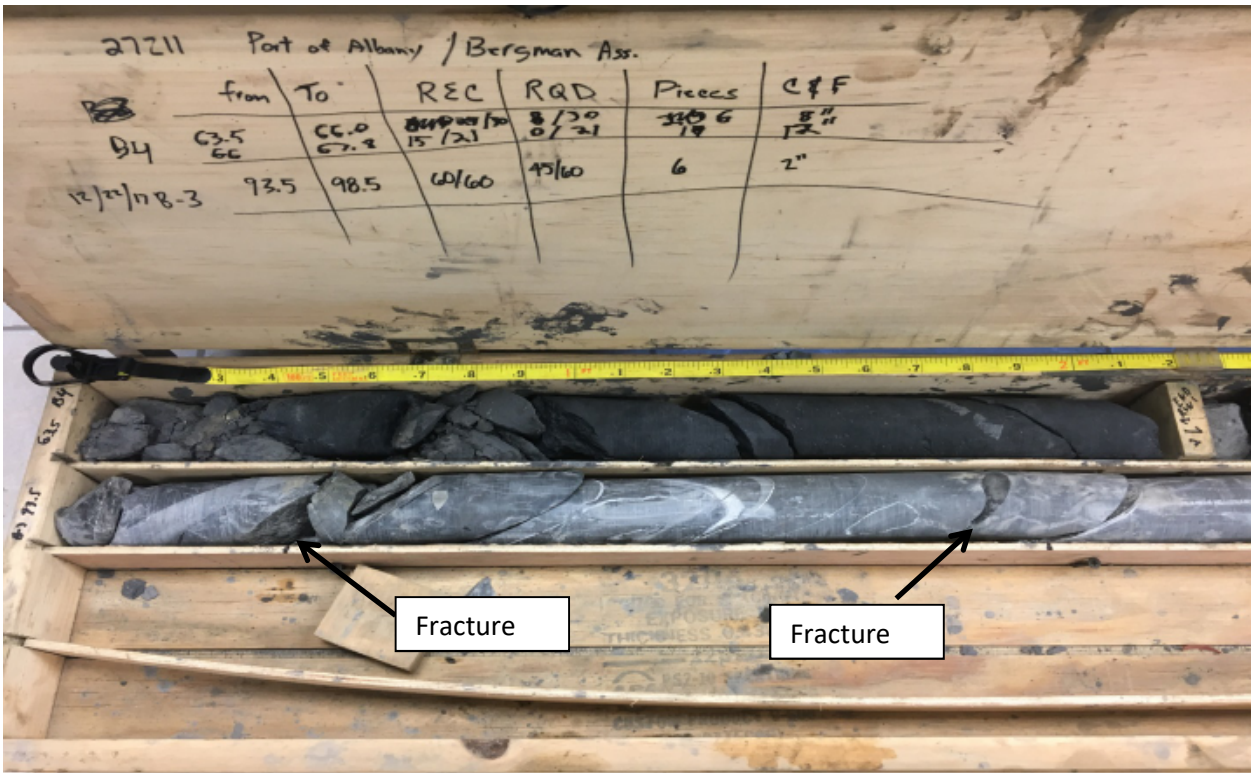
B-2
N 42.60247448
E -73.76751487
Elev. 15.65

Notes:
GPS coordinates were obtained utilizing a Trimble GeoXH system.
Latitude and Longitude are based on the World Geodetic System of 1984 (WGS 1984).
Elevations are based on NAVD 1988.

Attachment to CME Report No. 27211B-01-0417
Bedrock Core Photographs

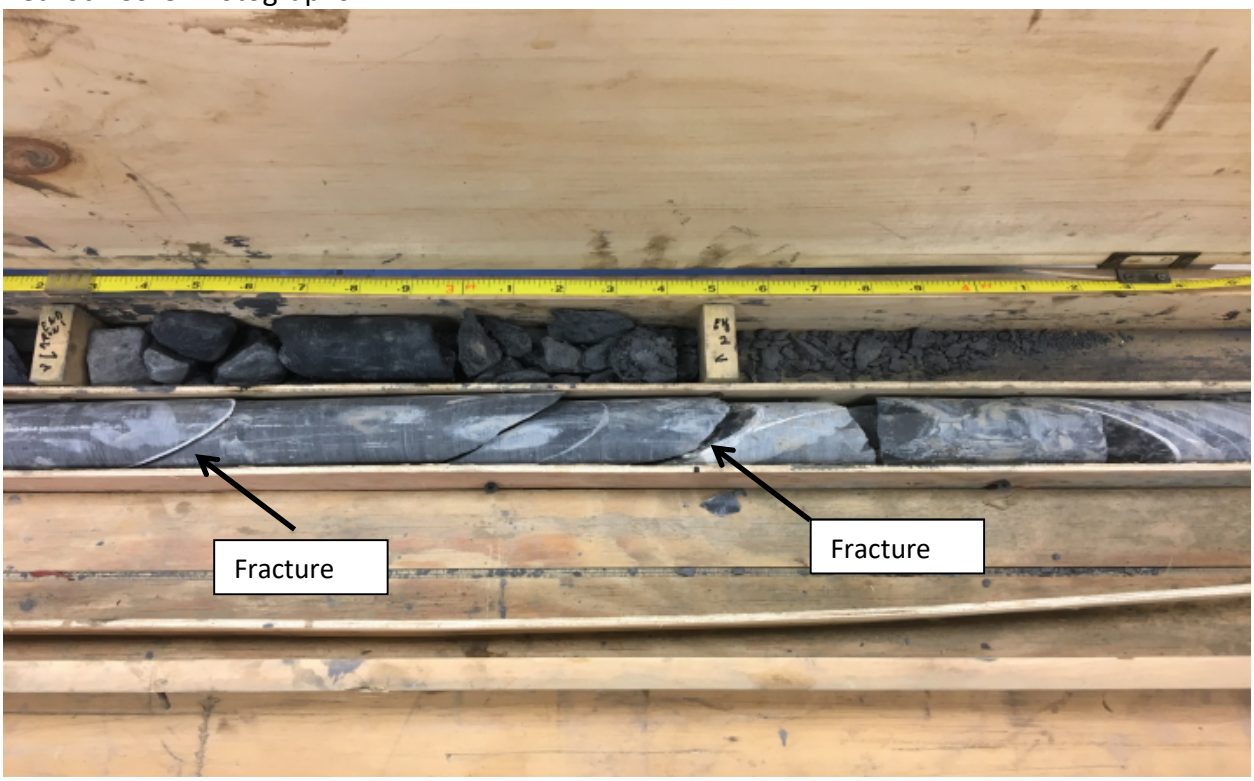


Photograph 1: Boring B-4: Core Run 1 (63.5' – 66.0') and Core Run 2 (66.0' – 67.8'). Note: B-4 core recoveries low.
Boring B-3: Core Run 1 (93.5' – 98.5')

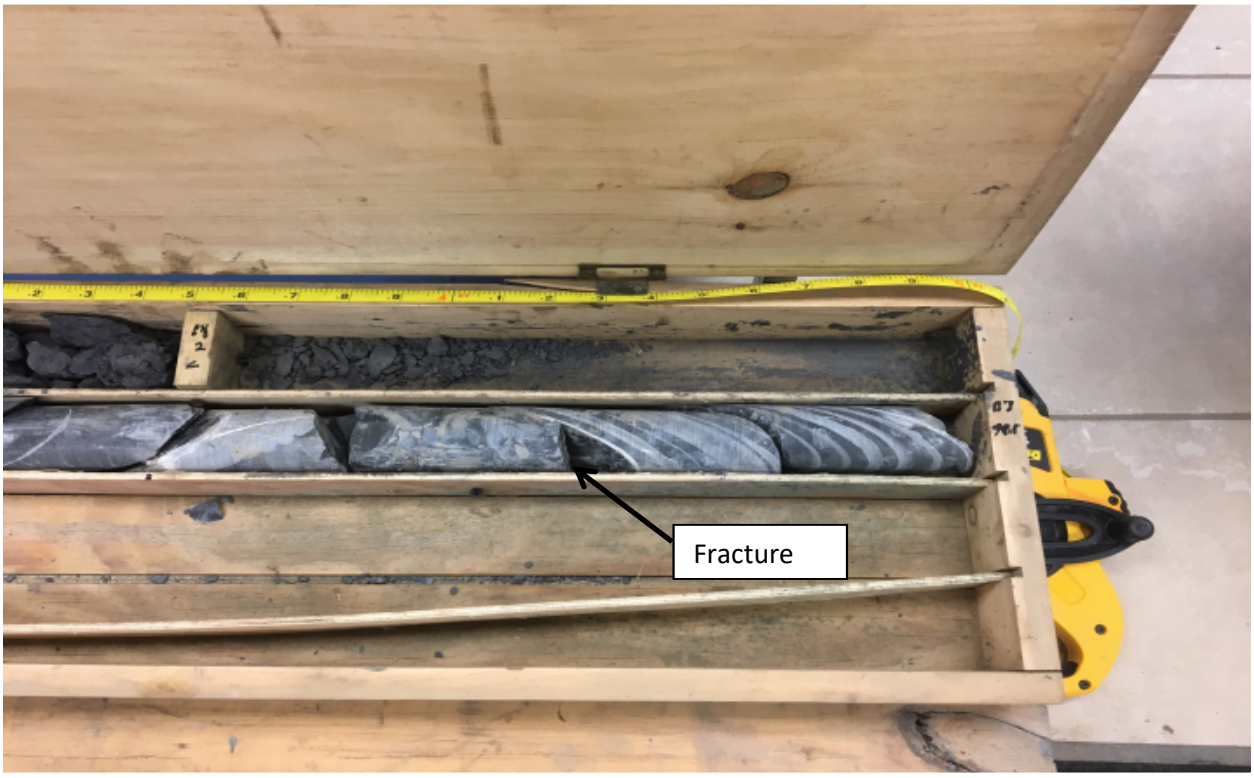


Photograph 2: B-4: Core Run 1 (See Photo No. 1).
B-3 Top of Core Run 1 – 93.5' – 95.5' (See Photo No. 1). High angle fractures at 93.8' and 95.4'

Attachment to CME Report No. 27211B-01-0417
Bedrock Core Photographs



Photograph 3: B-4: Core Run 2 (See Photo No. 1).
B-3 Middle of Core Run 1 – 95.5' – 97.5' (See Photo No. 1). High angle fractures at 95.9' and 97.0'



Photograph 4: B-3 Bottom of Core Run 1 – 97.5' – 98.5' (See Photo No. 1). High angle fracture at 97.8'

CME Associates, Inc.

