SECTION A

SUBSURFACE BORING AND SAMPLING

FOR

10th AVENUE AND WEST 18TH STREET DEVELOPMENT

PHASE I

NEW YORK, NEW YORK

ARTICLE I. LOCATION OF WORK

The site is located in Manhattan, NY on the block bounded by 10th Avenue to the west, West 19th Street the north, 11th Avenue to the east, and West 18th Street to the south, as shown on Drawing No. B-1. The site encompasses an open asphalt storage lot and two existing buildings. The borings will be drilled in two phases. Phase I borings will be drilled within the open lot and within the sidewalks on West 18th and West 19th streets. Phase II borings will be drilled within the two existing buildings. This work plan is only for Phase I.

The Contract Documents are attached herein and consist of the following items:

SECTION A	SUBSURFACE BORING AND SAMPLING
SECTION S	MRCE STANDARD SPECIFICATIONS FOR SUBSURFACE BORING AND SAMPLING
APPENDIX A	AVAILABLE INFORMATION

CONTRACT DRAWINGS:

Drawing No.	Title
B-1	Proposed Boring Location Plan

ARTICLE II. LOCATION AND ELEVATION OF BORINGS ON THE SITE

The Boring Contractor shall have a NYS Licensed Land Surveyor layout the borings on the site at the locations shown on the Contract Drawing(s) identified in Article VI within tolerances satisfactory to the Consulting Engineer and determine the elevations of the borings.

ARTICLE III. AVAILABLE INFORMATION

MRCE has obtained available subsurface information from previous investigations at or adjacent to the site. Logs from these investigations have been attached as Appendix A. The Owner and Consulting Engineer do not represent that this information shows completely the existing subsurface conditions.

ARTICLE IV. SCOPE OF WORK

The work to be done consists of making the following number and types of borings in the manner specified and as located on the contract drawings, together with the taking of samples as specified and the delivery of the samples as specified in Article 11 of Section S.

The Boring Contractor is to furnish all labor, materials and tools, supplies, transportation and equipment and any other items required for the work. The number and depths of borings stated below and the estimated quantities of each item of work noted in the Proposal are for purposes of establishing bid units only. The Owner and the Consulting Engineer reserve the right to add to or decrease the number of borings or to change the type of borings or the type of sampling or the amount of work in any category as the work progresses. Such changes will be based on the needs of the work and information disclosed by borings as they are completed, and payment therefore will be made on the basis of the unit prices stated in the Contract.

The following units of work have been established:

1. **Mobilization and Demobilization of one (1) track mounted mud-rotary drill rig and one (1) truck mounted mud-rotary drill rig**, Including all equipment and supplies necessary to perform the work, moving rig and equipment between borings, and delivery of all soil samples to the Consulting Engineer. The track mounted drill rig is to be used for the sidewalk borings and the truck mounted rig is to be used in the open lot. This item includes:
   - Obtaining and payment for all necessary permits including sidewalk and hydrant permits. Notification of One-Call and confirming locations of buried structures and utilities with all government agencies and/or utility companies before start of any work.
   - Drumming and off-site disposal of all excess drilling fluids, and cuttings.

2. **Eighteen (18) 3-1/2-inch minimum diameter land borings with sampling** , including crew, drilling equipment, materials, supplies, drilling fluids, and other materials required to advance the borings ten feet into bedrock, to a depth of 80 feet and as specified in Article 22 of Section S. Soil boring footage shall be measured from the ground surface to the bottom of the deepest soil sample attempted. Borings shall be advanced with rotary drilling techniques and drilling mud or by driving casing. Hollow stem augers shall not be permitted. Automatic hammers shall not be permitted. This item includes:
   - Ten (10) of the proposed borings with sampling will be drilled in the open lot using a truck-mounted drill rig.

- Eight (8) of the proposed borings with sampling will be drilled within the sidewalks surrounding the site using a track-mounted drill rig.
- Recovery of split spoon samples on five (5) foot centers, four (4) samples in the top ten (10) feet, and as directed by the engineer.
- All borings except as noted otherwise shall be tremie grouted with a lean cement mix when completed.
- Contractor shall restore the ground surface at each boring location to its existing condition. This will include asphalt patch, 4 inches minimum thickness, for borings in paved locations.

3. **Seven (7) 3-1/2-inch minimum diameter land borings without sampling,** including crew, drilling equipment, materials, supplies, drilling fluids, and other materials required to advance the borings ten feet into bedrock, to a depth of 80 feet. Borings will be advanced through overburden soils without sampling. Borings shall be advanced with rotary drilling techniques and drilling mud or by driving casing. Hollow stem augers shall not be permitted. Automatic hammers shall not be permitted. This item includes:
   - One (1) of the proposed borings without sampling shall be drilled within the open lot using a truck-mounted drill rig.
   - Six (6) of the proposed borings without sampling shall be drilled within the sidewalks surrounding the site using a track-mounted drill rig.
   - All borings except as noted otherwise shall be tremie grouted with a lean cement mix when completed.
   - Contractor shall restore the ground surface at each boring location to its existing condition. This will include asphalt patch, 4 inches minimum thickness, for borings in paved locations.

4. **Hand auger to five (5) feet at sidewalk locations.** Soil borings to be drilled within the sidewalks surrounding the site shall be advanced using to five feet below ground surface using a hand auger in order to clear buried utilities. This does not exempt the boring contractor from notifying One-Call to confirm utilities.

5. **Two (2) 2-inch O.D. PVC Standpipe Piezometer** to be installed in completed boreholes as shown on Drawing No. B-1, Proposed Boring Location Plan designated with the suffix "P" to a depth of 20 feet. The piezometers shall consist of a 10-slot screen, five (5) feet in length and a solid PVC riser to the ground surface. The annular space around the piezometer shall be filled with filter sand from the tip of the piezometer up to 2 feet above the screen section followed with a 3-foot bentonite seal. A cement-bentonite mix shall be placed over the bentonite seal to within 2 feet of the ground surface. The top of the piezometer shall be capped with a flush-mount steel cover, cemented in place. Alternatively an offset borehole shall be drilled to a depth of 20 feet, within five feet of the designated boring. No additional payment shall be made for the offset borehole.

6. **Rock coring and coring through obstructions**
   - Rock coring shall be performed using NX size diamond bit, "M" series double core barrel. Core runs shall not exceed 5 feet.

- The subsurface may contain various types of obstructions, including but not limited to boulders and fill with rubble. The Boring Contractor may drill or core through such obstructions, or offset from the obstructed location, once the Boring Contractor clears utilities, to an alternative location. No payment will be made for re-drilling to the depth of an obstruction at an offset location.

7. **Standby time, if necessary,** for drill rig and crew when the Boring Contractor's work is delayed at the request of the Consulting Engineer or the Owner.

8. **Boring Layout and As-Drilled Survey.** Obtain a NYS Licensed Land Surveyor to layout the boring locations on the site at the locations shown on the Contract Drawing(s) identified in Article VI within tolerances satisfactory to the Consulting Engineer. The Boring Contractor shall have the Surveyor determine the elevations of the borings.

ARTICLE V. SPECIAL CONDITIONS OF WORK

Articles in these specifications referring to types of borings and sampling not enumerated in Article XI shall be deemed excluded from the contract unless such types of borings are later included by separate agreement between the Contracting Parties. Unit Prices are requested for only those items of work listed on Page P2 of the Proposal.

1. UTILITIES & PERMITS
   (a) The Contractor shall confirm locations of buried structures and utilities with all government agencies and/or utility companies for all borings. The Contractor shall notify the Central Registry of Underground Facilities in accordance with Industrial Code Rule 53, Part 53 of Title 12 of the official compilation of codes, rules and regulations for the State of New York (cited as 12NYCRR53) effective April 1, 1975. The Contractor shall obtain all applicable untitled clearances. Should the Contractor's operations cause damage to utilities or structures, the Contractor shall notify the appropriate agency and shall arrange for immediate repairs.

   (b) All permits required by law for the boring work, including hydrant permits, sidewalk permits, etc., shall be obtained by the Boring Contractor prior to commencement of work.

2. ACCESS
   (a) The Consulting Engineer will offset borings as necessary to make the borings accessible by truck-mounted drill rigs. The Boring contractor must obtain all permits and clear utilities for offset borings.

3. WATER AVAILABILITY
   A source of water used in drilling may not be readily available at each boring location. The Contractor may elect to pump water form City hydrants and water lines. However, it is the Contractor's responsibility to obtain proper permits for use of water resources. It is also the Contractor's responsibility to provide hoses of sufficient length to run sources of water or to provide tanks at the work locations.

4. TIME
   (a) The Boring Contractor shall mobilize within five (5) work days after receiving the notice to proceed, and equip and prosecute the work continuously and as rapidly as possible during the day shifts for five days per week minimum until the required work is completed.

   (b) The Boring Contractor agrees that the specified number of rigs and crews will be used at all times during the work.

5. OBSTRUCTIONS
   The soil may contain various types of obstructions that cannot be easily penetrated while advancing the proposed borings. The Boring Contractor shall drill or core through such obstructions, or offset from the obstructed locations. Where the obstructions are penetrated by coring techniques, payment will be made for the actual length of the obstruction cored. Where offset borings are made, payment for the offset boring shall be made from the depth of the obstruction.

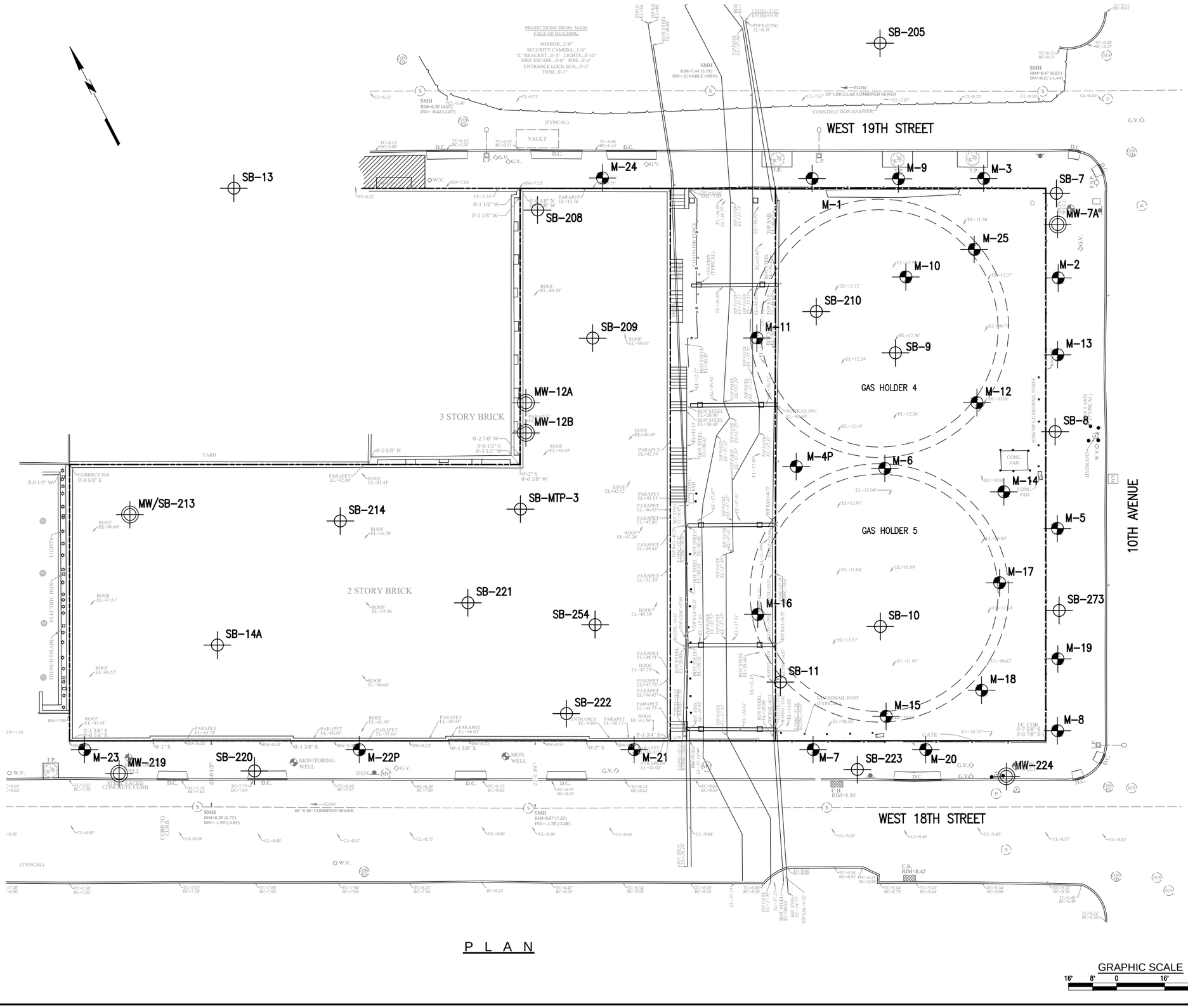
6. CREWS/EQUIPMENT
   It shall remain the responsibility of the Contractor to provide the necessary equipment and personnel sufficiently experienced in the use of the equipment to perform the work in a satisfactory manner in accordance with the applicable permit requirements. It shall be the Contractor's responsibility to extend casing to a sufficient depth in each hole to prevent loss of drilling mud during boring operations and to maintain a stable hole.

7. DRILLING TECHNIQUES
   The use of rotary drilling techniques with weighted drilling mud is required. Hollow stem augers will not be permitted. The borehole shall be kept full with drilling fluid at all times when the borehole is being advanced, during sampling, and when drilling tools are being withdrawn. Positive head, by means of weighted drilling fluid, must be maintained within the borehole when drilling tools are being withdrawn. In borings receiving a piezometer, Revert or a similar biodegradable drilling fluid shall be used.

8. SAMPLING
   The Contractor shall obtain split spoon samples as specified in Article 22 of Section S in the soil strata. Final depths of borings shall be determined by the Consulting Engineer.

9. SAMPLE DELIVERY
   The Contractor shall deliver samples recovered from the borings on a weekly basis to the Consulting Engineer's office in New York City. The cost of shipping all samples shall be included in the unit prices stated in the Contract for the various items of work.

End of Section.



P L A N

GRAPHIC SCALE
16' 8' 0 16' 32'

GENERAL NOTES:

1. BASE SURVEY PLAN PROVIDED BY FEHRINGER SURVEYING, P.C ON JULY 29, 2014.
2. THIS DRAWING IS ONLY TO BE USED FOR LAYOUT OF BORINGS.
3. ALL BORINGS SHALL BE MADE IN ACCORDANCE WITH THE NEW YORK CITY BUILDING CODE AND THE STANDARD SPECIFICATIONS FOR SUBSURFACE BORINGS AND SAMPLING BY MUESER RUTLEDGE CONSULTING ENGINEERS (MRCE).
4. ALL BORINGS WILL BE MADE UNDER THE CONTINUOUS INSPECTION OF MRCE.
5. CONTRACTOR SHALL LOCATE EXISTING UTILITIES PRIOR TO COMMENCEMENT OF WORK.
6. BORINGS SHALL BE MADE USING ROATARY DRILLING TECHNIQUES TO MAINTAIN A STABLE BOREHOLE.
7. SOIL SAMPLES WILL BE COLLECTED USING A 2-INCH DIAMETER SPLIT-SPOON SAMPLER ADVANCED WITH A 140-LB HAMMER FALLING 30 INCHES.
8. RECOVERY OF SPLIT SPOON SAMPLES SHALL BE ON FIVE FOOT CENTERS WITH FOUR SAMPLES IN THE TOP TEN FEET, AS DIRECTED BY THE ENGINEER.
9. ROCK CORING SHALL BE PERFORMED USING AN NX-SIZE DIAMOND BIT WITH AN "M" SIZE DOUBLE CORE BARREL. CORE RUNS SHALL NOT EXCEED FIVE FEET.
10. ALL BORINGS WITHOUT A PIEZOMETER SHALL BE TREMIE GROUTED WITH A LEAN CEMENT MIX WHEN COMPLETED.
11. CONTRACTOR SHALL RESTORE THE GROUND SURFACE AT EACH BORING LOCATION TO ITS EXISTING CONDITION.
12. ELEVATIONS SHOWN REFER TO NAVD88.