6035 Corporate Drive
East Syracuse, New York 13057
(315) 701-0522
(315) 701-0526 (Fax)
www.cmeassociates.com

LABORATORY TEST SUMMARY
Port of Albany Expansion Feasibility Project
CME Report No.: 27211L-01-0317
March 22, 2017

CME Representatives obtained soil samples from Test Borings advanced as part of the Subsurface Exploration Program conducted for the subject project. Selected samples were delivered to CME's East Syracuse facility, an AASTHO AMRL[1] accredited laboratory for various laboratory testing. The results are presented below:

Sample ID Notations: B - Test Boring, S – Sample

I. Natural Moisture Content (ASTM D2216)

Sample ID	Natural Moisture (%)
B-1; S-9	47.5
B-1; S-10	50.1
B-1; S-13	22.5
B-1; S-15	43.3
B-1; S-18	28.4
B-1; S-27	26.7
B-8; S-16	30.6

II. Organic Content (ASTM D2974)

Sample ID	Organic Content (%)
B-1; S-9	5.2
B-1; S-10	5.8

III. Atterberg Limits Testing (ASTM D4318)

Sample ID	Liquid Limit	Plastic Limit	Plasticity Index	Natural Moisture (%)
B-1; S-9 (Wet Prep)	51	28	23	47.5
B-1; S-9 (Dry Prep)	38	28	10	47.5
B-1; S-10 (Wet Prep)	59	31	28	50.1
B-1; S-10 (Dry Prep)	41	31	10	50.1
B-1; S-15	48	23	25	43.3
B-1; S-18	30	19	11	28.4
B-1; S-27	26	19	7	26.7
B-8; S-16	36	19	17	30.6

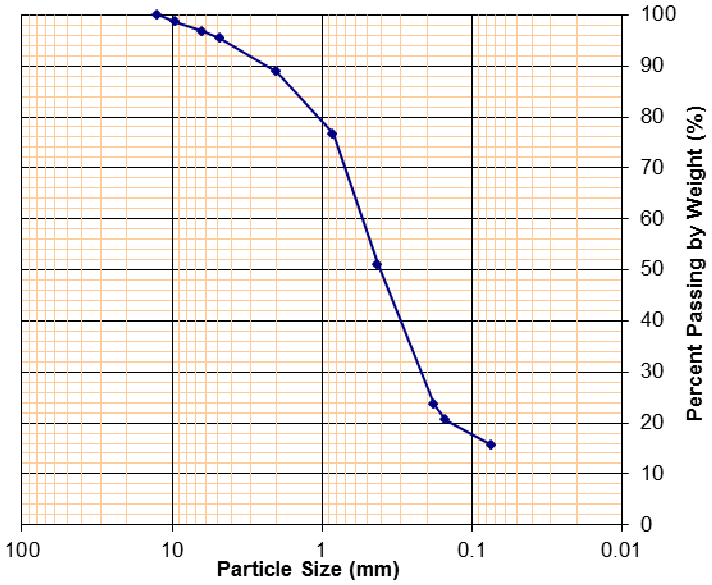
IV. Mechanical Analysis (ASTM D422)

Material Identification
Sample #
B-1;S-13

Classification
Grey cmf SAND, little SILT, trace mf GRAVEL

Sieve Designation	Sieve Size (mm)	Passing by Dry Weight (%)
1/2"	12.5	100
3/8"	9.5	99
1/4"	6.25	97
No.4	4.75	95
No.10	2.00	89
No.20	0.850	77
No.40	0.425	51
No.80	0.180	24
No.100	0.150	21
No.200	0.075	16

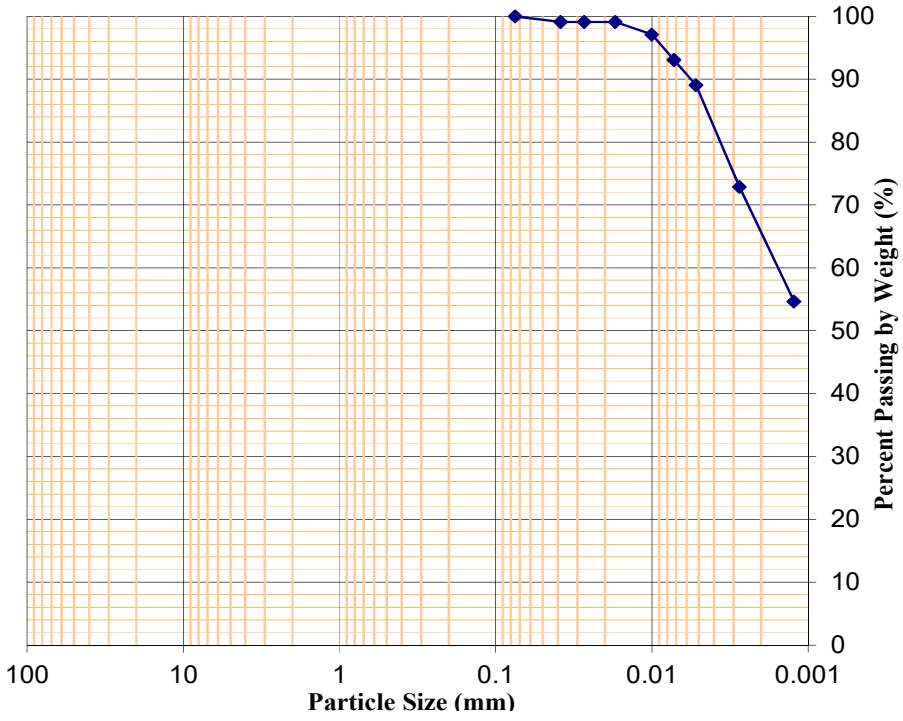
Grain Size Distribution Curve



Material Identification
Sample #
B-1; S-15

Classification
Grey Clay, little SILT

Sieve Designation	Sieve Size (mm)	Percent Passing by Weight (%)
No.200	0.075	100
Hydrometer	0.038	99
	0.027	99
	0.017	99
	0.010	97
	0.007	93
	0.005	89
	0.003	73
	0.001	55

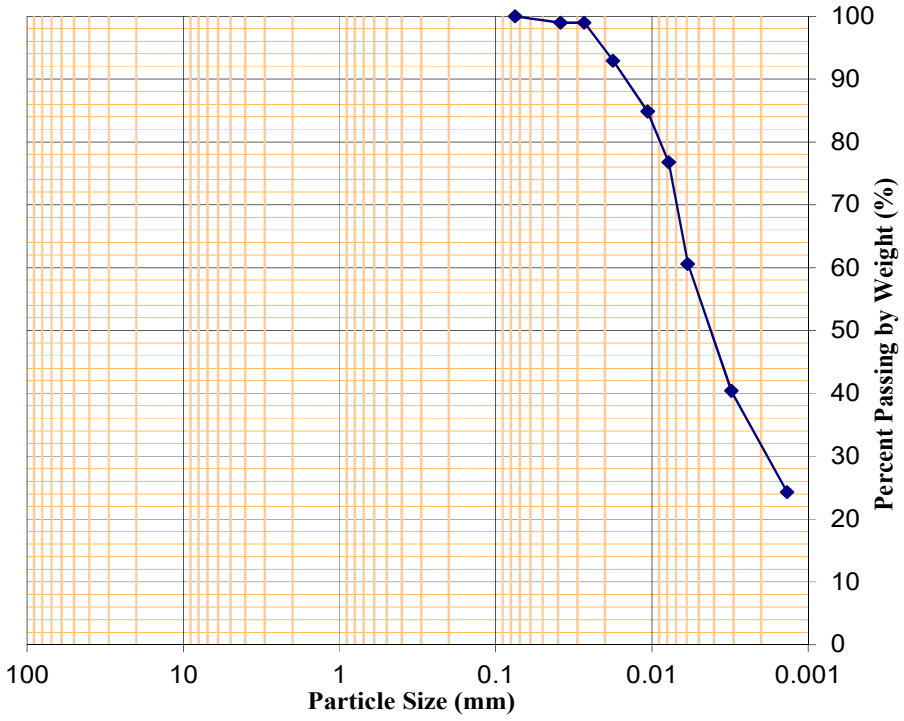


Material Identification

Sample #
B-1; S-18

Sieve Designation	Size (mm)	Percent Passing by Weight (%)
No.200	0.075	100
Hydrometer	0.038	99
	0.027	99
	0.018	93
	0.011	85
	0.008	77
	0.006	61
	0.003	40
	0.001	24