LEGEND:

M-4P
– PROPOSED MRCE BORING
"P" – PIEZOMETER

MW-12A
– EXISTING MONITORING WELL MADE BY ARCADIS (2007)

SB-10
– EXISTING BORING MADE BY ARCADIS (2007)

REV.	DATE	BY	DESCRIPTION

W18–W19 STREET DEVELOPMENT
NEW YORK NEW YORK

THE RELATED COMPANIES
NEW YORK NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS
14 PENN PLAZA – 225 W. 34TH STREET, NY, NY 10122

SCALE	MADE BY: L.R.	DATE: 12-24-2014	FILE NUMBER
GRAPHIC	CH'KD BY: A.E.P.	DATE: 12-24-2014	12320

PROPOSED BORING LOCATION PLAN — DRAWING NUMBER B-1

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Printed on: Monday, Mar 30, 2015 – 02:50:06 PM
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SECTION S

STANDARD SPECIFICATIONS

FOR

SUBSURFACE BORING AND SAMPLING

GENERAL CONDITIONS

ARTICLE 1. DEFINITIONS

Whenever the following terms occur in the Contract Documents they shall mean as follows:

(a) Contract Documents - Contract documents consist of Information to Bidders, Proposal and Contract, the Standard Specifications and the Contract Drawings. These form the Contract.

(b) Owner, Architect, Engineer and Consulting Engineer -The Owner, Architect, Engineer and Consulting Engineer shall mean the individuals, partners or corporations identified in Article V of Section A, and their authorized representatives.

(c) Boring Contractor - The Boring Contractor shall mean the individual, partnership or corporation who or which executes the Agreement and is to perform the work specified herein.

(d) Written Notice - Written notice shall be deemed to have been duly served if delivered in person to the individual or to a member of the firm for whom it is intended, or if delivered at or sent by registered mail to the last business address known to him who gives the notice.

(e) Work - The Work shall refer to all items to be furnished and performed by the Boring Contractor and necessary to complete the Contract.

ARTICLE 2. CONTRACT DRAWINGS

The Contract Drawings comprise those drawings which are listed in Article VI of Section A. Further drawings and instructions will be furnished by the Consulting Engineer if needed for information or requested.

ARTICLE 3. EMPLOYEES AND HOURS OF LABOR

(a) The Boring Contractor shall at all times, enforce strict discipline and good order among his employees, and shall not employ on the work any person not skilled in the work assigned to him or otherwise unfit to perform his duties. Whenever the Consulting Engineer shall notify the Boring Contractor, in writing, that any man on the work is, in his opinion, incompetent, unfaithful, disorderly or otherwise unsatisfactory, such a man shall be discharged from the work and shall not again be employed on it, except with the consent of the Consulting Engineer. No party to this Contract shall employ or hire any employee of the other party without mutual consent of both parties concerned.

(b) The actual making of subsurface borings shall be done during the usual eight (8) hour day shift unless special prior arrangements are made with the Consulting Engineer. The Boring Contractor may, at his option, pull casings and change locations of his rigs at other hours of the day, if the Consulting Engineer is notified previously.

ARTICLE 4. BORING FOREMAN

(a) The Boring Contractor shall keep at the site of the work, during its progress, a competent boring foreman and any necessary assistants, all satisfactory to the Consulting Engineer. The boring foreman shall not be changed except with the consent of the Consulting Engineer, unless the boring foreman proves to be unsatisfactory to the Boring Contractor and ceases to be in his employ. The boring foreman shall represent the Boring Contractor in his absence and all directions given to him shall be as binding as if given to the Boring Contractor himself. Verbal directions shall be confirmed in writing on request in any case.

(b) The Boring Contractor shall give personal supervision to the work, using his best skill and attention.

ARTICLE 5. INSPECTION OF WORK

The Consulting Engineer, the Architect, the Owner, and their representatives shall at all times have access to the work, and the Boring Contractor shall provide proper facilities for such access and for inspection. The making of borings, the taking of samples, the recording of samples and the storing and disposal of samples, shall be in accordance with the requirements of these specifications and the directions of the Consulting Engineer and will be continually inspected by a representative of the Consulting Engineer. Inspection at hours other than the regular day shift shall not be requested by the Boring Contractor except in an emergency.

ARTICLE 6. PERMITS AND REGULATIONS

Permits and licenses of a temporary nature necessary for the prosecution of the Boring Contractor's work shall be secured and paid for by the Boring Contractor. The Boring Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified.

ARTICLE 7. PROTECTION OF WORK, PUBLIC AND PROPERTY

The Boring Contractor shall continuously protect his work from damage, and protect adjacent property as provided by law. He shall maintain lights and other safety devices as required by public authority or local conditions. He shall promptly repair all damages caused by his operations under this Contract. Gasoline-driven equipment, if used inside buildings or enclosed areas, shall have its exhaust piped to the outside of the building or enclosed area. In such cases at each location and at all times of use of gasoline-driven equipment the Boring Contractor shall provide emergency fire extinguishers or other approved fire fighting apparatus.

ARTICLE 8. ROYALTIES AND PATENTS

(a) The Boring Contractor shall include in the unit prices bid, as part of the cost of the work, all royalties and license fees for the use of any device, method, arrangement, article, process or appliance used in connection with the work specified hereunder.

(b) The Boring Contractor shall defend at his own expense all suits or claims for infringement of any patent or trademark as a result of performing the work specified hereunder, and shall indemnify and save harmless the Owner and the Consulting Engineer from any loss on account thereof.

ARTICLE 9. CLAIMS FOR ADDITIONAL PAYMENTS

The unit prices in the Boring Contractor's Proposal shall include all payments of whatsoever kind to be paid to him on account of the work hereunder. All local and state taxes shall be included in the unit prices listed in the Proposal. No claims for extra work of any kind will be allowed except as specifically ordered in writing by the Owner. All payments to the Boring Contractor will be on the basis of the unit prices quoted and made part of this contract.

ARTICLE 10. STORAGE

The Boring Contractor shall provide suitable space on the site for the storage of boring equipment and samples unless such space is specifically made available by the Owner. Undisturbed and "Shelby" tube samples shall be protected from extreme heat and from freezing at all times.

ARTICLE 11. DELIVERY OF SOIL SAMPLES

The Boring Contractor shall deliver all soil samples to the office of the Consulting Engineer at 225 West 34th Street, New York, NY 10122. All samples shall be shipped or delivered by the Boring Contractor within two days after completion of the boring from which the samples were obtained. Samples placed in jars are to be packed in wooden boxes, metal containers or pasteboard cartons, properly marked to indicate to shipper that soil samples are enclosed. Boring Nos. in each container shall be indicated. Undisturbed soil samples are to be carefully boxed in wooden boxes, with each sample container surrounded by soft, dry packing, such as sawdust or excelsior, so that these samples may be safely shipped. Care must be taken when handling undisturbed soil samples to avoid shock or jar, which may affect the character of the sample, and adequate precautions must be taken to prevent freezing of samples during transportation. Undisturbed soil samples obtained at locations more than 200 miles distant from New York City shall be shipped by air freight to the office of the Consulting Engineer. All shipments are to be prepaid by the Boring Contractor.

ARTICLE 12. LIENS

The Boring Contractor warrants that the work hereunder shall be free of liens of any kind as of the date of completion of such work.

ARTICLE 13. AGREEMENT IN DEFAULT

(a) If the Boring Contractor should be adjudged a bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he should be guilty of substantial violation of any provision of this Contract, then the Owner may terminate this Agreement by serving the Boring Contractor with notice in writing of such termination.

(b) Upon termination of this Agreement in accordance with Sub-Section (a) of this Article, the Owner may finish the required work by whatever method he may deem expedient, and the Boring Contractor shall not be entitled to receive any further payment until such work is finished.

(b) If the actual costs to the Owner for completion of all work contemplated under this Contract exceed the cost of all such work computed on the basis of the unit prices in this Contract, such excess costs shall be deducted from the monies withheld from the Boring Contractor in accordance with Sub-Section (b) of this Article and any balance remaining shall then be paid to the Boring Contractor. If such excess costs are greater than the monies withheld from the Boring Contractor, he shall not be entitled to any payments from the Owner but his liability for excess costs shall not be greater than the total of all monies withheld at the time of termination of this Agreement.

ARTICLE 14. DAMAGES

If either party to this Agreement should suffer damage in any manner because of any wrongful act or neglect of the other party or of anyone employed by it, then the party wronged shall be reimbursed by the other party for such damage.

ARTICLE 15. PAYMENTS

Payment for the work required hereunder will be in one lump sum after the satisfactory completion of the work. The Boring Contractor shall make application for payment through the Consulting Engineer on the basis of unit prices, as stated in the Contract.

ARTICLE 16. PAYMENT WITHHELD

Payment for the work may be withheld by the Owner for any of the following reasons:

(a) Claims filed or reasonable evidence indicating probable filing of claims.

(b) Failure of the Boring Contractor to make payments properly for material or labor.

(c) Damages to persons or property of others that indicate probability of damage claims.

ARTICLE 17. ARBITRATION

Any claim or controversy arising out of or relating to this Contract or to any breach thereof, with the exception of claims relating to items for which insurance protection is required in Article IX of Section A, shall be settled by arbitration in accordance with the rules of the American Arbitration Association then in force. Such arbitration shall be submitted to three (3) arbitrators for a decision of a majority of them. Each disputant shall elect its arbitrator within seven (7) days of the demand for arbitration. If either disputant fails to designate an arbitrator within seven (7) days, then the American Arbitration Association shall designate that arbitrator.

The third arbitrator shall be designated by the American Arbitration Association.

The cost and expense of the arbitration shall be borne by the parties as assessed by a majority decision of the arbitrators. The parties agree to be bound by any award so made as the final adjudication of any such claim or controversy, and judgment upon an award may be entered in the court having jurisdiction.

The Boring Contractor shall not cause any delay in the work during any arbitration proceedings, except by agreement with the Owner or Consulting Engineer.

SPECIAL CONDITIONS AND WORKMANSHIP

ARTICLE 18. NUMBER AND LOCATIONS OF BORINGS

(a) The Contract Drawing(s) identified in Article VI, Section A show(s) the approximate number, type, locations and sequence of borings required. During the progress of the work the Owner may direct that certain borings be omitted, or may require that the number of borings be increased, or may change the types or required depths of borings. Any such change will be based on the needs of the work and the conditions disclosed by the borings and shall be carried out by the Boring Contractor as if originally specified for the work.

(b) Should the number of borings be increased over those shown on the Boring Location Plan or should any borings be omitted, the Boring Contractor will be paid only for the borings completed and accepted, at the unit prices stated in the Contract.

(c) Every attempt has been made by the Owner to locate borings so as to clear known underground structures and to permit the work to be done at points favorable to the Boring Contractor's operations. The Owner makes no representations as to the character of the subsoil through which the borings are to be sunk, or that any boring location given will be found free from obstructions.

ARTICLE 19. ABANDONED BORINGS

(a) Borings shall not be abandoned before reaching the final depth ordered by the Consulting Engineer except on the approval of the Consulting Engineer. No payment will be made for borings abandoned by reason of an accident or negligence attributable to the Boring Contractor.

Borings abandoned before reaching required depth, due to an obstruction or other reasonable cause not permitting completion of the boring by standard procedures, shall be replaced by a supplementary boring adjacent to the original and carried to the required depth. Penetration to the completed depth of the original boring may be made by any means selected by the Boring Contractor and approved by the Consulting Engineer. Payment will be made for the

approved portion of the abandoned hole plus that portion of the supplementary boring extending below the final elevation of the original borings. Samples shall be taken in the supplementary boring from the elevation at which the original boring was abandoned in manner specified for the original boring.

If abandoned for reasons acceptable to the Consulting Engineer, payment will be made for the boring at the appropriate unit prices for boring and sampling stated in the Contract, provided the Boring Contractor presents soil samples and records as specified plus a report on the obstruction which necessitated relocating the boring.

(b) Blasting with small charges will be permitted for removal of boulders or other obstructions which cannot conveniently be removed otherwise, providing the Boring Contractor obtains permission therefore from public authorities and the Owner, and such blasting shall be done only when and as directed by the Consulting Engineer. Before blasting, the casing, if used to depth of blasting, shall be pulled up at least 8 feet to avoid damage.

ARTICLE 20. CASING

The Boring Contractor shall provide pipe or drill casing in quantities and sizes adequate for expeditious performance of the work. Casing shall be no less than 2-1/2" diameter for dry sample borings, and not less than 3-1/2" diameter for undisturbed sample borings. Larger sizes of casing may be required where obstructions or hard driving require "telescoping" of casing to advance the minimum sizes of casing to the depth of sampling. All holes are to be cased for the upper 10 feet and to greater depths as needed to meet field conditions. The Consulting Engineer may require casing for the full depth of borings if, in his opinion, successful boring and sampling operations cannot be carried out without casing, or if casing is required to obtain ground water observations at particular depths or for extended periods.

ARTICLE 21. SOIL SAMPLING DEVICES

Soil sampling devices shall be approved by the Consulting Engineer before their use, but shall be generally as described or specified in Articles 22, 23 and 24.

ARTICLE 22. DRY SAMPLE BORINGS

The borings are to be advanced using ordinary boring techniques by driving casings not less than 2-1/2" in diameter to the extent needed to maintain an open hole without loss of ground and removing the soil from within the casing and from the hole by washing. Cleaning out the hole where casing is used or advancing the hole if casing is not needed shall not be done by washing through a sampling spoon or open-ended drill rod unless prior approval is obtained from the Consulting Engineer. The use of rotary drilling techniques with weighted drilling mud, hollow stem augers or other methods to advance and maintain a stabilized hole will not be

permitted unless prior approval is obtained from the Consulting Engineer. Casings, where used, shall be driven down without washing in stages of not more than five feet, after which the material shall be cleaned out to the depth of the casing. At every change in soil formation and at vertical intervals not to exceed 5 ft. hole advancement shall be stopped, the loose materials shall be removed from the hole, and an ordinary dry sample of the material shall be taken. These samples shall be taken by sampling barrels described in Paragraph (a) below. The samples shall be removed from the hole in unwashed condition in such a manner as to provide a true sample of the soil formation from which they are recovered. Requirements for the sampler and soil samples are as follows:

(a) A 2" O.D. split-barrel sampler similar to Sprague & Henwood's Sampler No. A 15376 or Ackers Sampler No. 220 17-9 may be used, provided a full I. D. open split-barrel at least 20" long is incorporated in the sampler. For material requiring more than 30 blows per foot a 12" split barrel will be acceptable. The beveled edge of the drive shoe shall be maintained in good condition and if excessively worn shall be reshaped to the satisfaction of the Consulting Engineer. The drive shoe of the sampler shall be replaced, if damaged in such a manner as to cause projections within the interior surface of the shoe.

(b) Under no circumstances shall samples be recovered by driving the casing as a sampling barrel. All samples shall be obtained by driving the barrel sampler in undisturbed ground beneath the bottom of the casing. Samples shall be recovered at every change in soil formation and at vertical intervals not to exceed 5 ft. For special conditions of samples and sampling in the upper 10 ft., see Section A.