Classification
Grey Clay and SILT

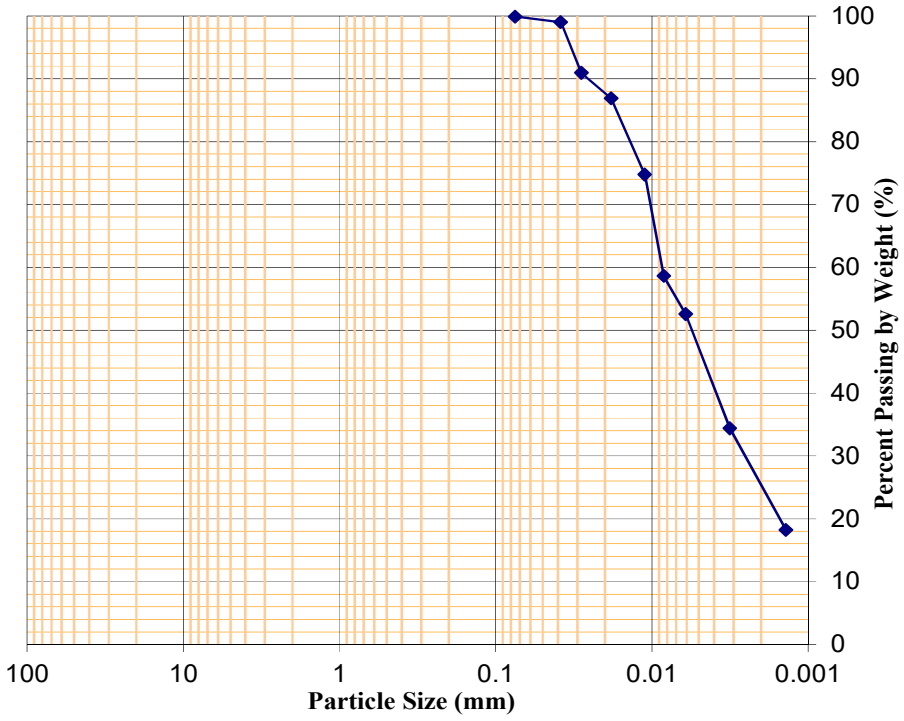


Material Identification

Sample #
B-1; S-27

Sieve Designation	Size (mm)	Percent Passing by Weight (%)
No.200	0.075	100
Hydrometer	0.038	99
	0.028	91
	0.018	87
	0.011	75
	0.008	59
	0.006	53
	0.003	34
	0.001	18

Classification
Grey SILT and CLAY



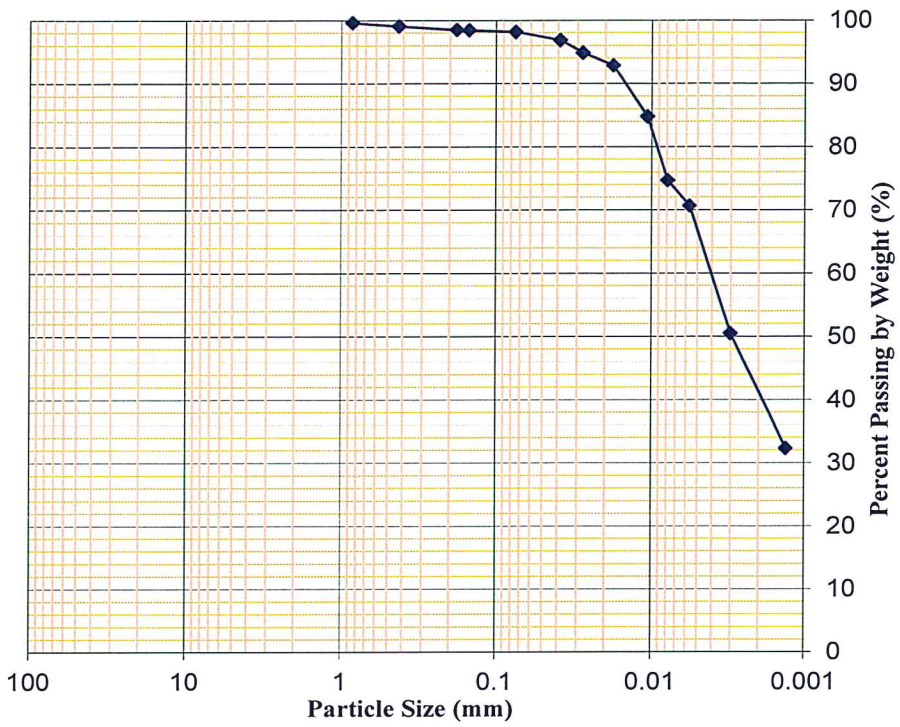
CME Associates, Inc.

Material Identification

Sample #
B-8; S-16

Sieve Designation	Size (mm)	Percent Passing by Weight (%)
No.20	0.850	100
No.40	0.425	99
No.80	0.180	98
No.100	0.150	98
No.200	0.075	98
Hydrometer	0.039	97
	0.028	95
	0.018	93
	0.011	85
	0.008	75
	0.006	71
	0.003	50
	0.001	32

Classification
Grey CLAY, some SILT, trace fine SAND



If you have any questions regarding this report please contact our office.

Yvonne Chu
Laboratory Supervisor

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: Port of Albany Expansion Feasibility Project, Albany, NY **Report No.:** 27211B-01-0417
Client: Bergmann Associates, P.C. **Date Started:** 02-15-17 **Finished:** 02-15-17
Location of Boring: See Exploration Location Plan **Elevation of Surface of Boring:** 20.3'

METHODS OF INVESTIGATION

Casing: 3-1/4" ID H. Stem Auger **Driller:** Bill Murphy
Casing Hammer: **Driller:** Beau Fletcher
Other: **Inspector:**
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: CME 550x ATV-Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
02-15-17	While drilling	12.9'	14.0'
02-15-17	Before casing removed		
02-15-17	After casing removed	12.0'	out
02-15-17	After casing removed	caved @ 14.0'	out

LOG OF BORING SAMPLES **CLASSIFICATION OF MATERIAL**

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/10	10-3-2-2		Miscellaneous FILL; black fine sand, coal ash, silt (moist)	5
	H	2	2.0	4.0	SS/12	2-2-2-2		Similar as above (moist)	4
	O	3	4.0	6.0	SS/22	WH-1-1-1		Similar as above (moist)	2
5	L	4	6.0	8.0	SS/16	1-1-1-1		Similar as above (moist)	2
	L O W							~ Landfill ~	
		5	8.0	10.0	SS/10	WH-WH-1-WH		Similar as above (moist)	1
10		6	10.0	12.0	SS/15	1-1-1-1		Similar as above (moist)	2
	S	7	12.0	14.0	SS/20	WH-WH-WH-WH		Similar as above (wet)	0
	T E	8	14.0	16.0	SS/24	WR-WR-WWH		Similar as above (wet)	0
15	M						16		
		9	16.0	18.0	SS/24	WH-WH-WH-WH		Brown/Grey SILT, some CLAY, trace fine SAND, trace ORGANIC MATTER (moist, very soft)	0
		10	18.0	20.0	SS/19	WH-WH-WH-1		Similar as above (moist, very soft)	0
	A U								
20								~ Buried Organic ~	
	G E	11	23.5	25.0	SS/6	8-10-7		Grey SILT, some CLAY, trace fine GRAVEL (moist, very stiff)	17
	R								
25								Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.
Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
25								Continued from page 1	
	H O L L O W S T E M A U G E R	12	28.5	30.0	SS/10	4-1-2		Grey SILT, some CLAY, trace fine SAND, trace ORGANIC MATTER (moist, soft)	3
30		13	33.5	35.0	SS/10	3-4-5		Grey cmf SAND, little SILT, trace mf GRAVEL (moist, loose)	9
35								~ Glaciofluvial ~	
		14	38.5	40.0	SS/8	1-1-2		Grey CLAY, little SILT (moist, soft)	3
40									
		15	43.5	45.0	SS/24	WH-WH-WH		Similar as above (moist, very soft)	0
45								~ Lacustrine ~	
		16	48.5	50.0	SS/20	WH-1-2		Similar as above (moist, soft)	3
50								Continued on page 3	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
50								Continued from page 2	
	H								
	O	17	53.5	55.0	SS/24	WH-2-3		Grey CLAY, some SILT (moist, medium stiff)	5
	L								
55									
	L								
	O								
	W	18	58.5	60.0	SS/24	WH-3-4		Grey CLAY and SILT (moist, medium stiff)	7
60									
								~ Lacustrine ~	
	S								
	T								
		19	63.5	65.0	SS/24	WH-3-3		Similar as above (moist, medium stiff)	6
	E								
65	M								
	A	20	68.5	70.0	SS/24	3-3-4		Similar as above (moist, medium stiff)	7
	U								
70									
	G								
	E								
	R	21	73.5	75.0	SS/24	3-3-4		Similar as above (moist, medium stiff)	7
75								Continued on page 4	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
75								Continued from page 3	
	H								
	O	22	78.5	80.0	SS/24	WH-3-3		Similar as above (moist, medium stiff)	6
80	L								
	L								
	O								
	W	23	83.5	85.0	SS/24	4-4-4		Similar as above (moist, medium stiff)	8
85									
								~ Lacustrine ~	
	S								
	T								
		24	88.5	90.0	SS/24	WH-3-4		Similar as above (moist, medium stiff)	7
	E								
90	M								
	A	25	93.5	95.0	SS/24	WH-2-4		Similar as above (wet, medium stiff)	6
	U								
95									
	G								
	E								
	R	26	98.5	100.0	SS/24	WH-1-4		Similar as above (wet, medium stiff)	5
100								Continued on page 5	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
100								Continued from page 4	
	H								
	O								
	L								
105									
	L								
	O								
	W	27	108.5	110.0	SS/24	WH-2-3		Grey SILT and CLAY (wet, medium stiff)	5
110									
	S								
	T								
								~ Lacustrine ~	
	E								
115	M								
	A	28	118.5	120.0	SS/24	WH-2-2		Similar as above (wet, medium stiff)	4
	U								
120									
	G								
	E								
	R								
125								Continued on page 6	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
125								Continued from page 5	
	H							~ Lacustrine ~	
	O	29	128.5	130.0	SS/24	3-3-4		Grey CLAY, some SILT (wet, medium stiff)	7
	L								
130									
	L						131.4	*Change in drilling at 131.4'*	
	O								
	W	30	133.5	135.0	SS/0	17-19-28		No Recovery *Gravel stuck in mouth of spoon*	47
135									
	S								
	T								
	E								
140	M								
								~ Glacial Till ~	
	A								
	U								
145									
	G								
	E								
		31	148.5	148.9	SS/3	100@4"		Black SILT and CLAY, some mf GRAVEL, little cmf SAND (wet, hard) *Spoon refusal at 148.9'*	100+
	R								
	XXX							Bottom of Boring @ 148.9'	
150									

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: Port of Albany Expansion Feasibility Project, Albany, NY **Report No.:** 27211B-01-0417
Client: Bergmann Associates, P.C. **Date Started:** 2-27-17 **Finished:** 2-27-17
Location of Boring: See Exploration Location Plan **Elevation of Surface of Boring:** 15.7'

METHODS OF INVESTIGATION

Casing: 3-1/4" ID H. Stem Auger **Driller:** Bill Murphy
Casing Hammer: **Driller:** Beau Fletcher
Other: **Inspector:**
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: CME 550x ATV-Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
2-27-17	While drilling	4.3'	4.0'
2-27-17	Before casing removed	34.1'	48.5'
2-27-17	After casing removed	None Noted	out
2-27-17	After casing removed	caved @ 17.1'	out

LOG OF BORING SAMPLES / **CLASSIFICATION OF MATERIAL**

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/17	2-1-2-3		Miscellaneous FILL; grey/black fine sand, coal ash, silt (moist)	3
	H	2	2.0	4.0	SS/18	2-2-2-2		Similar as above (moist)	4
	O								
	L	3	4.0	6.0	SS/24	1-1-1-1		Similar as above (wet)	2
5								~ Landfill ~	
	L	4	6.0	8.0	SS/18	WH-1-WH-1		Similar as above (wet)	1
	O								
	W	5	8.0	10.0	SS/2	WH-1-WH-1		Miscellaneous FILL; grey/black fine sand, ash, silt, wood (wet)	1
							10		
10		6	10.0	12.0	SS/24	WH-WH-WH-WH		Grey SILT, some CLAY, trace ORGANIC MATTER, trace fine SAND (wet, very soft)	0
	S	7	12.0	14.0	SS/18	WH-1-WH-WH		Similar as above (wet, very soft)	1
	T							~ Buried Organic ~	
	E	8	14.0	16.0	SS/8	WH-WH-1-1		Similar as above (wet, very soft)	1
15	M						16.0		
		9	16.0	18.0	SS/20	1-2-3-3		Grey mf SAND, little SILT (wet, loose)	5
		10	18.0	20.0	SS/17	2-1-1-1		Grey mf SAND, some SILT (wet, very loose)	2
	A								
	U								
20								~ Glaciofluvial ~	
	G								
	E								
		11	23.5	25.0	SS/18	3-2-1		Grey mf SAND, little SILT (wet, very loose)	3
	R								
25								Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.
Remarks:

LOG OF BORING SAMPLES								CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
25								Continued from page 1	
	H								
	O	12	28.5	30.0	SS/8	3-2-1		Grey CLAY, little SILT (wet, soft)	3
30	L								
	L								
	O								
	W	13	33.5	35.0	SS/18	WH-WH-WH		Grey CLAY, some SILT (wet, very soft)	0
35									
	S							~ Lacustrine ~	
	T								
		14	38.5	40.0	SS/18	WH-WH-WH		Similar as above (wet, very soft)	0
	E								
40	M								
	A	15	43.5	45.0	SS/18	WH-2-3		Similar as above (wet, medium stiff)	5
	U								
45									
	G								
	E								
	R	16	48.5	50.0	SS/18	1-2-3		Similar as above (wet, medium stiff)	5
50	XXX							Bottom of Boring @ 50.0'	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: Port of Albany Expansion Feasibility Project, Albany, NY **Report No.:** 27211B-01-0417
Client: Bergmann Associates, P.C. **Date Started:** 02-20-17 **Finished:** 02-22-17
Location of Boring: See Exploration Location Plan **Elevation of Surface of Boring:** 16.7'

METHODS OF INVESTIGATION

Casing: 3-1/4" ID H. Stem Auger **Driller:** Bill Murphy
Casing Hammer: **Driller:** Beau Fletcher
Other: NQ-Core **Inspector:**
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: CME 550x ATV-Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
02-20-17	While drilling	14.9'	14.0'
02-21-17	Before casing removed	5.3'	33.5' *
02-22-17	Before casing removed	4.7'	93.0' *
02-22-17	After casing removed	8.8'	out
02-22-17	After casing removed	caved @ 48.8'	out

LOG OF BORING SAMPLES / **CLASSIFICATION OF MATERIAL**

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/18	1-8-8-8		Miscellaneous FILL; black fine sand, silt (moist)	16
	H	2	2.0	4.0	SS/21	7-7-7-8		Miscellaneous FILL; black fine sand, silt, coal ash (moist)	14
	O	3	4.0	6.0	SS/19	7-2-3-7		Miscellaneous FILL; organic silt, fine sand, gravel, silt, ash (moist)	5
5	L								
	L	4	6.0	8.0	SS/10	7-14-8-8		Similar as above (moist)	22
	O							~ Landfill ~	
	W	5	8.0	10.0	SS/18	5-5-6-6		Similar as above (moist)	11
10		6	10.0	12.0	SS/12	5-4-5-5		FILL; brown cmf sand (moist)	9
	S	7	12.0	14.0	SS/8	4-5-5-6		Similar as above (moist)	10
	T	8	14.0	16.0	SS/12	6-4-4-3		Miscellaneous FILL; brown cmf sand, gravel, ash (moist)	8
	E						16		
15	M	9	16.0	18.0	SS/12	2-3-3-3		Grey/Brown SILT, little mf SAND, trace CLAY, trace ORGANIC MATTER (moist, medium stiff)	6
							18	~ Buried Organic ~	
		10	18.0	20.0	SS/20	1-2-3-4		Grey/Brown cmf SAND, little SILT (moist, loose)	5
	A								
	U								
20								~ Glaciofluvial ~	
	G								
	E	11	23.5	25.0	SS/18	2-2-4		Grey cmf SAND, some SILT (moist, loose)	6
	R								
25								Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.
Remarks: *Overnight.

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
25								Continued from page 1	
	H O L L O W S T E M A U G E R	12	28.5	30.0	SS/14	5-4-5		Similar as above (wet, loose)	9
30								~ Glaciofluvial ~	
		13	33.5	35.0	SS/18	4-5-5		Grey cmf SAND, trace SILT (wet, medium compact)	10
35									
		14	38.5	40.0	SS/18	6-5-6		Similar as above (wet, medium compact)	11
40									
		15	43.5	45.0	SS/14	3-3-3		Grey CLAY, trace SILT (wet, medium stiff)	6
45								~ Lacustrine ~	
		16	48.5	50.0	SS/18	WH-WH-1		Similar as above (wet, very soft)	1
50								Continued on page 3	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
50								Continued from page 2	
	H O L L O W S T E M A U G E R	17	53.5	55.0	SS/18	WH-WH-1		Similar as above (wet, very soft)	1
55		18	58.5	60.0	SS/18	1-2-3		Grey CLAY, some SILT (wet, medium stiff)	5
60								~ Lacustrine ~	
		19	63.5	65.0	SS/18	WH-1-3		Similar as above (wet, medium stiff)	4
65									
		20	68.5	70.0	SS/18	WH-1-3		Grey CLAY, little SILT (wet, medium stiff)	4
70									
75								Continued on page 4	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
75								Continued from page 3	
	H							~ Lacustrine ~	
	O								
		21	78.5	80.0	SS/18	2-3-3		Similar as above (wet, medium stiff)	6
	L								
80	L								
							81.6	*Drilled gravelly at 81.6'*	
	O							Grey mf SAND and SILT, little mf GRAVEL	
		22	82.0	83.5	SS/17	8-20-14		(moist, compact)	34
	W								
	S								
85	T								
	E							~ Glacial Till ~	
	M								
	A								
90	U								
	G						92	*Change in drilling at 92'*	
								Roller bit to 93.0'	
	E							~ Normanskill Shale Formation ~	
		23	93.0	93.0	SS/0	100@0"		No Recovery, Spoon Refusal	100+
	R								
	XXX	R-1	93.5	98.5	C/60	NQ-Core		Grey/Black SHALE Bedrock, weathered, medium	75%
95								hard, thin high angle bedding and mechanical	
	C							breaks, fractures at 93.8', 95.4', 95.9', 97.0' and	
	O							97.8', calcite filling and veins in core	
	R							Recovery: 60"/60" = 100%	
	E							RQD: 45"/60" = 75%	
								6 Pieces; 2" Chips and Fragments (*See Remark 1*)	
	XXX							Bottom of Boring @ 98.5'	
100									

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.
Remarks: 1. See Bedrock Core Photos.