(c) After cleaning the hole of all loose material, the sampling barrel shall be driven by a free-falling drop weight weighing 140 lbs. and falling 30". The sampler shall be driven using Standard A-rods connected between the sampler and drive head unless use of other equipment is approved by the Consulting Engineer.

(d) In all soils requiring less than 30 blows per foot of penetration, the sampling barrel shall be driven 18" with the number of blows for each 6" of penetration observed and recorded. The penetration resistance of the soil shall be the sum of the number of blows for the second and third 6" increments of penetration but the boring records shall show the observations for all three 6" increments of driving.

(e) In soils requiring 30 or more blows per foot of penetration, the sampling barrel shall be driven 12" with the number of blows for each successive 6" penetration observed and recorded. In extremely hard materials requiring over 80 blows per foot, the blows for smaller amounts of penetration may be observed and recorded with special note of the amount of penetration actually obtained.

(f) When casing is used, particular care shall be taken to remove all soil to the bottom of the casing before sampling. Particular care must be exercised to maintain the hole full of water during all operations preceding sampling, such as during removal of wash pipe and wash bit and assembly and insertion of sampling barrel. The Boring Contractor shall provide positive inflow of water at the top of the casing during removal of drill rods or wash pipe.

(g) Trap doors of flap valves protruding at any point into the inside diameter of the sampler may not be used without prior approval of the Consulting Engineer.

Immediately on removal from the hole the split-barrel samples shall be tightly sealed in screw-top glass jars or bottles at least 3-1/2" high, approximately 1-3/4" inside diameter at the mouth, and with inside diameter of the jar no more than 1/4" larger than that at the mouth. The jars shall be provided with metal screw caps containing a rubber or waxed-paper gasket. Each sample container shall be labeled to show plainly the number of the hole, the depth from which the sample was taken, and the number of blows for penetration of the sampler as previously specified. Samples shall be placed in the jars in the condition in which they are removed from the split-barrel sampler without squeezing, mashing or otherwise excessively distorting the sample. The Boring Contractor shall, at his expense, provide such containers, keeping a sufficient supply on hand to prevent any delay in the work.

At the request of the Consulting Engineer, the Boring Contractor may be required to take samples in a 2" O. D. open-type "Shelby" tube sampler with sample tubes 30" long and provided with a positive ball check valve in its head. Such samples shall be obtained by shoving or jacking the sampler into undisturbed soil at the bottom of the hole. Wherever possible, the equipment for advancing the sampler shall measure the force required to penetrate the soil. The Boring Contractor shall record this force, the time required for penetration, depth of penetration and length of sample recovered. These samples shall be sealed in the tubes in which they are obtained and carefully labeled to show location and depth of sample. Payment for 2" diameter Shelby tube samples shall be made in addition to the payment for the 2-1/2" diameter dry sample boring, at the unit price per sample stated in the Contract, which unit price shall include the cost of recovery of the sample, cost of the tube, sealing and shipment to the Consulting Engineer.

ARTICLE 23. CONTINUOUS SAMPLING

Continuous sampling in certain borings or through certain soil strata may be called for in Article XI of Section A, or may be requested by the Consulting Engineer on the basis of information disclosed by the borings. Continuous sampling shall mean the securing of successive 2" diameter samples in thin-wall tube sampling devices without intervening drilling or washing except for cleanout operations as specified in Article 24.

When continuous sampling is required in cohesive soils, samples shall be taken in a 2" O.D. open-type "Shelby" tube sampler as specified in Article 22, except that cleaning the hole between samples shall be accomplished as specified in Article 24. Continuous sampling in cohesive soils shall be performed when ordered at the unit prices stated in the Contract for 2-1/2" diameter dry sample borings and for 2" diameter by 30" long "Shelby" tube samples.

Continuous sampling in cohesionless silts, sands, sands and gravels, and in strata where cohesive soils are interlayered with non-cohesive materials is a special operation and shall be performed as follows at unit prices established specifically for this work in the Contract. The drill hole shall be kept filled with a stable drilling mud of sufficient density and viscosity to maintain an open hole whether or not casing is used. The drilling mud may be formed from natural clay, added bentonite or "aquagel", commercial drilling muds or any similar material providing a non-segregating, high density, viscous fluid. Samples shall be taken in a 2" diameter piston-type sampler provided with a thin-wall sampler barrel not less than 30" long, which can be separated longitudinally into two halves after removal from the ground. This sampler shall be operated as specified in Article 24 with the exceptions that cleaning out between samples shall be done with drilling mud previously described and that the sampler will be opened, measurements on the sample will be completed, and the sample will be removed from the sampler barrel immediately after removal from the hole.

As an alternative to continuous sampling by 2" diameter piston sampler with split barrel, the Boring Contractor may elect to use a 3" diameter open-type "Shelby" tube sampler in conjunction with the boring procedure specified above. The entire sample recovered in this operation shall be pushed from the tube immediately after recovery by equipment exerting sufficient pressure to extrude the sample in one continuous operation without distortion of the individual strata. When this method is chosen by the Boring Contractor, payment will be made at the unit prices stated in the Contract for 2-1/2" dry sample borings and continuous "Shelby" tube sampling.

Detailed measurements of all materials recovered in each such sample, including the per cent of recovery, will be made and incorporated into the boring records. At the direction of the Consulting Engineer, certain materials recovered in this sampling operation shall be preserved in the manner described in Article 22 for split barrel samples.

ARTICLE 24. UNDISTURBED SAMPLE BORINGS

For obtaining undisturbed soil samples, borings shall be made as specified under Article 22, except that casing shall be at least 3-1/2" in diameter. At locations in the soil strata selected by the Consulting Engineer, undisturbed soil samples shall be recovered by means of special piston-type samplers. When ready to take such samples, all loose and disturbed materials shall be removed to the bottom of the casing or of the open hole. This final cleaning shall be accomplished with a device in which wash water is fully deflected in an upward direction. No washing with downward directed jets will be permitted within 4" of the intended top of the undisturbed sample unless otherwise directed by the Consulting Engineer. Cleaning out of the last

4" above the intended top of the sample must be accomplished with a shielded-jet auger such as an "MPF&M Clean-Out Jet Auger" (Sprague & Henwood Catalog A15239 for 3-1/2" pipe or A15240 for 4" pipe) (Ackers Catalog 320396 for 3-1/2" pipe or 320397 for 4" pipe) or equivalent device. Cleaning out shall be done in such manner that the soil immediately below the bottom of the casing shall be as nearly undisturbed as possible. The sampling device connected to the drilling rod shall then be lowered slowly to the bottom of the hole and the sampler forced into the soil for a distance of not less than 24" or more than 27".

In the operation of securing the undisturbed samples, the samplers shall be forced into the soil at a rate of 4" to 5" per second. The samplers shall be pushed or jacked downward, and not be driven unless the character of the soil is such that driving with the hammer is absolutely necessary and is approved by the Consulting Engineer.

The sampler with its contained soil sample shall then be carefully removed from the hole. The thin tube containing the sample shall be detached from the driving head, and the soil sample shall not be extruded from the tube. The soil sample in the tube shall be carefully squared at each end, not less than 1/4" back of the ends of the tube, and the end spaces shall be filled with hot paraffin. The ends of the tube shall then be closed with snug-fitting metal caps which shall be secured in place with friction tape, after which the ends of the tube shall be dipped in hot paraffin to provide air-tight seals.

Tubes for undisturbed samples shall be provided by the Boring Contractor, and shall be of 16-gauge seamless brass or hard aluminum. Steel tubes shall not be used except with the express approval of the Consulting Engineer. If steel tubes are approved for use they shall be of 16 or 18 gauge seamless steel, fully coated with lacquer inside and out. Sample tubes shall have a machine-prepared sharp cutting edge with a flat bevel to the outside wall of the tube. The cutting edge shall be drawn in to provide an inside clearance beyond the cutting edge of 0. 015"+ 0. 005".

Undisturbed soil samples are to be recovered by means of a thin-wall piston-type sampling device, similar to Sprague and Henwood's No. A 15119 or Ackers No. 22041-7 in which piston rods extend to the ground surface, or a self-contained hydraulically operated piston sampler such as the "Osterberg" sampler, or a casing-actuated piston sampler such as the "Hong" sampler. The sampler selected shall be designed to utilize sample tubes of three inches outside diameter. When samplers utilizing piston rods extending to the ground surface are used, positive locking of the piston rods with respect to the surface of the ground must be provided to prevent upward or downward motion of the piston during the advance of the sampling tube and the piston rods must be positively locked to the drill pipe at the surface during removal of the sampler for the depth to which it penetrated undisturbed soil. If the piston rods are locked to the mast of a truck-mounted drill rig, the rig shall be blocked and anchored to the ground in such a manner as to prevent motion of the rig during the sampling operation.

If specifically approved in advance by the Consulting Engineer, samples may be recovered in hard soils by an open-type, thin-wall sampling device, similar to Sprague and Henwood's "Shelby Tube Sampler" No. A 15446 or No. A 15447 or Ackers No. 22012-4 or No. 22058-4.

In very soft soils a weighted drilling mud may be required by the Consulting Engineer, whether or not casing is used, in order to maintain a pressure on the soil as nearly equal as possible to that existing before the drilling operations.

Under certain conditions continuous sampling with 2" diameter "Shelby" tubes may be required in cohesionless materials encountered in 3-1/2" undisturbed sample borings. Such continuous sampling operations shall be carried out in the manner specified in Article 23. Payment for 2" diameter continuous "Shelby" tube samples shall be made at the unit price per foot stated in the Contract in addition to payment for the 3-1/2" undisturbed sample boring.

Undisturbed soil samples shall be clearly, accurately and permanently marked to show the number of the hole, the number of samples, the depth from which the sample was taken, the measured recovery and any other information which may be helpful in determining subsurface conditions. Whenever possible a measurement of the force required to push the undisturbed sampler tube into the soil shall be obtained and recorded.

ARTICLE 25. CORE DRILLING IN ROCK

When core drilling in rock is called for in Article XI of Section A, casing for each boring so designated shall be driven to and sealed into bedrock. A Series "M" double-tube core barrel with a diamond bit shall be used for the recovery of rock cores not less than 1-3/8" (one and three-eights inches) in diameter. A core barrel and bit other than Series "M" may be used if it recovers core of the required diameter and if in the opinion of the Consulting Engineer equivalent core recovery will be obtained.

The Boring Contractor shall drill the minimum distance into sound bedrock called for in Article XI of Section A or to depths as directed by the Consulting Engineer. Where soft or broken rock overlying bedrock is encountered, the Boring Contractor shall drill through the soft or broken rock and to the specified depth into sound rock. Soft or decomposed rock shall be sampled with a driven sampler whenever possible. Measurement for payment of core drilling will begin at that depth, established by the Consulting Engineer, where it becomes impracticable to advance the hole by washing and chopping and using a driven sampler.

The individual drill runs in the coring operations shall in no case be in excess of 5 ft. and shall be of such an amount, depending on the nature of the rock encountered, as to assure maximum core recovery. Every effort shall be made by the Boring Contractor to obtain maximum possible core recovery. The core barrel and bit shall be in good condition. The rate of rotation and downward pressure of the core barrel and the pressure of circulating fluid shall be controllable and adjustable in a manner that will produce optimum core recovery. Drill rods shall be straight and drilling equipment shall be adjusted so that the head of the rods do not oscillate. The coring equipment used shall be of a type that will maintain continuous contact between the core bit and the rock being drilled. All significant actions of the bit and reasons for loss of core shall be recorded in the boring log.

The Boring Contractor shall preserve and deliver to the Consulting Engineer, as specified in Article 11, the entire rock core obtained, stating the length of core recovered compared with the actual depth of drilling required to obtain the sample. Each core shall be packed in well-constructed wooden boxes, provided by the Boring Contractor at his expense, with dividing strips to hold the cores in position and in the order in which they were recovered from each hole. Core boxes shall be marked on the inside and the outside with the number of the bore hole and depths from which the cores were recovered so that they may be easily identified. Wooden blocks shall be placed in the box to separate the core runs and shall be marked to identify the core depth. When the core recovered is fragmented, all pieces of size less than the core diameter shall be put in plastic bags and placed in the appropriate position in the core box.

ARTICLE 26. GROUND WATER OBSERVATIONS AND PIEZOMETER INSTALLATIONS

Observations shall be made of ground water levels in all completed holes. Any and all unusual water conditions and gain or loss of water in boring operations shall be recorded completely in the boring logs. Whenever required by the Consulting Engineer, bore holes shall be bailed for observations of ground water conditions. When the open hole process is used utilizing natural or commercial drilling mud to stabilize the hole, the hole shall be flushed thoroughly with clean water at the completion of the boring for the purpose of observing ground water levels.

In general, ground water level observations shall be made by filling the hole with clean water to a point above the natural ground water level and observing the drop in level of water in the hole. This shall be followed by bailing the hole to a point below the natural ground water level and observing the rise in level of water in the hole. All individual measurements of water level in holes shall state the time elapsed since the last filling or bailing of the hole. Observations of ground water levels as specified above are considered the responsibility of the Boring Contractor and all costs therefore shall be included in the unit prices stated in the Contract for the various items of the work.

If required in Article XI of Section A, the Boring Contractor shall install standpipe piezometers in certain bore holes identified on the Boring Location Plan and designated by the Consulting Engineer. The piezometer shall consist of either a porous stone with plastic tubing or a ½" diameter pipe equipped with wellpoint screen. The type of piezometer to be installed shall be as indicated in Section A of the specifications.

Borings designated to receive porous tube piezometers shall be cased to a minimum of 2 feet below the bottom of the deepest proposed piezometer. All materials for the assembled porous tube piezometer will be furnished by the Consulting Engineer. Elevations for the proposed piezometers will be provided by the Consulting Engineer. After the boring is completed the hole shall be backfilled to the bottom of the casing. Two feet of clean concrete sand, well-graded between the No. 200 sieve and the 1/4" size shall be placed in the casing, and

the casing withdrawn 2 feet. The deepest piezometer shall then be placed in the casing with plastic tubing sufficiently to reach 6 inches above ground surface. The space surrounding the piezometer should then be backfilled with the same concrete sand to a minimum of 2 feet above the intake point of the piezometer. The sand backfill shall be tamped while being placed using a special tamping weight provided by the Consulting Engineer. During all the backfilling operations the casing shall be withdrawn in small increments so as to avoid disturbing the backfill, but without exposing the sides of the hole above the backfill at any time. After tamping the sand backfill and while the standpipe is centered in the casing, an impervious plug of grout not less than 4 feet in length shall be placed above the sand around the standpipe. In general, the grout seals shall consist of a stiff sand-cement mixture or a sand-cement-bentonite mixture containing not less than 40% cement by volume and shall be tamped in place. When the depth of the next piezometer is reached, the above process shall be repeated. A 2 foot length of 2-1/2" diameter pipe or casing shall be placed around the standpipe at the surface, seated in grout and capped and the location and number of the piezometer prominently marked and protected. The Boring Contractor will not be responsible for observations of water levels in the standpipe piezometers. All costs of materials required for the porous tube piezometer and its installation, as specified above, which are not designated as supplied by the Consulting Engineer shall be included in the Contractor's cost for each piezometer. If modifications of the installation procedure are required by the Consulting Engineer which entail a substantial increase in cost to the Boring Contractor, an appropriate adjustment will be made in the unit price stated in the Contract.