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: Port of Albany Expansion Feasibility Project, Albany, NY **Report No.:** 27211B-01-0417
Client: Bergmann Associates, P.C. **Date Started:** 02-14-17 **Finished:** 02-15-17
Location of Boring: See Exploration Location Plan **Elevation of Surface of Boring:** 10.4'

METHODS OF INVESTIGATION

Casing: 3-1/4" ID H. Stem Auger **Driller:** Bill Murphy
Casing Hammer: **Driller:** Beau Fletcher
Other: NQ-Core **Inspector:**
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: CME 550x ATV-Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
02-14-17	While drilling	7.2'	8.0'
02-15-17	Before casing removed	35.8'	63.5'
02-15-17	After casing removed		out
02-15-17	After casing removed	caved @	out

LOG OF BORING SAMPLES **CLASSIFICATION OF MATERIAL**

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/20	5-1-1-1		Miscellaneous FILL; black silt, fine sand, organic matter (moist)	2
	H	2	2.0	4.0	SS/24	2-2-1-2		Miscellaneous FILL; black fine sand, silt, ash (wet)	3
	O	3	4.0	6.0	SS/0	1-WH-1-WH		No Recovery	1
5	L								
	L	4	6.0	8.0	SS/24	1-WH-1-WH		Miscellaneous FILL; black fine sand, coal ash, silt (wet)	1
	O	5	8.0	10.0	SS/0	WH-WH-WH-WH		No Recovery	0
	W							~ Landfill ~	
10		6	10.0	12.0	SS/4	WH-WH-WH-WH		Miscellaneous FILL; black/grey fine sand, coal ash, silt (wet)	0
	S	7	12.0	14.0	SS/8	WH-WH-WH-WH		Similar as above (wet)	0
	T	8	14.0	16.0	SS/8	WH-1-1-2		Similar as above (wet)	2
	E								
15	M	9	16.0	18.0	SS/8	WH-1-WH-1		Similar as above (wet)	1
		10	18.0	20.0	SS/14	WH-WH-2-2		Similar as above (wet)	2
	A								
	U								
20									
	G								
	E	11	23.5	25.0	SS/12	3-2-2		Grey cmf SAND, little SILT, trace mf GRAVEL (wet, loose)	4
	R							~ Glaciofluvial ~	
25								Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.
Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
25								Continued from page 1	
	H								
	O	12	28.5	30.0	SS/14	3-2-1		Grey CLAY, trace SILT (wet, soft)	3
30	L								
	L								
	O								
	W	13	33.5	35.0	SS/16	WH-1-2		Similar as above (wet, soft)	3
35									
	S							~ Lacustrine ~	
	T								
		14	38.5	40.0	SS/18	WH-1-2		Similar as above (wet, soft)	3
	E								
40	M								
	A	15	43.5	45.0	SS/18	WH-WH-WH		Grey CLAY and SILT (wet, very soft)	0
	U								
45									
	G								
	E						47.5	*Change in drilling at 47.5'*	
	R	16	48.5	50.0	SS/10	6-7-14		Grey SILT and mf SAND, trace fine GRAVEL (wet, very stiff)	21
								~ Glacial Till ~	
50								Continued on page 3	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
50								Continued from page 2	
	H O L L O W S T E M A U G E R	17	53.5	55.0	SS/13	8-6-14		Grey mf SAND, some SILT, little fine GRAVEL (wet, medium compact)	20
55								~ Glacial Till ~	
		18	58.5	59.5	SS/8	52-100@5"		Grey SILT and mf GRAVEL, little fine SAND (wet, hard)	100+
60							60.7	*Change in drilling at 60.7' – lifting rig*	
	XXX	19	63.5	63.5	SS/0	100@0"		~ Normanskill Shale Formation ~ Black ROCK FRAGMENTS; shale	100+
65	C O R E	R-1	63.5	66.0	C/24	NQ-Core		Black, SHALE Bedrock, weathered, medium hard, thin high angle bedding and mechanical breaks Recovery: 24"/30" = 80% RQD: 8"/30" = 27% 6 Pieces; 8" Chips and Fragments *Core blocked at 66.0' – approximately 2" of mud seam at 66.0'*	27%
		R-2	66.0	67.8	C/15	NQ-Core		Black, SHALE Bedrock, highly weathered, medium hard, thin high angle bedding and mechanical breaks Recovery: 15"/21" = 71% RQD: 0"/21" = 0% 1 Piece; 12" Chips and Fragments *Core blocked at 67.8'* (*See Remark 1*)	0%
70	XXX							Bottom of Boring @ 67.8'	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.
Remarks: 1. See Bedrock Core Photos.

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: Port of Albany Expansion Feasibility Project, Albany, NY **Report No.:** 27211B-01-0417
Client: Bergmann Associates, P.C. **Date Started:** 2-27-17 **Finished:** 2-27-17
Location of Boring: See Exploration Location Plan **Elevation of Surface of Boring:** 23.9'

METHODS OF INVESTIGATION

Casing: 3-1/4" ID H. Stem Auger **Driller:** Bill Murphy
Casing Hammer: **Driller:** Beau Fletcher
Other: **Inspector:**
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: CME 550x ATV-Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
2-27-17	While drilling	13.7'	14.0'
2-27-17	Before casing removed	39.8'	48.5'
2-27-17	After casing removed	18.1'	out
2-27-17	After casing removed	caved @ 19.2'	out

LOG OF BORING SAMPLES **CLASSIFICATION OF MATERIAL**

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/17	1-2-2-2		Miscellaneous FILL; black fine sand, coal ash, silt, organic matter (moist)	4
	H	2	2.0	4.0	SS/21	2-3-3-3		Similar as above (moist)	6
	O	3	4.0	6.0	SS/15	3-3-3-3		Similar as above (moist)	6
5	L							~ Landfill ~	
	L	4	6.0	8.0	SS/24	4-4-4-4		Miscellaneous FILL; brown fine sand, silt, ash, organic matter (moist)	8
	O	5	8.0	10.0	SS/11	3-4-7-7		Miscellaneous FILL; brown sand, ash, silt, gravel (moist)	11
	W								
10		6	10.0	12.0	SS/24	7-6-3-3		Similar as above (moist)	9
	S	7	12.0	14.0	SS/6	2-6-4-3		Grey Similar as above (moist)	10
	T	8	14.0	16.0	SS/4	3-2-2-4		Miscellaneous FILL; grey gravel, silt, ash (wet)	4
	E								
15	M						16		
		9	16.0	18.0	SS/24	3-2-1-2		Grey SILT, some CLAY, trace ORGANIC MATTER (wet, soft)	3
								~ Buried Organic ~	
		10	18.0	20.0	SS/24	3-2-1-1		Grey/Brown SILT, some CLAY (wet, soft)	3
	A								
	U								
20									
	G								
	E								
		11	23.5	25.0	SS/22	WH-5-8		Brown mf SAND, trace SILT (wet, medium compact)	13
	R							~ Glaciofluvial ~	
25								Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.
Remarks:

LOG OF BORING SAMPLES								CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
25								Continued from page 1	
	H O L L O W S T E M A U G E R	12	28.5	30.0	SS/14	26-13-8		*Drilled gravelly at 27.7'* Grey/Brown cmf SAND, some mf GRAVEL, trace SILT (wet, medium compact)	21
30								~ Glaciofluvial ~	
		13	33.5	35.0	SS/18	2-2-2		Grey CLAY, some SILT (wet, soft)	4
35									
		14	38.5	40.0	SS/18	2-2-2		Grey CLAY, little SILT (wet, soft)	4
40								~ Lacustrine ~	
		15	43.5	45.0	SS/18	3-3-3		Similar as above (wet, medium stiff)	6
45									
		16	48.5	50.0	SS/18	1-2-2		Grey CLAY, some SILT (wet, medium stiff)	4
50	XXX							Bottom of Boring @ 50.0'	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: Port of Albany Expansion Feasibility Project, Albany, NY **Report No.:** 27211B-01-0417
Client: Bergmann Associates, P.C. **Date Started:** 2-22-17 **Finished:** 2-23-17
Location of Boring: See Exploration Location Plan **Elevation of Surface of Boring:** 13.6'

METHODS OF INVESTIGATION

Casing: 3-1/4" ID H. Stem Auger **Driller:** Bill Murphy
Casing Hammer: **Driller:** Beau Fletcher
Other: **Inspector:**
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: CME 550x ATV-Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
2-22-17	While drilling	7.8'	6.0' *
2-23-17	Before casing removed	33.8'	48.5' *
2-23-17	After casing removed	None Noted	out
2-23-17	After casing removed	caved @ 8.5'	out