If requested by the Consulting Engineer the piezometer used shall consist of a ½" diameter pipe equipped with a wellpoint screen in its bottom 3 feet, and placed in a 6-foot length of sand packing at the bottom of the bore hole with a 4 foot long grout seal above the sand packing as follows: A boring designated to receive a piezometer shall be cased for its entire length and after the boring is completed, clean wash water shall be circulated until the return water is clear of fines. The bottom 2 feet of the bore hole shall be backfilled with the clean concrete sand. The wellpoint screen and the length of ½" diameter pipe shall be sufficient to reach from the top of the sand backfill to within 6" of the ground surface and shall be lowered to the previously placed sand with its wellpoint screen end down and centered in the casing while the space surrounding the pipe is backfilled with the same clean concrete sand for a length of 4 feet above the tip of the pipe. During all the backfilling operations the casing shall be withdrawn in small increments so as to avoid disturbing the backfill but without exposing the sides of the hole above the backfill at any time. After tamping the sand backfill and while the ½" diameter pipe is centered in the casing a 4:3:1 mixture by volume of fine sand, cement and bentonite shall be poured around the pipe to fill a 4 foot length above the sand backfill. The casing shall be removed from this depth immediately after pouring the grout. The ½" diameter pipe shall be fitted with a threaded cap having a 1/8" diameter opening at the top. A 2 foot length of 2-1/2" diameter pipe or casing shall be placed around the standpipe at the surface, seated in grout and capped, and the location and number of the piezometer prominently marked. The Boring Contractor will not be responsible for observations of water levels in such standpipe piezometers. All costs of the materials for the ½" diameter standpipe with wellpoints required for the piezometer and its installation as specified above shall be included in the Contractor's cost for each piezometer. If modifications of the installation procedure are required by the Consulting

Engineer which entail a substantial increase in cost to the Boring Contractor, an appropriate adjustment will be made in the unit price stated in the Contract.

ARTICLE 27. PLAN OF LOCATION AND ELEVATIONS OF BORINGS

The Boring Contractor shall prepare a plan from survey data obtained as specified in Article VIII of Section A, showing the final position of all completed borings in relation to permanent and well-defined reference points within an accuracy of 1 foot of their true location in the field, and the ground surface elevation at each boring relative to established bench marks to an accuracy within 0. 2 ft. of the true elevation. This plan shall also show the identifying number of the boring, the datum for elevations, and the location of reference points in relation to features identified on the Contract Drawing No. 1, "Boring Location Plan". Four copies of the Boring Contractor's final location plan shall be furnished the Consulting Engineer together with the records required in Article 28.

ARTICLE 28. SAMPLES AND RECORDS

Each sample shall be labeled to show plainly the number of the boring, the sampler number, description, depth below the surface from which the sample came, and the resistance to penetration of the sampler.

During the progress of each boring the Boring Contractor shall keep a continuous and accurate log of the materials encountered and a complete record of the operation of sinking the casing. Where driving is permitted on the sampler he shall also keep a record of the number of blows required to advance the sampling barrel each 6" in the soil where each sample is taken.

Records shall include at least the following data:

- Dates and times of beginning and completion of work.
- Identifying number and location of test boring.
- Ground surface elevation at the boring.
- Diameter and description of casing.
- Total length of each size of casing.
- Length of casing extending below ground surface at the completion of the boring.
- Weight, number of blows, and drop of hammer used to drive the casing each successive foot.
- Elevation of ground water table.
- Elevation of top of each different material penetrated.
- Elevation of the bottom of sampler at start of driving for each sample.
- Elevation to which the sampler was driven.
- Weight and drop of hammer used to drive the sampler and number of blows required to drive it each 6" for each sample.
- Methods and forces used to push sampler tube when not driven.

- Length of sample obtained.
- Distance from the bottom of the sampler to the lower end of the sample when the sampler is not filled to the bottom, and any other circumstances of obtaining the sample.
- Stratum represented by the sample.
- Loss or gain of drilling water or mud.
- Any sudden dropping of drill rods or other abnormal behavior.

Soil shall be described in accordance with the following classifications:

1.	Texture and Composition	Topsoil, fill including complete description of character and constituents, gravel, sand, silt, clay, organic silt, peat, meadow mat, etc. Designate predominant soil type last, as in: sandy, silty clay with trace gravel; or organic silt, some sand lenses, trace leaves and grass roots.
2.	Consistency	Sands and gravels – loose, medium, compact, very compact. Clays and silts – soft, medium, stiff, hard.
3.	Plasticity	Non-plastic, slightly plastic, plastic, fat, sticky, etc.
4.	Color	Light, dark, black, blue, yellow, red, brown, etc. as in: dark greenish brown organic silt with some sand.
5.	Moisture	Dry, moist, wet, etc.

At the completion of the work, copies in blueprint form of logs and records of the borings, records of the ground water level observations, and the plan showing the actual locations and surface elevations of all borings required in Article 27 shall be delivered in quadruplicate to the Consulting Engineer.

The purpose of these borings is to provide reliable information regarding the character and elevation of the several soil formations. The Boring Contractor shall give the Consulting Engineer every facility for obtaining his own records and determining every detail of the work as it progresses.

ARTICLE 29. CLEAN UP

(a) On completion of the work the Boring Contractor shall remove his rigs, all surplus and unused material and material removed from the holes and leave the spaces in clean condition to the satisfaction of the Owner and Consulting Engineer.

(b) The Boring Contractor shall cut off and remove all casing in water to the level of the bed of the waterway or lake, and on land he shall cut off casing at one foot below the surface, or remove it entirely, as he wishes. Any other requirement made by the authority controlling the use of the waterway shall be observed. All holes remaining inside buildings or in public ways shall be plugged at top with concrete.

ARTICLE 30. DEFINITIONS OF PAY QUANTITIES

The amount of work to be paid for at the unit prices bid shall be the total lineal feet of borings made and the total number of undisturbed samples taken, and accepted by the Consulting Engineer as conforming to the requirements of these Specifications, and shall be measured as follows:

1. For 2-1/2" diameter dry sample borings, including the recovery of split-barrel samples, payment will be made at the unit price per foot stated in the Contract for the actual lineal feet of hole sunk and accepted by the Consulting Engineer, measured from the surface of the ground to the bottom of the hole or to the depth at which core drilling begins, but the lineal feet of borings for which payment will be made shall not exceed five times the number of samples recovered.

2. For 2" diameter "Shelby" tube samples taken in 2-1/2" diameter dry sample borings, payment will be made for each tube sample successfully recovered at the unit price per tube sample stated in the Contract, such price to include the cost of the tube, sealing and shipment to the Consulting Engineer.

3. For continuous 2" diameter "Shelby" tube samples through cohesionless sands, sands and gravels, or in strata where cohesive soils are interlayered with non-cohesive materials, payment will be made at the unit price per foot stated in the Contract for the actual lineal feet of hole sampled continuously with sample recoveries greater than seventy-five per cent (75%) of the gross depth. For other portions of the depth of the hole, payment will be made at the unit price per foot for 2-1/2" diameter dry sample borings.

4. For 3-1/2" minimum diameter soil borings, including the recovery of split-barrel samples, but excluding the recovery of undisturbed soil samples, payment will be made at the unit price per foot stated in the Contract for the actual lineal foot of hole sunk and accepted by the Consulting Engineer, measured from the surface of the ground to the bottom of the deepest undisturbed soil sample recovered. Extensions of such borings in soil below the depth of undisturbed sampling will be paid for at the unit price per foot for 2-1/2" diameter dry sample borings.

5. For undisturbed soil samples as specified, payment will be made for each sample successfully recovered at the unit price per sample stated in the Contract, such price to include the cost of the tube and the sealing and shipment to the Consulting Engineer.

6. For borings in water, including the taking of split-barrel samples as specified, payment will be made at the unit prices per foot stated in the Contract, for the actual lineal feet of holes sunk and accepted by the Consulting Engineer, measured from the water level noted on the "Boring Location Plan" to the bottom of the hole or to the depth at which core drilling begins.

7. For core drilling in bedrock, including the recovery of cores as specified, payment will be made at the unit price per foot stated in the Contract for the actual lineal feet of hole cored and accepted by the Consulting Engineer, measured from the depth at which core drilling begins, as specified in Article 25, to the bottom of the hole.

8. For installation of porous stone standpipe piezometers for ground water observations in bore holes, including all labor and materials required, except the cost of the boring operation and the cost of the porous stone and plastic tubing, payment will be made at the unit price for each piezometer as stated in the Contract.

9. For installation of ½" diameter standpipe piezometers with wellpoint screen for ground water observations in bore holes, including all materials required but excluding the costs of the boring operation, payment will be made at the unit price for each piezometer stated in the Contract.

10. For moving equipment, tools and supplies to and from the job, and for any required plant rental, payment will be made in lump sum as stated in the Contract.

APPENDIX A

AVAILABLE INFORMATION

FOR

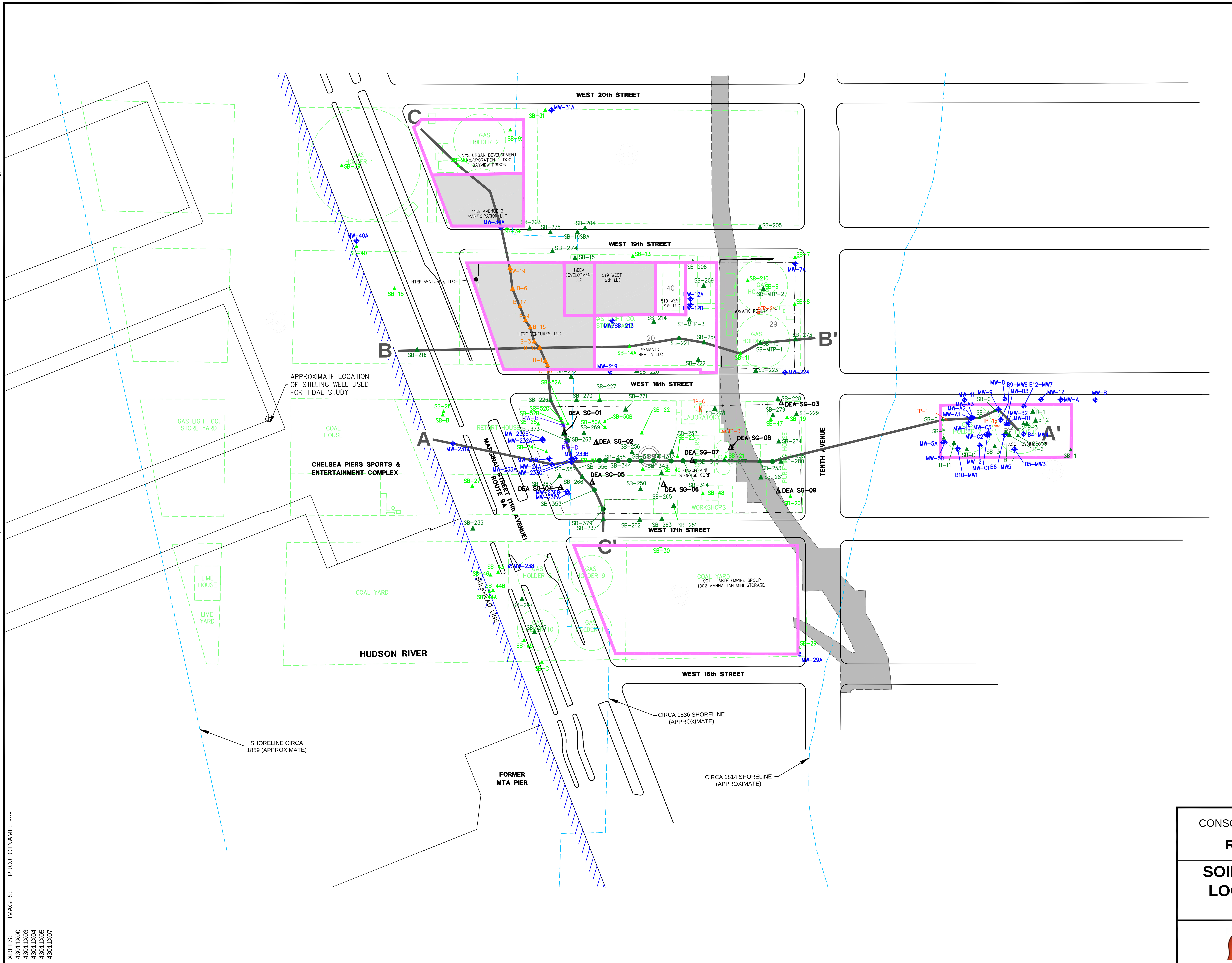
SUBSURFACE BORING AND SAMPLING

FOR

10th AVENUE AND WEST 18TH STREET DEVELOPMENT

PHASE I

NEW YORK, NEW YORK



LEGEND:

- MONITORING WELL LOCATION
- SOIL BORING LOCATION
- PRE-DESIGN NAPL DELINEATION SOIL BORING LOCATION
- RECOVERY WELL LOCATION
- BORING LOCATION (BBL)
- TEST PIT LOCATION
- APROXIMATE SOIL GAS SAMPLE LOCATION
- LOT BOUNDARY
- 691 BLOCK ID
- 43 LOT ID
- BULKHEAD
- HIGH LINE
- REMEDIATED PROPERTY
- A—A' CROSS SECTION TRANSECT LOCATION

NOTE:

1. BLOCK AND LOT ID AND PROPERTY LINE INFORMATION WAS OBTAINED FROM NEW YORK CITY DEPARTMENT OF FINANCE AUTOMATED CITY REGISTER INFORMATION SYSTEM (ACRIS).
2. SURVEY CONTROL WAS TAKEN FROM SITE WIDE BASE SURVEY PREPARED BY MUNOZ ENGINEERING, P.C. DATED APRIL 2007.
3. CURBING AND STREET BOUNDARIES TAKEN FROM MUNOZ ENGINEERING DRAWING ENTITLED MONITORING WELLS AND BORINGS LOCATION SURVEY" DATED 11/24/2008 AND TRC DRAWING ENTITLED PROPOSED REMEDIAL INVESTIGATION SAMPLE LOCATIONS" DATE UNKNOWN.
4. ALL LOCATIONS ARE APPROXIMATE.
5. HISTORICAL SHORELINES DIGITIZED FROM W BRIDGES, 1814, COLTON, 1836, AND PERRIS, 1859.
6. FORMER MANUFACTURED GAS PLANT (MGP) STRUCTURES ARE FROM THE CONSOLIDATED GAS COMPANY PLANT, AS SHOWN ON SANBORN MAPPING DATED 1895.
7. BORINGS WERE COMPLETED BY BBL DURING THE PRELIMINARY SITE INVESTIGATION (2002) AND PHASE II SITE INVESTIGATION (2003).