LOG OF BORING SAMPLES / **CLASSIFICATION OF MATERIAL**

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/12	3-2-1-1		Miscellaneous FILL; black fine sand, coal ash, silt, organic matter (moist)	3
	H	2	2.0	4.0	SS/14	1-1-1-1		Similar as above (moist)	2
	O								
	L	3	4.0	6.0	SS/13	1-1-1-1		Miscellaneous FILL; black fine sand, silt (moist)	2
5								~ Landfill ~	
	L	4	6.0	8.0	SS/10	1-1-2-1		Similar as above (moist)	3
	O								
	W	5	8.0	10.0	SS/12	1-1-1-1		Similar as above (moist)	2
							10.0		
10		6	10.0	12.0	SS/20	1-1-1-1		Grey ORGANIC SILT, some CLAY, trace fine SAND, trace ORGANIC MATTER (wet, soft) *Reddish rusty stain noted*	2
	S	7	12.0	14.0	SS/24	WH-WH-WH-WH		Grey ORGANIC SILT, little CLAY (moist, very soft)	0
	T							~ Buried Organic ~	
	E	8	14.0	16.0	SS/22	WH-WH-WH-WH		Grey ORGANIC SILT, some CLAY, little fine SAND, trace ORGANIC MATTER (moist, very soft)	0
15	M								
		9a	16.0	17.5	SS/24	1-2-2-3		Black/Brown SILT and fine SAND, trace ORGANIC MATTER (moist, medium stiff)	4
		9b	17.5	18.0				Grey/Brown SILT, some CLAY, trace ORGANIC	
							18.0	MATTER (moist, medium stiff)	
	A	10	18.0	20.0	SS/22	WH-2-1		Grey cmf SAND, trace SILT, trace fine GRAVEL (moist, very loose)	3
	U								
20								*Flowing sands – water added*	
	G								
								~ Glaciofluvial ~	
	E								
		11	23.5	25.0	SS/24	3-4-5		Grey cmf SAND, little mf GRAVEL, trace SILT (wet, loose)	9
	R								
25								Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.
Remarks: *Overnight.

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
25								Continued from page 1	
	H O L L O W S T E M A U G E R	12	28.5	30.0	SS/22	3-2-3		Grey cmf SAND, little SILT, trace fine GRAVEL (wet, loose)	5
30								~ Glaciofluvial ~	
		13	33.5	35.0	SS/24	4-2-3		Similar as above (wet, loose)	5
35									
		14	38.5	40.0	SS/6	2-3-2		Grey CLAY, little SILT (moist, medium stiff)	5
40									
		15	43.5	45.0	SS/12	2-3-2		Similar as above (moist, medium stiff)	5
45								~ Lacustrine ~	
		16	48.5	50.0	SS/19	1-2-2		Similar as above (moist, soft)	4
50	XXX							Bottom of Boring @ 50.0'	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: Port of Albany Expansion Feasibility Project, Albany, NY **Report No.:** 27211B-01-0417
Client: Bergmann Associates, P.C. **Date Started:** 2-22-17 **Finished:** 2-22-17
Location of Boring: See Exploration Location Plan **Elevation of Surface of Boring:** 16.0'

METHODS OF INVESTIGATION

Casing: 3-1/4" ID H. Stem Auger **Driller:** Bill Murphy
Casing Hammer: **Driller:** Beau Fletcher
Other: **Inspector:**
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: CME 550x ATV-Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
2-22-17	While drilling	1.5'	4.0'
2-22-17	Before casing removed	38.4'	48.5'
2-22-17	After casing removed	None Noted	out
2-22-17	After casing removed	caved @ 6.2'	out

LOG OF BORING SAMPLES / **CLASSIFICATION OF MATERIAL**

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/20	4-2-2-1		Miscellaneous FILL; black fine sand, silt, organic matter (moist)	4
	H	2	2.0	4.0	SS/22	1-2-2-1		Miscellaneous FILL; black fine sand, coal ash, silt (wet)	4
	O							~ Landfill ~	
5	L	3	4.0	6.0	SS/24	1-WH-1-WH		Similar as above (wet)	1
	L						6		
		4	6.0	8.0	SS/8	1-3-4-4		Brown SILT, trace CLAY, trace ORGANIC MATTER (moist, medium stiff)	7
	O								
	W	5	8.0	10.0	SS/24	1-2-2-WH		Grey SILT, little CLAY (moist, soft)	4
								~ Buried Organic ~	
10		6	10.0	12.0	SS/14	WH-WH-WH-WH		Similar as above (moist, very soft)	0
	S								
		7	12.0	14.0	SS/18	WH-WH-WH-WH		Similar as above (moist, very soft)	0
	T								
							14		
	E	8	14.0	16.0	SS/13	WH-2-2-3		Grey mf SAND, little SILT (wet, loose)	4
15	M								
		9	16.0	18.0	SS/14	WH-3-3-4		Grey mf SAND, trace SILT (wet, loose)	6
		10	18.0	20.0	SS/24	2-2-2-1		Grey cmf SAND, trace SILT (wet, loose)	4
	A								
	U								
20								~ Glaciofluvial ~	
	G								
	E								
		11	23.5	25.0	SS/24	3-3-4		Grey cmf SAND, little fine GRAVEL, trace SILT (wet, loose)	7
	R							*Flowing sands at 25.0' feet – water added*	
25								Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.
Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
25								Continued from page 1	
	H								
	O	12	28.5	30.0	SS/20	2-2-3		Similar as above (wet, loose)	5
	L								
30									
	L							~ Glaciofluvial ~	
	O								
	W	13a	33.5	34.0	SS/18	2-1-2	34.0	Similar as above (wet, very loose)	3
		13b	34.0	35.0				Grey CLAY, little SILT (moist, soft)	
35									
	S								
	T								
		14	38.5	40.0	SS/14	WH-1-2		Similar as above (moist, soft)	3
	E								
40	M								
								~ Lacustrine ~	
	A	15	43.5	45.0	SS/20	WH-WH-WH		Grey CLAY, some SILT (moist, very soft)	0
	U								
45									
	G								
	E								
	R	16	48.5	50.0	SS/24	2-2-2		Grey CLAY, little SILT (moist, soft)	4
50	XXX							Bottom of Boring @ 50.0'	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: Port of Albany Expansion Feasibility Project, Albany, NY **Report No.:** 27211B-01-0417
Client: Bergmann Associates, P.C. **Date Started:** 2-23-17 **Finished:** 2-23-17
Location of Boring: See Exploration Location Plan **Elevation of Surface of Boring:** 13.4'

METHODS OF INVESTIGATION

Casing: 3-1/4" ID H. Stem Auger **Driller:** Bill Murphy
Casing Hammer: **Driller:** Beau Fletcher
Other: **Inspector:**
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: CME 550x ATV-Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
2-23-17	While drilling	21.4'	28.5'
2-23-17	Before casing removed	42.4'	48.5'
2-23-17	After casing removed	None Noted	out
2-23-17	After casing removed	caved @ 18.7'	out

LOG OF BORING SAMPLES / **CLASSIFICATION OF MATERIAL**

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse; **m** – **m**edium; **f** – **f**ine; **and** – 35 to 50 %; **some** – 20 to 35 %; **little** – 10 to 20 %; **trace** – 0 to 10 %	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/19	4-4-5-6		Miscellaneous FILL; brown silt, fine sand, ash, organic matter (moist)	9
	H	2	2.0	4.0	SS/21	6-11-22-22		Similar as above (moist)	33
	O	3	4.0	6.0	SS/23	9-9-8-9		Miscellaneous FILL; black fine sand, silt, coal ash (moist)	17
5	L							~ Landfill ~	
	L	4	6.0	8.0	SS/22	8-10-8-7		Similar as above (wet)	18
	O	5	8.0	10.0	SS/17	2-2-4-7		Miscellaneous FILL; black fine sand, silt, coal ash, gravel (wet)	6
10		6	10.0	12.0	SS/8	8-13-10-7		Miscellaneous FILL; brown fine sand, gravel, coal ash (moist)	23
	S						12		
	T	7	12.0	14.0	SS/5	2-1-2-2		Grey/Brown ORGANIC SILT, little CLAY, trace fine SAND (moist, soft)	3
	E							~ Buried Organic ~	
		8	14.0	16.0	SS/24	WH-WH-WH-1		Similar as above (wet, very soft)	0
15	M						16		
		9	16.0	18.0	SS/24	2-3-4-4		Brown/Grey fine SAND, some SILT (wet, loose)	7
		10	18.0	20.0	SS/24	1-1-3-5		Similar as above (wet, loose)	4
	A								
	U								
20								~ Glaciofluvial ~	
	G								
	E								
		11	23.5	25.0	SS/18	1-2-3		Brown/Grey cmf SAND, trace SILT (wet, loose)	5
	R								
25								Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.
Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL	
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse **m** – **m**edium **f** – **f**ine **and** – 35 to 50 % **some** – 20 to 35 % **little** – 10 to 20 % **trace** – 0 to 10 %	SPT "N" or RQD
25								Continued from page 1	
	H O L L O W S T E M	12	28.5	30.0	SS/18	4-4-5		Similar as above (wet, loose) *Putrid odor*	9
30		13	33.5	35.0	SS/18	5-4-5		Similar as above (wet, loose)	9
35								~ Glaciofluvial ~	
		14	38.5	40.0	SS/18	4-3-3		Grey Similar as above (wet, loose)	6
40									
	A U G E R	15a	43.5	44.8	SS/18	5-4-3		Similar as above (wet, loose)	7
							44.8	*Trace clay in end of spoon*	
		15b	44.8	45.0				Grey CLAY, little SILT (wet, medium stiff)	
45								~ Lacustrine ~	
		16	48.5	50.0	SS/18	3-2-3		Grey CLAY, some SILT, trace fine SAND (wet, medium stiff)	5
50	XXX							Bottom of Boring @ 50.0'	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WR = Weight of Rods, WH = Weight of Hammer plus Rods.