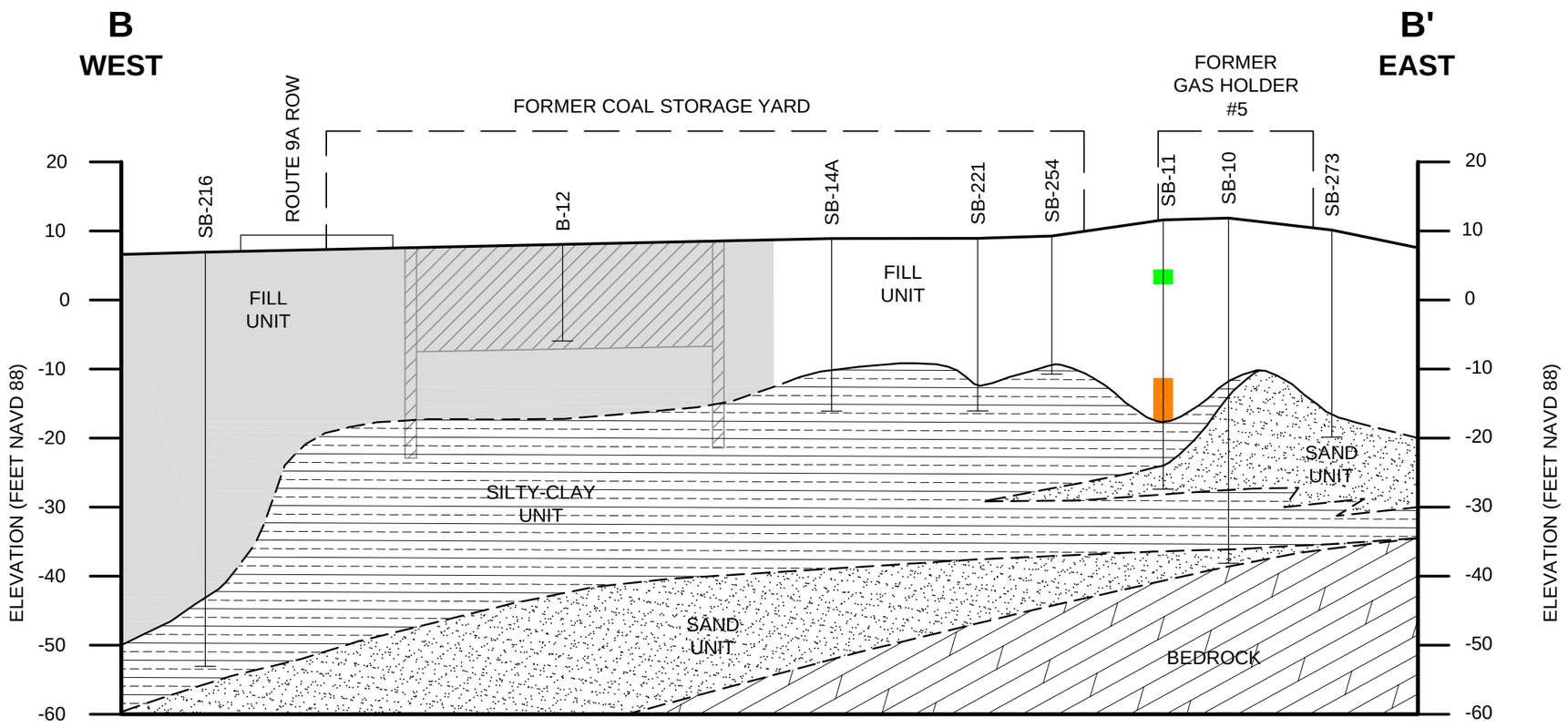
CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
WEST 18TH STREET FORMER GAS WORKS
REMEDIAL INVESTIGATION REPORT

SOIL AND GROUNDWATER SAMPLE LOCATIONS AND CROSS SECTION TRANSECTS

ARCADIS

FIGURE
4

CITY:Syracuse DIV/GROUP:Env-141 DB:A.Schilling LD:A.Schilling PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0043011\0001\00004\DWG\RI\43011B07.DWG LAYOUT: 4 SAVED: 12/23/2009 5:26 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 12/23/2009 5:26 PM BY: DECLERCQ, BRIAN
XREFS: 43011X00 43011X03 43011X04 43011X05 43011X07 IMAGES: PROJECTNAME: ----



LEGEND:

SB-216 — BORING

GROUND SURFACE

LITHOLOGICAL CONTACT

BOTTOM OF BORING

STAINING/SHEEN

OLM/TLM

FILL

SILT AND CLAY

SAND UNIT

BEDROCK (HARTLAND FORMATION)

AREA REMEDIATED BY EXCAVATION AND/OR BARRIER WALL

APPROXIMATE EXTENT OF HISTORICAL CRIBBING

NOTES:

1. ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
2. HORIZONTAL LOCATION OF HOLDER WALLS BASED ON HISTORIC MAPS.
3. EXCAVATION DEPTH AND BARRIER WALLS AT BLOCK 690, LOT 12 FROM THE REMEDIAL ENGINEER'S FINAL ENGINEERING REPORT, WEST 19th STREET DEVELOPMENT SITE, NEW YORK, NEW YORK, 2006.

0 20' 40'
VERTICAL SCALE

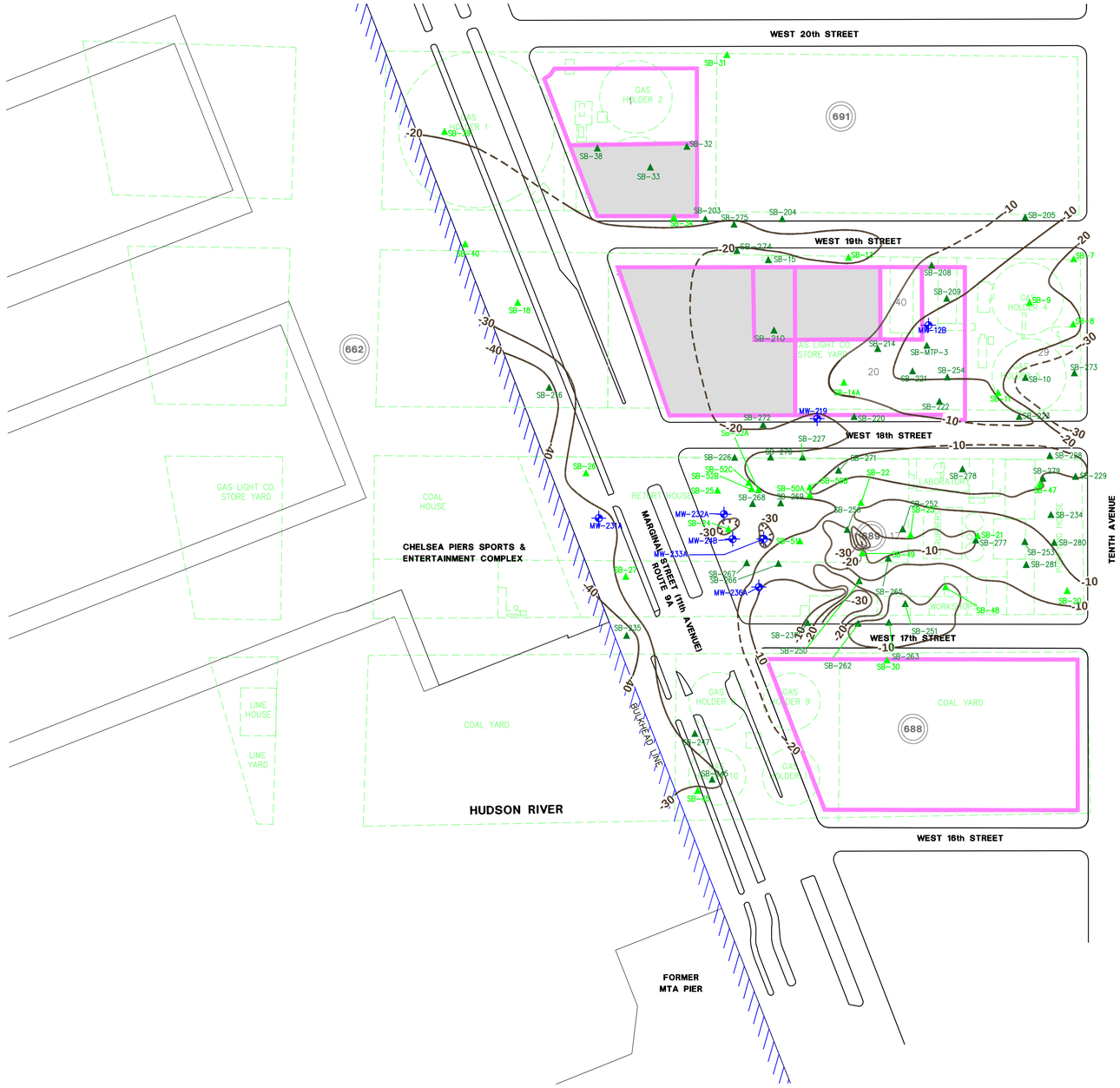
0 80' 160'
HORIZONTAL SCALE

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
WEST 18TH STREET FORMER GAS WORKS
REMEDIAL INVESTIGATION REPORT

CROSS SECTION B - B'

ARCADIS

FIGURE
5-B



LEGEND:

- MONITORING WELL LOCATION
- SOIL BORING LOCATION
- LOT BOUNDARY
- 691 — BLOCK ID
- 43 — LOT ID
- BULKHEAD
- HIGH LINE
- REMEDIATED AREA – CLAY SURFACE BOUND BY BARRIER WALL
- CURRENT BUILDING FOOTPRINT
- -30 — TOP OF CLAY ELEVATION CONTOUR IN FEET (DASHED WHERE INFERRED)
- CLOSED DEPRESSION

NOTE:

1. BLOCK AND LOT ID INFORMATION WAS OBTAINED FROM NEW YORK CITY DEPARTMENT OF FINANCE AUTOMATED CITY REGISTER INFORMATION SYSTEM (ACRIS).
2. SURVEY CONTROL WAS TAKEN FROM SITE WIDE BASE SURVEY PREPARED BY MUNOZ ENGINEERING, P.C. DATED APRIL 2007.
3. CURBING AND STREET BOUNDARIES TAKEN FROM MUNOZ ENGINEERING DRAWING ENTITLED MONITORING WELLS AND BORINGS LOCATION SURVEY" DATED 11/24/2008 AND TRC DRAWING ENTITLED PROPOSED REMEDIAL INVESTIGATION SAMPLE LOCATIONS" DATE UNKNOWN.
4. PROPERTY OWNERSHIP RECORDS OBTAINED FROM THE CITY OF NEW YORK DEPARTMENT OF FINANCE ACRIS DATABASE.
5. BUILDING LOCATIONS ARE APPROXIMATE.
6. FORMER MANUFACTURED GAS PLANT (MGP) STRUCTURES ARE FROM THE CONSOLIDATED GAS COMPANY PLANT, AS SHOWN ON SANBORN MAPPING DATES 1895.
7. PROPERTY BOUNDARIES FOR LOT 662 NOT SHOWN.
8. ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM (NAVD)OF 1988.
9. A SUMMARY TABLE OF CLAY SURFACE ELEVATIONS USED TO PREPARE THIS FIGURE CAN BE FOUND IN APPENDIX.
10. ONLY BORING LOCATIONS WITH CLAY SURFACE DATA USED TO PREPARE THIS CLAY SURFACE FIGURE ARE SHOWN.
11. ONLY REMEDIAL DESIGN BORINGS USED TO SUPPORT THE DEVELOPMENT OF CLAY SURFACE ARE PRESENTED ON THIS FIGURE.

0 80' 160'
GRAPHIC SCALE

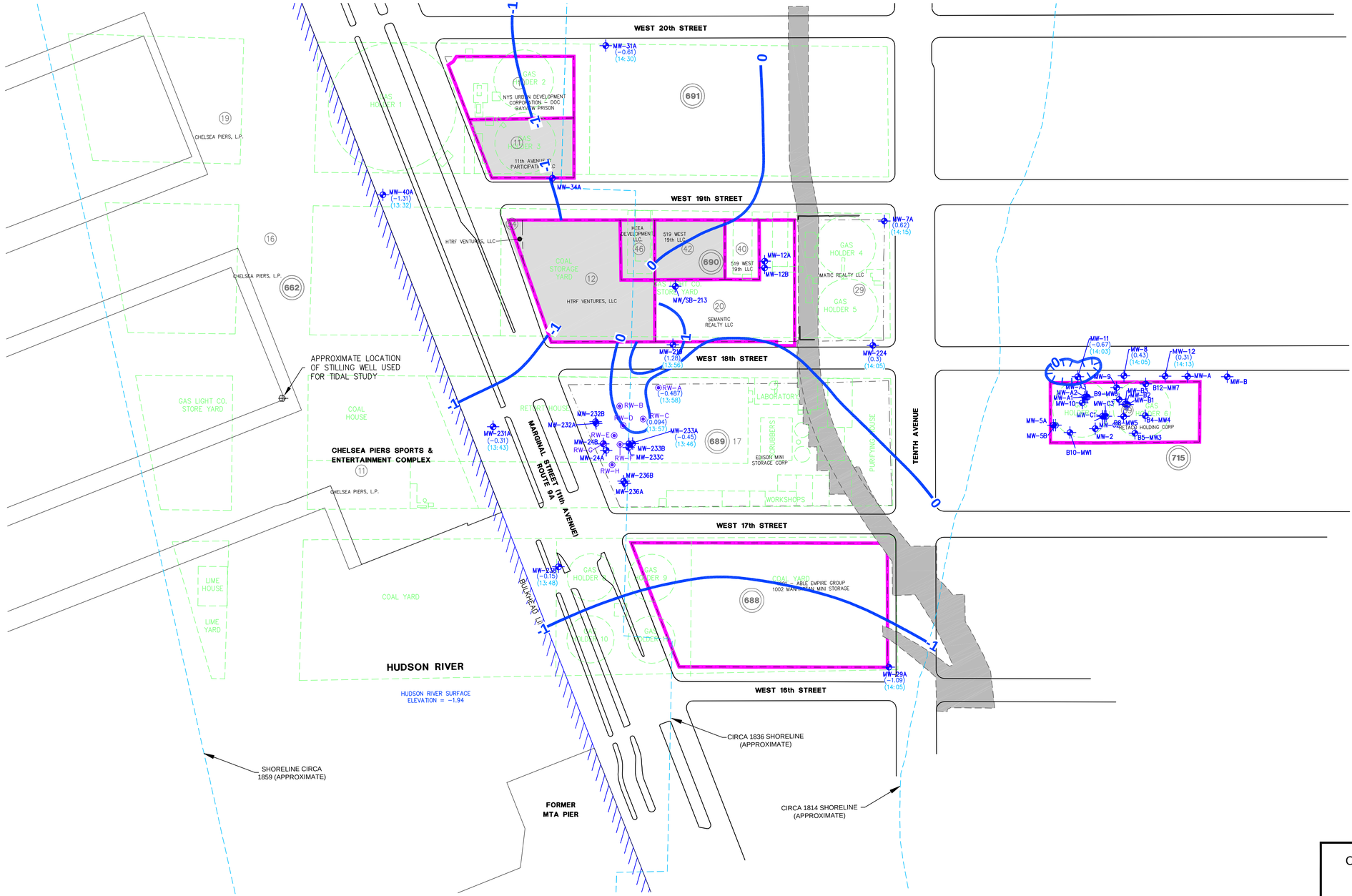
CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
WEST 18TH STREET FORMER GAS WORKS
REMEDIAL INVESTIGATION REPORT

TOP OF CLAY ELEVATION CONTOUR MAP

ARCADIS

FIGURE 6

CITY:Syracuse DIV/GROUP:Env-141 DB:A.Schilling LD:A.Schilling PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACTIVE\00430111000100004\DWG\R\430111B10.DWG LAYOUT: 6SAVED: 12/23/2009 4:34 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: ----PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 12/23/2009 5:08 PM BY: DECLERCQ, BRIAN
XREFS: IMAGES: PROJECTNAME: ----
430111X00
430111X03
430111X04
430111X05
430111X07
430111X06



LEGEND:

- MONITORING WELL LOCATION
- RECOVERY WELL LOCATION
- LOT BOUNDARY
- 691 — BLOCK ID
- 43 — LOT ID
- BULKHEAD
- HIGH LINE
- REMEDIATED PROPERTY
- CURRENT BUILDING FOOTPRINT
- (0.43) — GROUNDWATER ELEVATION
- (14:05) — TIME GROUNDWATER ELEVATION WAS MEASURED
- 0 — GROUNDWATER CONTOUR (DASHED WHERE INFERRED)
- CLOSED DEPRESSION

NOTE:

1. BLOCK AND LOT ID AND PROPERTY LINE FROM NEW YORK CITY DEPARTMENT OF FINANCE AUTOMATED CITY REGISTER INFORMATION SYSTEM (ACRIS).
2. SURVEY CONTROL WAS TAKEN FROM SITE WIDE BASE SURVEY PREPARED BY MUNOZ ENGINEERING, P.C. DATED APRIL 2007.
3. CURBING AND STREET BOUNDARIES TAKEN FROM MUNOZ ENGINEERING DRAWING ENTITLED MONITORING WELLS AND BORINGS LOCATION SURVEY" DATED 11/24/2008 AND TRC DRAWING ENTITLED PROPOSED REMEDIAL INVESTIGATION SAMPLE LOCATIONS" DATE UNKNOWN..
4. PROPERTY OWNERSHIP RECORDS OBTAINED FROM THE CITY OF NEW YORK DEPARTMENT OF FINANCE ACRIS DATABASE.
5. BUILDING LOCATIONS ARE APPROXIMATE.
6. HISTORICAL SHORELINES DIGITIZED FROM W BRIDGES, 1814 AND COLTON, 1836.
7. FORMER MANUFACTURED GAS PLANT (MGP) STRUCTURES ARE FROM THE CONSOLIDATED GAS COMPANY PLANT, AS SHOWN ON SANBORN MAPPING DATED 1895.
8. PROPERTY BOUNDARIES FOR LOT 662 NOT SHOWN.
9. ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988.
10. GROUNDWATER ELEVATIONS SHOWN ON THIS FIGURE ARE WITHIN 10 FEET OF THE SCREEN.
11. HUDSON RIVER SURFACE ELEVATION IS FROM A NOAA MEASUREMENT LOCATIONS AT THE BATTERY, NEW YORK CITY AT 13:48 EST ON JANUARY 21, 2009. THE ELVATION IS REFERENCED TO THE NAVD OF 1988.

0 80' 160'
GRAPHIC SCALE

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
WEST 18TH STREET FORMER GAS WORKS
REMEDIAL INVESTIGATION REPORT

WATER TABLE MAP FOR SHALLOW GROUNDWATER SURFACE - JANUARY 21, 2009

ARCADIS

FIGURE 7

CITY:Syracuse DIV/GROUP:Env-141 DB:A.Schilling LD:A.Schilling PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*OFF=*REF* G:\ENVCAD\SYRACUSE\ACTIVE\B0043011\10001\000041\DWG\R\43011W01.DWG LAYOUT: 7SAVED: 12/23/2009 4:11 PM BY: SCHILLING, ADAM
XREFS: IMAGES: PROJECTNAME: ----
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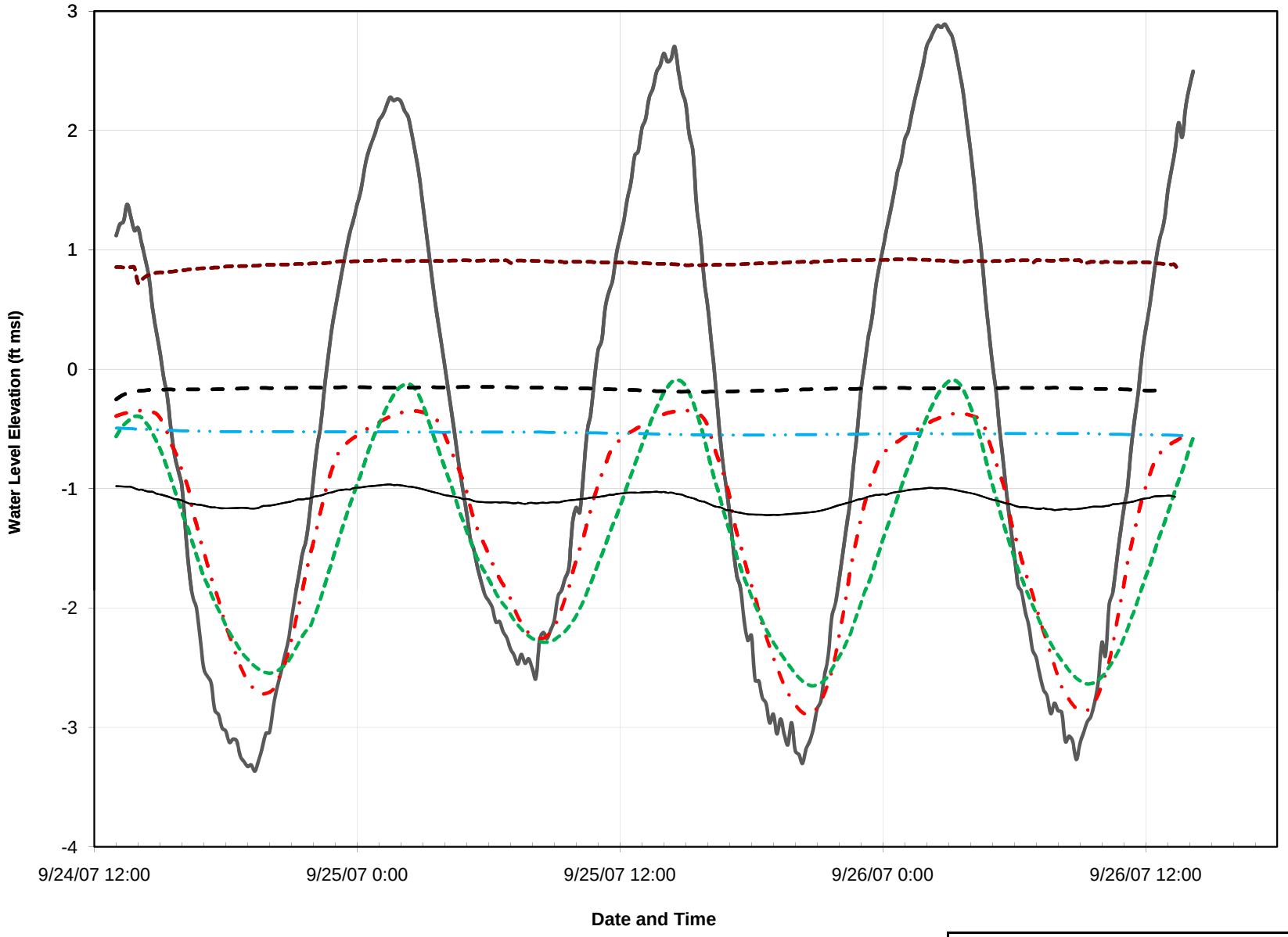
43011X03
43011X04
43011X05
43011X07



Notes:
1) River location levels recorded at a stilling well on Chelsea Piers.
2) FILL denotes well screens the Fill Unit; SAND denote the well screens the Sand Unit.

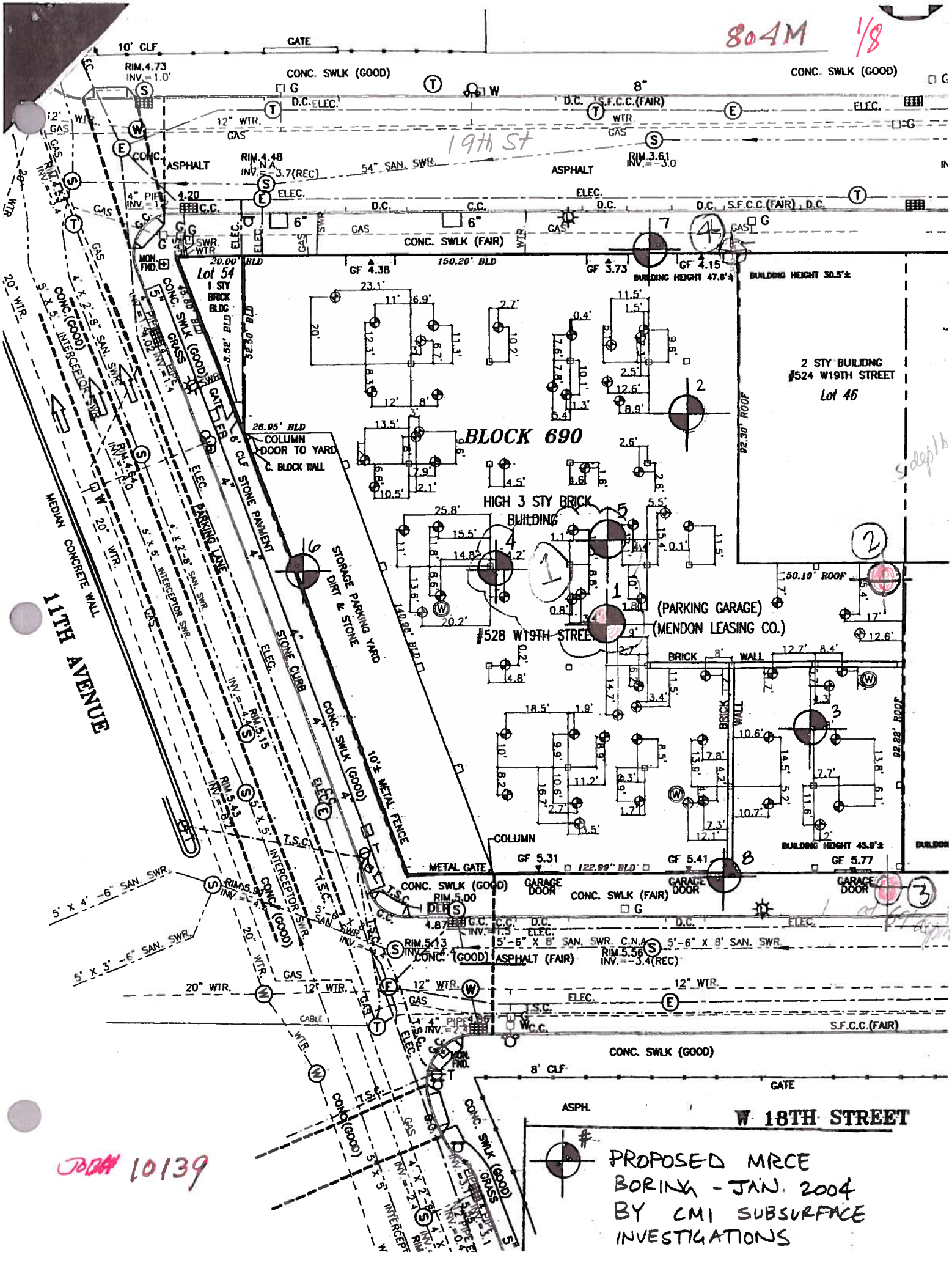
CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
WEST 18th STREET FORMER GAS WORKS
REMEDIAL INVESTIGATION REPORT

TIDAL INFLUENCE ON GROUNDWATER LEVELS

ARCADIS

FIGURE
15

G:\Clients\ConEd\West 18th Street\11 Draft Reports and Presentations\Site Wide RI Report\Figures\Hydrograph_fig.xlsx


804M 1/8
19th St
W 18TH STREET
11TH AVENUE
BLOCK 690
Lot 54
1 STY BRICK BLDG
Lot 46
2 STY BUILDING
#524 W19TH STREET
HIGH 3 STY BRICK BUILDING
(PARKING GARAGE)
(MENDON LEASING CO.)
#528 W19TH STREET
STORAGE PARKING YARD
DIRT & STONE
10'± METAL FENCE
MEDIAN CONCRETE WALL
PROPOSED MRCE BORING - JAN. 2004 BY CMI SUBSURFACE INVESTIGATIONS
JOB# 10139

804M 2/8

Langan
Engineering and Environmental Services, Inc.

LOG OF BORING B-1 **SHEET** 1 **OF** 6

PROJECT	Inter Active Corp Headquarters	PROJECT NO.	5586401
LOCATION	542 W 19th St, Manhattan, NY	ELEVATION AND DATUM	el 5.5 ±
DRILLING AGENCY	WGI	DATE STARTED 9/25/03	DATE FINISHED 9/25/03
DRILLING EQUIPMENT	CME 75 Truck Mounted Rig	COMPLETION DEPTH 92'	ROCK DEPTH 82'
SIZE AND TYPE OF BIT	3 7/8" Tri-Cone Roller bit	NO. SAMPLES 19 / DIST.	UNDIST. – / CORE 10'
CASING	4"	WATER LEVEL FIRST 7'	COMPL. – / 24 HR. –
CASING HAMMER Donut / WEIGHT 300 lb / DROP 30"		FOREMAN	Greg Manney
SAMPLER	2" O.D. Splitspoon	INSPECTOR	Clay Patterson
SAMPLER HAMMER Donut / WEIGHT 140 lb / DROP 30"			

NYCBC 11-65 Fill Class	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BLG/in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
	Concrete	1					– Start work 9/25/03 @ 1:30 pm
	Bk-Br-Tan m-f SAND, sm silt, tr f gravel & brick	2	S-1	SS	10"	5 3 5 3	
	Bk-Tan m-f SAND, sm f gravel, tr silt	3 4 5	S-2	SS	6"	5 10 8 8	– Drill to 5' – Casing to 5'
L	Br-Bk m-f SAND, sm silt & f gravel, tr brick	6	S-3	SS	6"	2 4 3 2	– chemical odor in sample
L		7					– chemical odor in sample
L	Br-Grey-Bk m-f SAND, sm silt, tr wood	8 9	S-4	SS	12"	4 2 6 9	– Drill to 9'
L		10	S-5	SS	NR	15 9 8 7	– No rec 1st attempt – No rec 2nd attempt
		11					– Drill to 15' – Casing to 15'
		12 13 14					

JOB# 10139

804M 3/8

Langan
Engineering and Environmental Services, Inc.

JOB NO. 5586401
DATE 9/25/03

LOG OF BORING NO. B-1
SHEET 2 OF 6

NYCBC CLASS	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BLOWS/FT.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		14					
	Rd-Br m-f SAND, sm m-f gravel, tr silt	15					
		16	S-6	SS	13"	6 9 11 13	- Chem odor in sample
		17					- Drill through obstruction 17' - possible wood from wash cuttings
		18					
		19					- Drill to 20'
		20					- Casing to 20'
	Br-Bk m-f SAND, sm silt & f gravel	21	S-7	SS	10"	20 23 13 12	- slight chem odor in sample
		22					
		23					
		24					- Drill to 25'
		25					
	Bk m-f SAND, sm silt, tr f gravel	26	S-8	SS	3"	2 1 2 3	- sample is stained w/ oily sheen, chemical odor
		27					
		28					
		29					- Drill to 30'
		30					
	Bk m-f SAND, sm silt, tr f gravel	31	S-9	SS	3"	2 1 2 2	- sample is stained, has chem odor
		32					

804M 4/8

Langan
Engineering and Environmental Services, Inc.

JOB NO. 5586401
DATE 9/25/03

LOG OF BORING NO. B-1
SHEET 3 OF 6

NYCDEP CLASS	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLOWS/FT.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		32					
		33					
		34					– Drill to 35'
		35					
	Grey CLAY tr marine shells	36	S-10	SS	24"	2 2 1 2	
		37					
		38					– Drill to 40'
		39					
		40					
SILT	Gr CLAY tr marine shells	41	S-11	SS	24"	1 2 2 2	
		42					
		43					– Drill to 45'
		44					
		45					
	Gr CLAY, tr marine shells + f sand	46	S-12	SS	24"	1 1 2 2	
		47					
		48					– Drill to 50'
		49					
		50					

804M 5/8

Langan
Engineering and Environmental Services, Inc.

JOB NO. 5586401
DATE 9/25/03

LOG OF BORING NO. B-1

SHEET 4 OF 6

NYCBC CLASS	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BLWS/6"	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
GC-1 CLAY	Gr CLAY, tr marine shells, tr f Sand	50–52	S-13	SS	24"	1 1 2 2	
		53–55					– Drill to 55'
	Grey CLAY, tr f sand & marine shells	56–59	S-14	SS	24"	1 2 3 2	
		58–60					– Drill to 60'
GS-1 FINE SAND	Grey f SAND, sm silt	61–62	S-15	SS	17"	8 14 15 24	
		63–65					– Drill to 65'
	Gr silty f SAND	66–67	S-16	SS	1"	6 7 10 12	
		68					

804M 6/8

Langan
Engineering and Environmental Services, Inc.