Remarks:

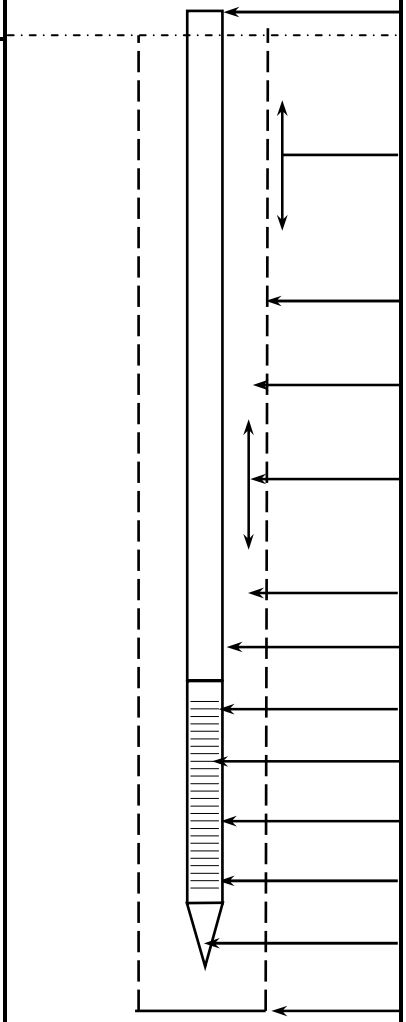
GROUNDWATER OBSERVATION WELL LOG

Project	Port of Albany Expansion Feasibility Project			**Report No.**	27211B-01-0417		
Client	Bergmann Associates, P.C.			**Boring No.**	B-3		
Location	Albany, New York			**Well No.**	MW-1		
Contractor	CME Associates, Inc.			**Location**	See Exploration Location Plan		
Driller	Bill Murphy	**Inspector**	Beau Fletcher	**Surface Elevation**	16.7'		
Installation Date	02-28-17			**Sheet**	1	**of**	1

Subsurface Soil Conditions

See Boring Log B-3

Bottom of Boring @ 23'



Stickup of riser pipe above ground surface	3 ft
Thickness of surface seal	2 ft
Type of surface seal	grout
Diameter of Borehole	8 in
Type of backfill around riser	grout
Thickness of seal	2 ft
Type of seal	Bentonite
Depth to top of filter pack	10 ft
Depth to bottom of riser	12 ft
Type of well screen	PVC
Screen gauge or size of openings	0.010 in
Diameter of well	2 in
Type of backfill/filter pack around point	#2 SAND
Depth to bottom of point	22 ft
Depth to bottom of borehole	23 ft

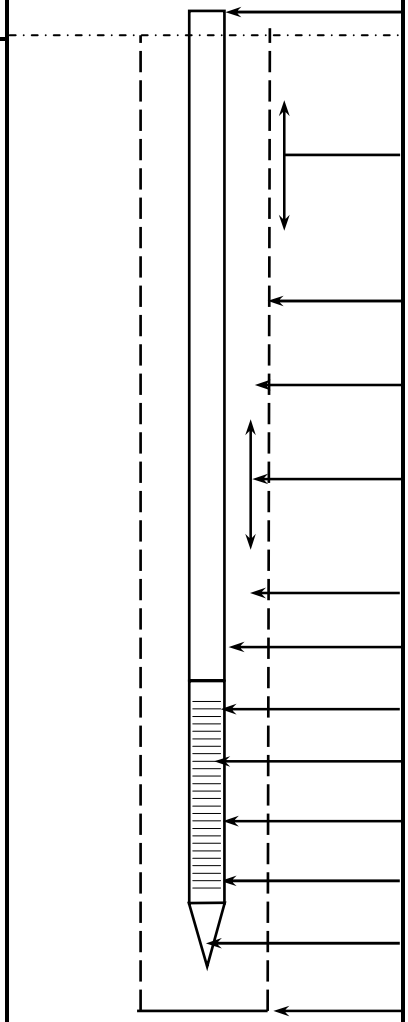
GROUNDWATER OBSERVATION WELL LOG

Project	Port of Albany Expansion Feasibility Project			**Report No.**	27211B-01-0417		
Client	Bergmann Associates, P.C.			**Boring No.**	B-5		
Location	Albany, New York			**Well No.**	MW-2		
Contractor	CME Associates, Inc.			**Location**	See Exploration Location Plan		
Driller	Bill Murphy	**Inspector**	Beau Fletcher	**Surface Elevation**	23.9'		
Installation Date	02-28-17			**Sheet**	1	**of**	1

Subsurface Soil Conditions

See Boring Log B-5

Bottom of Boring @ 22'



Stickup of riser pipe above ground surface	3 ft
Thickness of surface seal	2 ft
Type of surface seal	grout
Diameter of Borehole	2 ft
Type of backfill around riser	grout
Thickness of seal	2 ft
Type of seal	Bentonite
Depth to top of filter pack	9 ft
Depth to bottom of riser	11 ft
Type of well screen	PVC
Screen gauge or size of openings	0.010 in
Diameter of well	2 in
Type of backfill/filter pack around point	#2 SAND
Depth to bottom of point	21 ft
Depth to bottom of borehole	22 ft

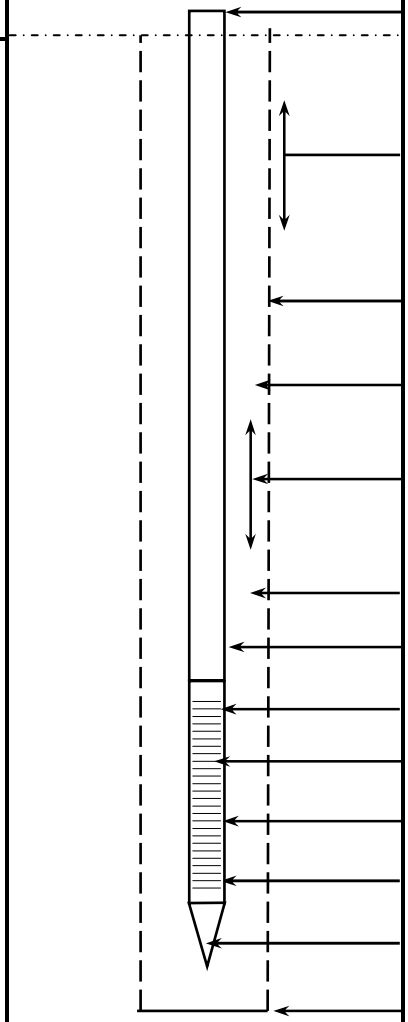
GROUNDWATER OBSERVATION WELL LOG

Project	Port of Albany Expansion Feasibility Project			**Report No.**	27211B-01-0417		
Client	Bergmann Associates, P.C.			**Boring No.**	B-4		
Location	Albany, New York			**Well No.**	MW-3		
Contractor	CME Associates, Inc.			**Location**	See Exploration Location Plan		
Driller	Bill Murphy	**Inspector**	Beau Fletcher	**Surface Elevation**	10.4’		
Installation Date	02-28-17			**Sheet**	1	**of**	1

Subsurface Soil Conditions

See Boring Log B-4

Bottom of Boring @ 16’



Stickup of riser pipe above ground surface	3 ft
Thickness of surface seal	N/A
Type of surface seal	Bentonite
Diameter of Borehole	8 in
Type of backfill around riser	Bentonite
Thickness of seal	N/A
Type of seal	Bentonite
Depth to top of filter pack	3 ft
Depth to bottom of riser	5 ft
Type of well screen	PVC
Screen gauge or size of openings	0.010 in
Diameter of well	2 in
Type of backfill/filter pack around point	#2 SAND
Depth to bottom of point	15 ft
Depth to bottom of borehole	16 ft

GENERAL INFORMATION & KEY TO TEST BORING LOGS

The **Subsurface Exploration - Test Boring Logs produced by CME Associates, Inc.** present the observations and mechanical data collected by the driller while at the site, supplemented, at times, by classification of the materials removed from the borings as determined through visual identification by technicians in the laboratory. It is cautioned that the materials removed from the borings represent only a fraction of the total volume of the deposits at the site and may not necessarily be representative of the subsurface conditions between adjacent borings or between the sampled intervals. The data presented on the Exploration Logs together with the recovered samples will provide a basis for evaluating the character of the subsurface conditions relative to the proposed construction. The evaluation must consider all the recorded details and their significance relative to each other. Often, analyses of standard boring data indicate the need for additional testing and sampling procedures to more accurately evaluate the subsurface conditions. Any evaluations of the contents of CME's report and the recovered samples must be performed by Licensed Professionals having experience in Soil Mechanics and Foundation Engineering. The information presented in this Key defines some of the procedures and terms used on the CME Exploration Logs to describe the conditions encountered. Refer to the Log on page 3 for key number.