JOB NO. 5586401
DATE 9/25/03

LOG OF BORING NO. B-1

SHEET 5 OF 6

NYCBC CLASS	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BLS/6in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
8.5-65 F. SAND		68					- Drill to 70'
		69					
		70					
4.5-65 CLAY	Gr CLAY, tr f sand	71	S-17	SS	24"	4 4 4 5	
		72					
		73					- Drill to 75'
		74					
		75					
7-65 SAND	No Recovery	76	S-18	SS	NR	5 26 6 11	- Sample lost in hole or possible gravel in catch
		77					
		78					- Drill to 80'
		79					- Chatter 78'-80'
		80					
11-65 Decomp Rock	Upper 7': Br m-f SAND, sm m-f gravel, tr silt Lower 5" Decomposed Rock	81	S-19	SS	12"	62 for 5"	
		82					- Drill to Roller Bit refusal - 82' - start core
1-65 ROCK	Bk-wt mka SCHIST, slightly fractured, slightly weathered	83	Run # 1 (RQD)	NX Core	REC = 57/60 = 95%	6	REC = 57"/60" = 95%
		84				5	RQD = 57"/60" = 95%
		85				5	
		86				5	

804M 7/8

Langan
Engineering and Environmental Services, Inc.

JOB NO. 5586401
DATE 9/25/03

LOG OF BORING NO. B-1

SHEET 6 OF 6

NYCBC CLASS	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLOWS/in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
ROCK	BK. wt mica SCHIST, partially fractured, slightly weathered	86–92	R1 Run #2 (R2) NX CORE	NX	REC = 59"/60" = 98%	4 7 5 6 5 5	REC = 59"/60" = 98% RQD = 51"/60" = 85% E.O.B. 92'
		92–104					

MUESER RUTLEDGE CONSULTING ENGINEERS

804M 8/8

SHEET 2 OF 4

FILE NO. 10139

PROJECT W 19TH ST — IAC BUILDING

BORING NO. 1A

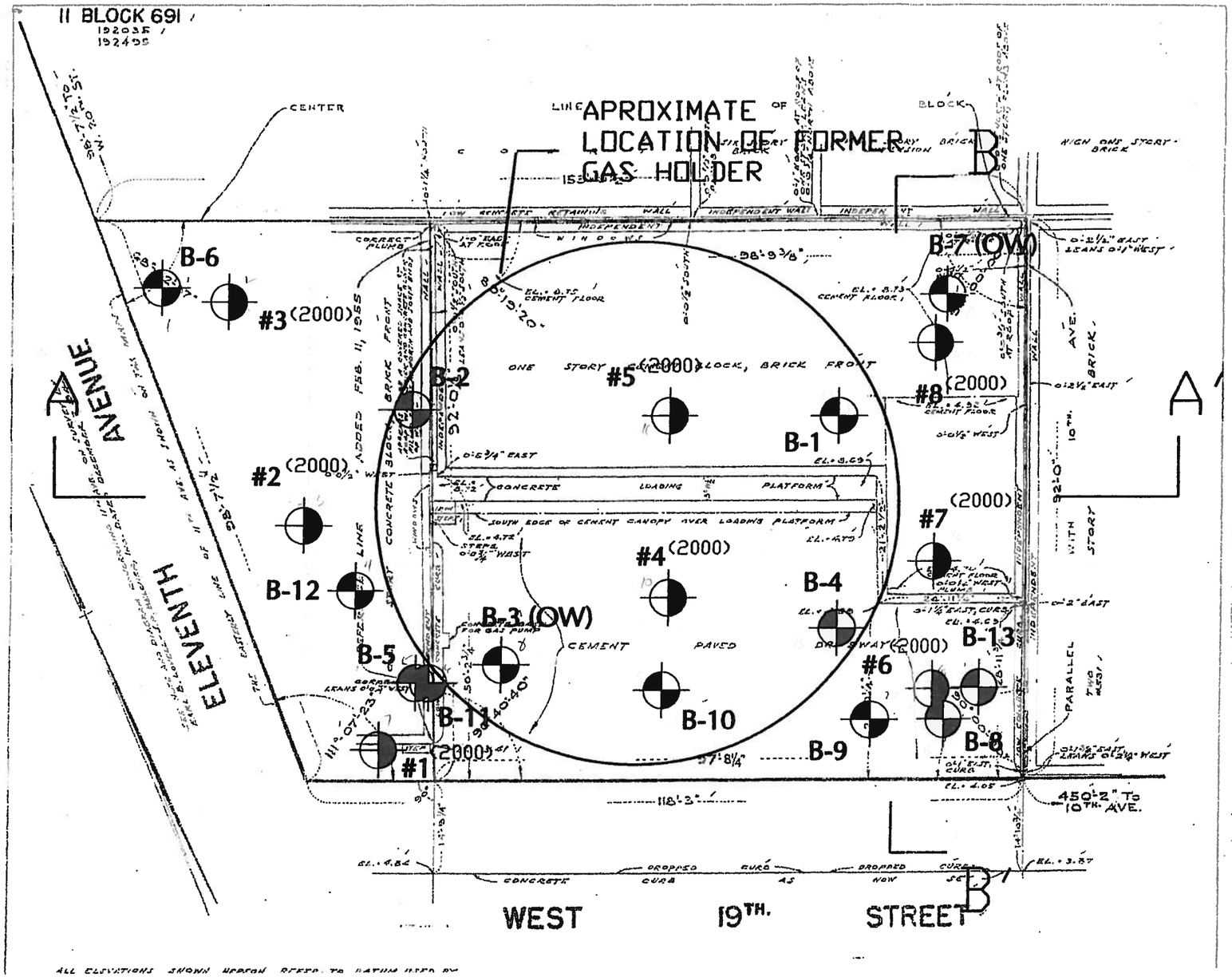
SURFACE ELEV.

PROJECT LOCATION NEW YORK, NY

RES. ENGR. T.C. - MICHAEL LAW

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
								Hand drilling at 54'
						55		
								Rod chattered at 59'
						60		
						65		
						70		Rod chattered at 70'
						75		
4:00				To sl. w.				Rod chattered at 76'
7:00	1C	77'–	REC = 100%	Hard gray mica schist trace			7+	
12/7/04		82'	RQD = 92%	stained … joint.			11+	
						80	10+	
							15+	
							10+	
	2C	82'–	REC = 100%	Do 1C	R		6+	
		87'	RQD = 100%				4+	
						85	7+	
							10+	
14:00							8+	
	3C	87'–	REC = 98%	Hard gray mica schist, mod.			9+	
		92'	RQD = 92%	jnt.			8+	
						90	10+	
							13+	
							11+	
								B.O.B. at 92'
5:00						95		
						100		

766M



NOTES:

1. Base Plan for Boring Location Plan is obtained from survey completed by Earl B. Lovell - S.P. Belcher, Inc. dated September 26, 1954.
2. Elevations are referenced to Borough President of Manhattan Topographical Bureau Datum (BPMD), which is 2.75 feet above mean sea level at Sandy Hook, N.J. as established by the U.S. Coast and Geodetic Society.
3. Borings B-1 through B-13 were completed by Jersey Boring and Drilling Company, Inc. between June 6, 2005 and July 16, 2005 under the full-time engineering inspection and supervision of Langan Engineering and Evironmental Services, P.C.
4. Borings B-1(2000) through B-8(2000) were completed by Jersey Boring and Drilling Company, Inc. in October 2000.

LEGEND

- B-12 — BORINGS COMPLETED IN 2005
- #3 (2000) — BORINGS COMPLETED IN 2000
- (OW) — OBSERVATION WELL

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES
21 Penn Plaza, Suite 900 New York, NY 10001
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www.langan.com
NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA
NJ Certificate of Authorization No: 24GA27996400

WEST 19th & ELEVENTH AVENUE

BORING LOCATION PLAN

New York New York

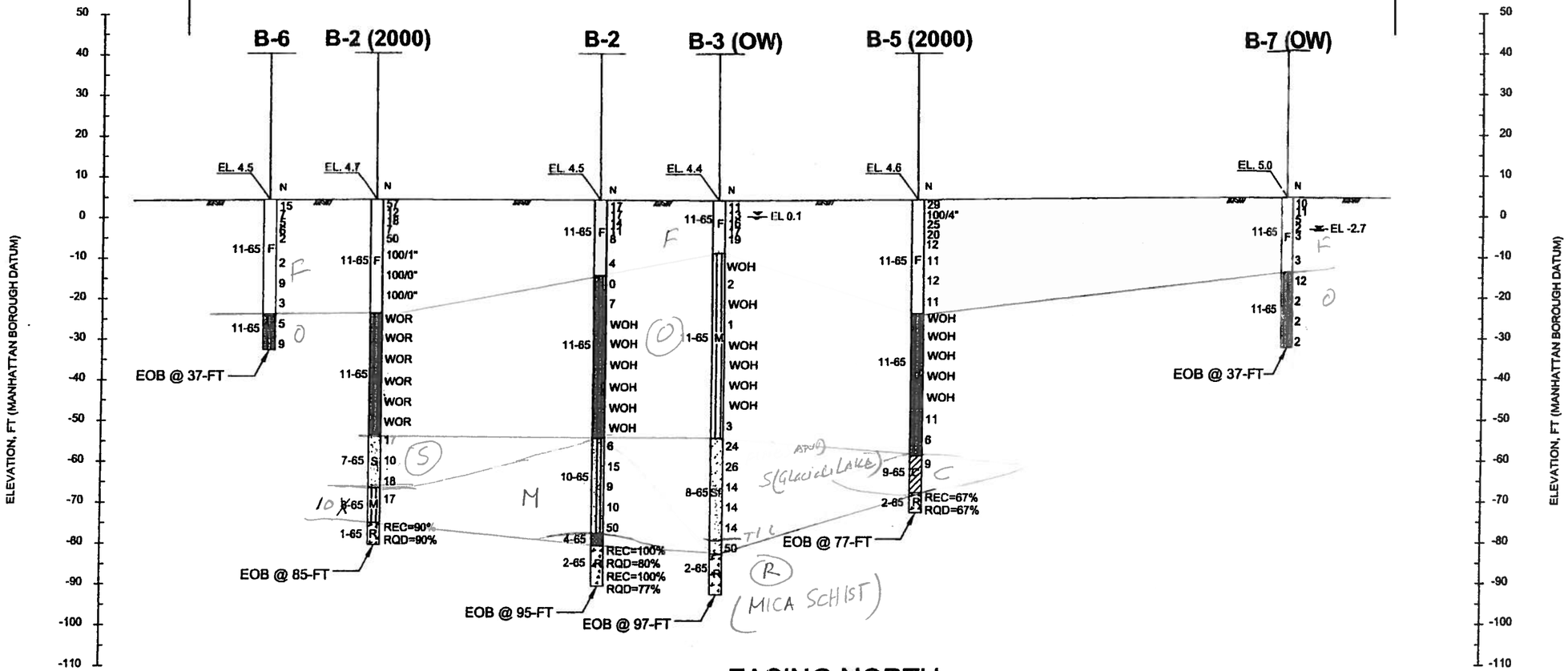
Project No.	Date	Scale	Dwg. No.
5660001	12/07/2005	1"=20'	4

766M

ELEVENTH AVENUE

PROJECT SITE

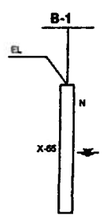
531 WEST 19th STREET



FACING NORTH

LEGEND

- SAND
- SILT
- DECOMPOSED ROCK
- ORGANIC SILT
- UNCONTROLLED FILL
- GROUND SURFACE
- CLAY
- ROCK



B BORING IDENTIFICATION
EL GROUNDSURFACE ELEVATION AT TIME OF BORING
N STANDARD PENETRATION RESISTANCE
X-65 NEW YORK CITY BUILDING CODE CLASSIFICATION
(OW) GROUNDWATER OBSERVATION WELL
MEASURED GROUNDWATER LEVEL

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WEST 19th & ELEVENTH AVENUE

SUBSURFACE PROFILE A-A'

New York New York

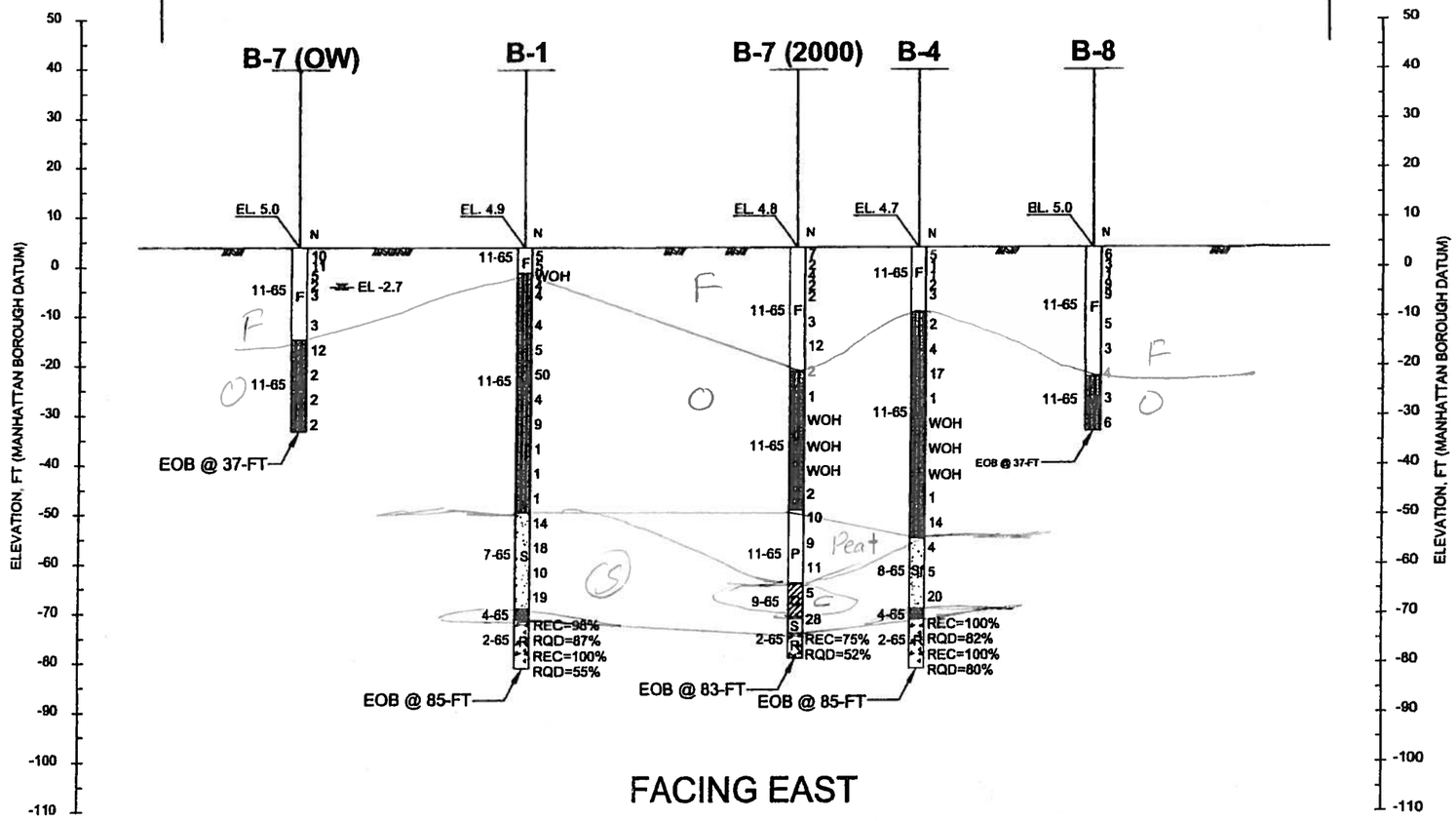
Project No.	Date	Scale	Dwg. No.
5660001	12/07/2005	H: 1"=15' V: 1"=30'	5