Key No. **Description**

1. The figures in the **DEPTH SCALE** column define the vertical scale of the Boring Log.

2. **CASING BLOWS/FOOT** - shows the number of blows required to advance the casing a distance of 12 inches. The casing size, the hammer weight and the length of drop are noted under the **Methods of Investigation**. If the casing is advanced by means other than driving, the method of advancement will be indicated under **Methods of Investigation** at the top of the Log. If Hollow Stem Augers or Coring is used, it will be so noted in this column.

3. The **SAMPLE I.D.** is used for identification on the sample containers and in the Laboratory Test Report or Summary.

4. The **DEPTH OF SAMPLE** column gives the exact depth range from which a sample was recovered.

5. The **SAMPLE TYPE/RECOVERY** column is used to signify the various type of sample attempt. "SS" is Split Spoon, "P" is piston tube, "U" is Undisturbed tube. For soil samples, the recovered length of the sample is also indicated, in inches. If a rock core sample is taken, the core bit size designation is given here.

6. **BLOWS ON SAMPLER** - shows the results of the "Standard Penetration Test (SPT) ASTM D1586", recording the number of blows required to drive a split spoon sampler into the soil beneath the casing. The number of blows required for each six inches of penetration is recorded. The total number of blows required for the 6 inch to 18 inch interval is summarized in the **SPT "N"** column and represents the "Standard Penetration Number". The outside diameter of the sampler, the hammer weight and the length of drop are noted in the **Methods of Investigation** portion of the log. A "WH" or "WR" in this column indicates that the sample spoon advanced the 6 inch interval under **W**eight of **H**ammer or **W**eight of **R**ods, respectively.

7. The **DEPTH OF CHANGE** column designates the depth (in feet) that the driller noted a compactness or stratum change. In soft materials or soil strata exhibiting a consistent relative density, it is difficult for the driller to determine the exact change from one stratum to the next. In addition, a grading or gradual change may exist. In such cases the depth noted is approximate or estimated only and may be represented by a dashed line.

8. **CLASSIFICATION OF MATERIAL - Soil materials** encountered and sampled are described by the driller on the original log. Notes of driller observations are also placed in this column. Recovered samples may also be visually classified by a Soil Technician upon receipt in the Laboratory. Visual sample classification is by Burmister System and strata may be classified additionally by the Unified System. The Burmister System is a type of visual-manual textural classification estimated by the Driller or Technician on the basis of weight-fraction of the recovered soil. See Table 1 **"Classification of Materials"**. The description of the relative soil compactness or consistency is based upon the standard penetration number as defined in Table 2. The description of the soil moisture condition is described as dry, moist, wet, or saturated. Water used to advance the boring may have affected the in-situ moisture content of the sample. Special terms are used as required to describe materials in greater detail, such terms are listed in ASTM D653. When sampling gravelly soils with a standard two-inch O.D. Split Spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter. The presence of boulders, cobbles, and large gravel is sometimes, but not necessarily, detected by an evaluation of the casing and sampler blows or through the "action" of the drill rig as reported by the driller.

8. **CLASSIFICATION OF MATERIAL** (continued)
The Description of **Rock** is based upon the recovered rock core. Terms frequently used in the description are included in Table 3. The length of core run is defined as length of penetration between retreivals of the corebarrel from the bore hole, expressed in inches. The core recovery expresses the length of core recovered from the core barrel per core run, in percent. The size core barrel used is noted in **Column 5**. The more commonly used sizes of core barrels are denoted "AX" and "NX". An "NX" core, being larger in diameter than "AX" core, often produces better recovery, and is frequently utilized where accurate information regarding the geologic conditions and engineering properties is needed. A better estimate of in-situ rock quality is provided by a *modified core recovery ratio* known as the **"Rock Quality Designation" (RQD)**. This ratio is determined by considering only pieces of core that are at least 4 inches long and are hard and sound. Breaks obviously caused by drilling are ignored. The diameter of the core should preferably be not less than 2 inches (NX). The percentage ratio between the total length of such core recovered and the length of core drilled on a given run is the RQD. Table 4 gives the rock quality description as related to the **RQD**.

9. The **SPT "N"** or **RQD** is given in this column as applicable to the specific sample taken. In Very Compact coarse grained soils the N-value may be indicated as 50+, and in Hard fine-grained soils the N-value may be indicated as 30+. This typically means that the blow count was achieved prior to driving the sampler the entire 6 inch interval or the sampler refused further penetration. For "NX" rock cores, the RQD is reported here, expressed in percent.

10. **GROUND WATER OBSERVATIONS** and timing noted by the driller are shown in this section. It is important to realize that the reliability of the water level observations depend upon the soil type (water does not readily stabilize in a hole through fine grained soils), and that drill water used to advance the borings may have influenced the observations. Ground water levels typically fluctuate seasonally so those noted on the log are only representative of that exhibited during the period of time noted on the log. One or more perched or trapped water levels may exist in the ground seasonally. All the available readings should be evaluated. If definite conclusions cannot be made, it is often prudent to examine the conditions more thoroughly through test pit excavations or ground water observation well installations.

TABLE 1 - VISUAL CLASSIFICATION OF MATERIALS (BURMISTER)

GROUP	TEXTURAL CLASSIFICATION SIZES
BOULDERS	larger than 12" diameter
COBBLES	12" diameter to 3" sieve
GRAVEL	3" - coarse - 1" - medium - 1/2" - fine - #4 sieve
SAND	#4 - coarse - #10 - medium - #40 - fine - #200 sieve
SILT	#200 sieve (0.074mm) to 0.005mm size (see below *)
CLAY	0.005mm size to 0.001mm size (see below *)

ABBREVIATIONS	PERCENT OF TOTAL SAMPLE BY WEIGHT	
f - fine	and	35 to 50%
m - medium	some	20 to 35%
c - coarse	little	10 to 20%
	trace	0 to 10%

***PLASTICITY DESCRIPTIONS**

TERM	PLASTICITY INDEX	DRY STRENGTH	FIELD TEST
Non-plastic	0 - 3	Very low	falls apart easily
Slightly plastic	4 - 15	Slight	easily crushed by fingers
Plastic	15 - 30	Medium	difficult to crush
Highly plastic	31 or more	High	impossible to crush with fingers

*TABLE 2 - DESCRIPTION OF SOIL COMPACTNESS OR CONSISTENCY based on SPT "N"**		
Primary Soil Type	**Descriptive Term of Compactness**	**Range of Standard Penetration Resistance (N)**
COARSE GRAINED SOILS	Very loose	less than 4 blows per foot
(More than half of Material is larger than No. 200 sieve size.)	Loose	4 to 10
	Medium compact	10 to 30
	Compact	30 to 50
	Very compact	Greater than 50
FINE GRAINED SOILS	**Descriptive Term of Consistency**	**Range of Standard Penetration Resistance (N)**
(More than half of material is smaller than No. 200 sieve size.)	Very soft	less than 2 blows per foot
	Soft	2 to 4
	Medium stiff	4 to 8
	Stiff	8 to 15
	Very stiff	15 to 30
	Hard	Greater than 30
*The number of blows of 140 pound weight falling 30 inches to drive 2 inch O.D., 1-3/8 inch I.D. sampler 12 inches is defined as the Standard Penetration Resistance designated "N".		

TABLE 3 - ROCK CLASSIFICATION TERMS		
Rock Classification Terms		**Field Test or Meaning of Term**
Hardness	Soft	Scratched by fingernail
	Medium Hard	Scratched easily by penknife
	Hard	Scratched with difficulty by penknife
	Very Hard	Cannot be scratched by penknife
Weathering	Very Weathered Weathered Sound	Judged from the relative amounts of disintegration, iron staining, core recovery, clay seams, etc.
Bedding (Natural Breaks in Rock Layers)	Laminated Thinly bedded Bedded Thickly bedded Massive	less than 1inch 1inch to 4 inches 4 inches to 12 inches 12 inches to 36 inches greater than 36 inches

TABLE 4 **Relation of Rock Quality Designation (RQD) and in-situ Rock Quality**	
RQD (%)	**Rock Quality Term Used**
90 to 100	Excellent
75 to 90	Good
50 to 75	Fair
25 to 50	Poor
0 to 25	Very Poor

BORING NO.: B-1 Page 1 of 1

SUBSURFACE EXPLORATION - TEST BORING LOG

Project: **Report No.:**

Client: **Date Started:** **Finished:**

Location of Boring: **Elevation of Surface of Boring:**

METHODS OF INVESTIGATION	**GROUND WATER OBSERVATIONS**			
Casing: 3-1/4" I.D. Hollow Stem Auger **Hammer:**	Date	Time	Depth	Casing At
Other:		While drilling		
Soil Sampler: 2" O.D. Split Barrel **Rod Size:**		Before casing removed		
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.		After casing removed		
Make & Model of Drill Rig:				

LOG OF BORING SAMPLES							**CLASSIFICATION OF MATERIAL**		
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (inches)	Blows on Sampler Per 6 inches	Depth of Change (feet)	**f** - fine **m** - medium **c** - coarse	**and** - 35 to 50% **some** - 20 to 35% **little** - 10 to 20% **trace** - 0 to 10%	STP "N" or RQD
1	2	3	4	4	5	6	7	8		9

Denotes Key Number (see page 1)