766 M

BAYVIEW REHABILITATION CENTER

PROJECT SITE

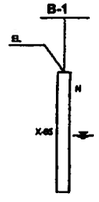
West 19th Street



FACING EAST

LEGEND

- SAND
- SILT
- DECOMPOSED ROCK
- ORGANIC SILT
- UNCONTROLLED FILL
- GROUND SURFACE
- CLAY
- ROCK



B BORING IDENTIFICATION
EL GROUNDSURFACE ELEVATION AT TIME OF BORING
N STANDARD PENETRATION RESISTANCE
X-65 NEW YORK CITY BUILDING CODE CLASSIFICATION
(OW) GROUNDWATER OBSERVATION WELL
MEASURED GROUNDWATER LEVEL

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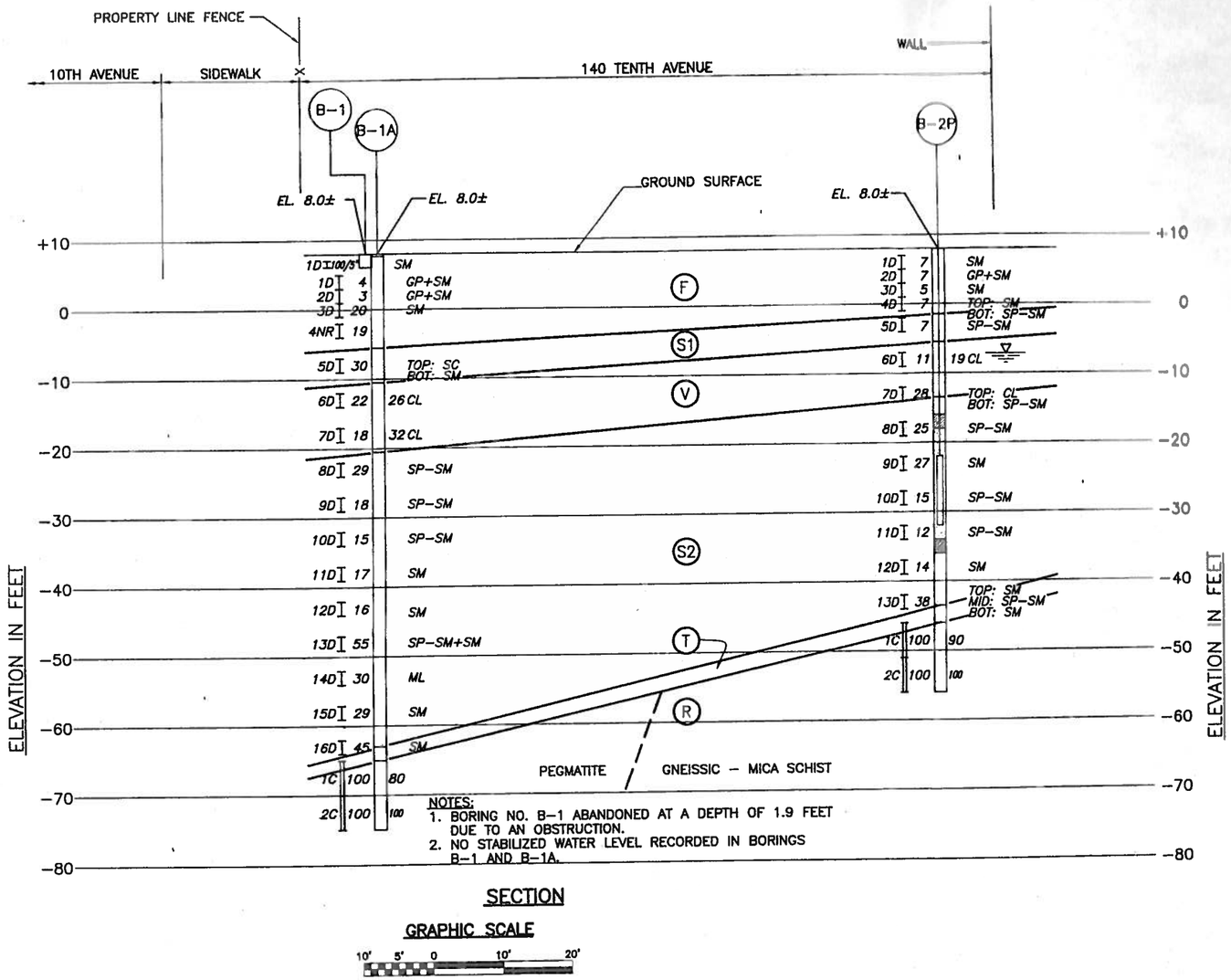
WEST 19th & ELEVENTH AVENUE

SUBSURFACE PROFILE B-B'

New York New York

Project No.	Date	Scale	Dwg. No.
5660001	12/07/2005	H: 1"=15' V: 1"=30'	6

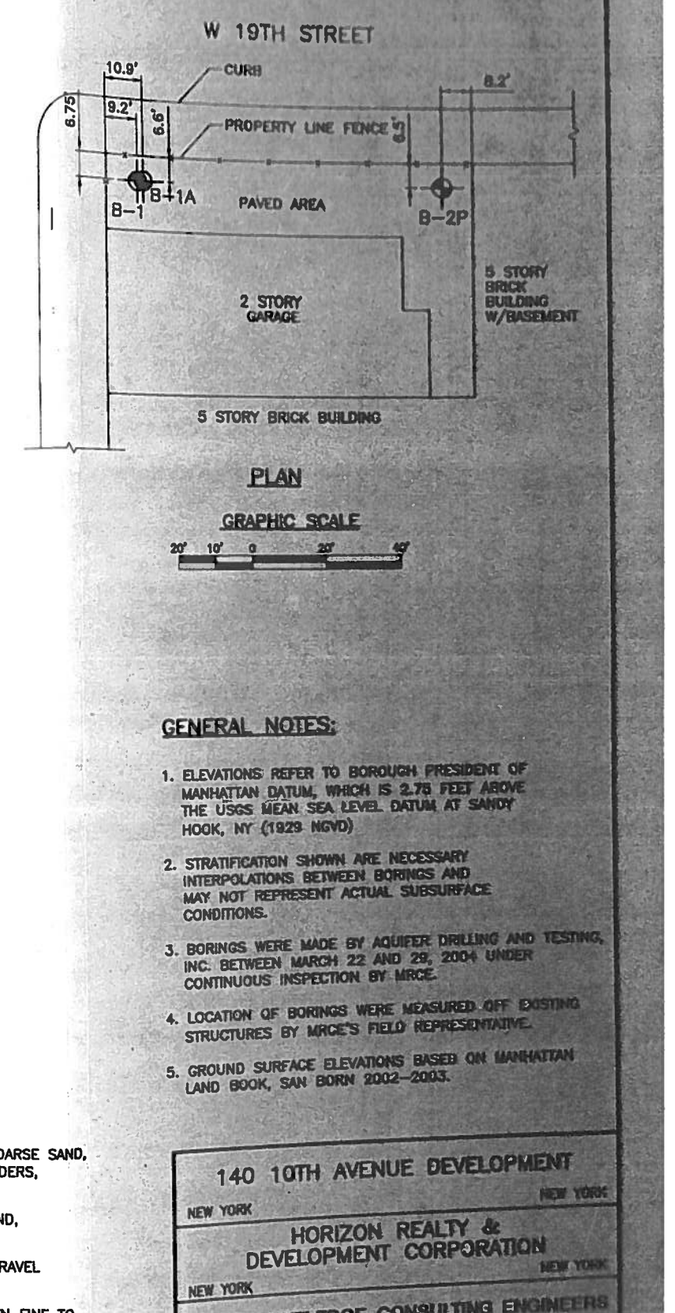


NOTES:
1. BORING NO. B–1 ABANDONED AT A DEPTH OF 1.9 FEET DUE TO AN OBSTRUCTION.
2. NO STABILIZED WATER LEVEL RECORDED IN BORINGS B–1 AND B–1A.

SECTION

GRAPHIC SCALE

10' 5' 0 10' 20'



PLAN

GRAPHIC SCALE

20' 10' 0 20' 40'

GENERAL NOTES:

1. ELEVATIONS REFER TO BOROUGH PRESIDENT OF MANHATTAN DATUM, WHICH IS 2.78 FEET ABOVE THE USGS MEAN SEA LEVEL DATUM AT SANDY HOOK, NY (1929 NGVD)
2. STRATIFICATION SHOWN ARE NECESSARY INTERPOLATIONS BETWEEN BORINGS AND MAY NOT REPRESENT ACTUAL SUBSURFACE CONDITIONS.
3. BORINGS WERE MADE BY AQUIFER DRILLING AND TESTING, INC. BETWEEN MARCH 22 AND 29, 2004 UNDER CONTINUOUS INSPECTION BY MRCE.
4. LOCATION OF BORINGS WERE MEASURED OFF EXISTING STRUCTURES BY MRCE'S FIELD REPRESENTATIVE.
5. GROUND SURFACE ELEVATIONS BASED ON MANHATTAN LAND BOOK, SAN BORN 2002–2003.

STRATA DESCRIPTIONS:

(F) – FILL – LOOSE TO MEDIUM COMPACT, GRAY AND BROWN FINE TO COARSE SAND, SOME SILT, TRACE TO SOME GRAVEL, TRACE BRICK AND CINDERS, OCCASIONAL OBSTRUCTIONS.

(S1) – ALLUVIAL SAND – LOOSE TO COMPACT GRAY AND BROWN FINE TO COARSE SAND, TRACE TO SOME GRAVEL, SILT, CLAY, TRACE ROOTS.

(V) – VARVED CLAY – STIFF BROWN SILTY CLAY, TRACE FINE TO COARSE SAND, GRAVEL VARVED WITH TRACE MICACEOUS FINE SANDY SILT.

(S2) – GLACIAL SAND – MEDIUM COMPACT TO VERY COMPACT BROWN TO RED–BROWN FINE TO COARSE SAND, TRACE TO SOME SILT, TRACE GRAVEL, GRADING WITH DEPTH TO MICACEOUS SILTY FINE SAND TO FINE SANDY SILT.

(T) – TILL – COMPACT TO VERY COMPACT, BROWN TO RED BROWN, FINE TO COARSE SAND, SOME SILT AND GRAVEL.

(R) – ROCK – HARD UNWEATHERED GRAY AND PINK PEGMATITE, JOINTED TO MODERATELY JOINTED, IRON STAINED JOINTS TO HARD SLIGHTLY WEATHERED GRAY GNEISSIC TO MICA SCHIST, MODERATELY JOINTED.

140 10TH AVENUE DEVELOPMENT
NEW YORK

HORIZON REALTY & DEVELOPMENT CORPORATION
NEW YORK

MUESER RUTLEDGE CONSULTING ENGINEERS
14 PENN PLAZA – 225 W. 34TH STREET, NY, NY 10122

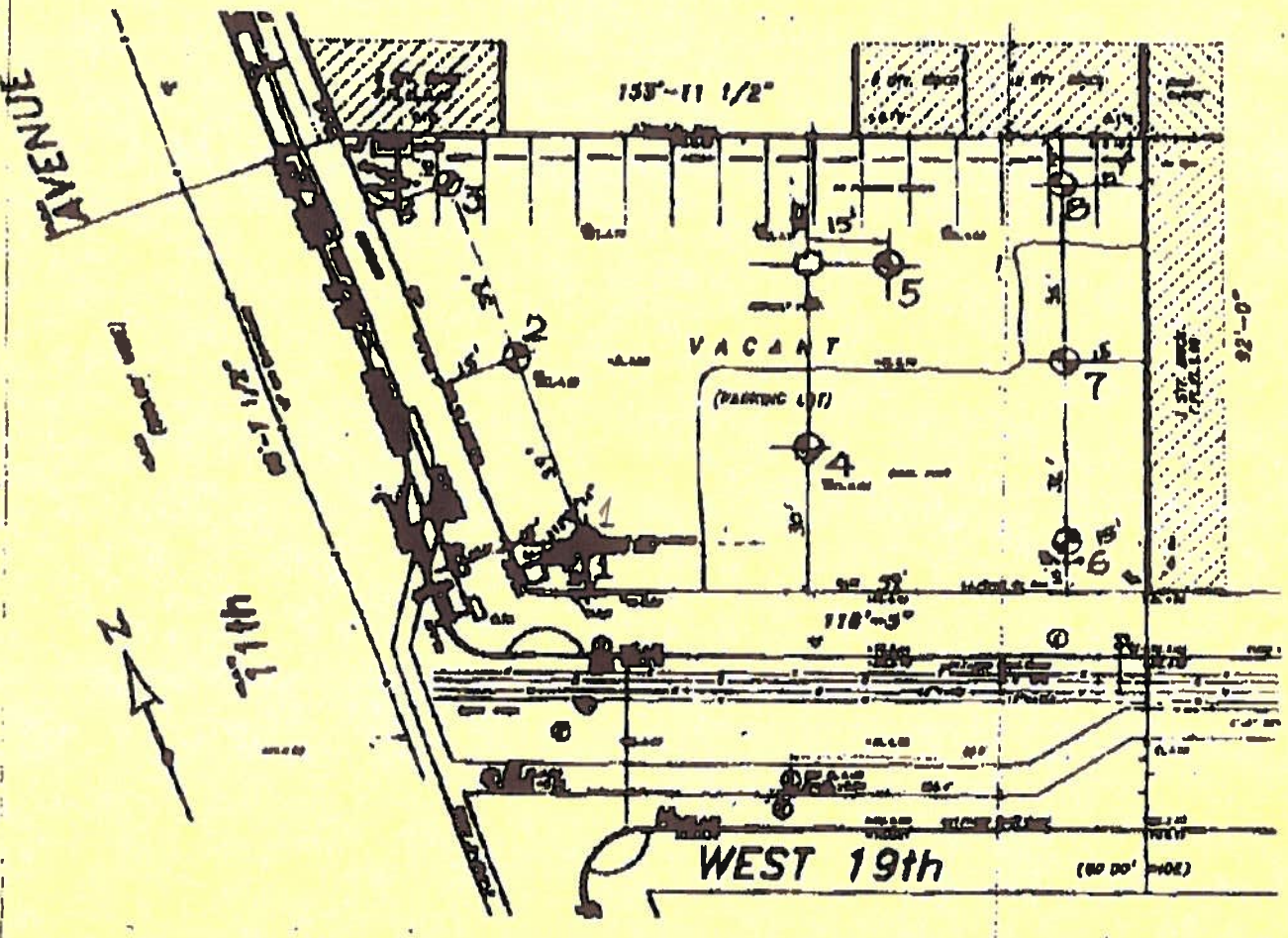
SCALE	MADE BY C.P.J.	DATE 4/9/04	FILE NO. 10173
AS NOTED	CHKD BY C.M.	DATE 4/13/04	

BORING LOCATION PLAN AND SECTION

B–1

766/M 1/21

A. REGINATTO CONSULTING ENGINEERS P.C.



NEW YORK CITY
W. 19th Street and 11th Avenue
BORING LOCATION PLAN

Scale : 1" = 30' Oct. 2000

766 3/4

JERSEY BORING & DRILLING CO., INC.	TEST BORING LOG	BORING NO. 1
PROJECT Apartment Building W. 19th Street, NYC		SHT NO. 1 OF 4
CLIENT Kenneth Heller		JOB NO.
LOCATION W.19th Street, NYC		ELEVATION
GROUND WATER		PERMIT NO
DATE / TIME / DEPTH / CASING	TYPE / DIA / WT. / FALL	DATE START 10-19-00
	CAS / SAMP: SS, 1.5", 140#, 30" / CORE: NX / TUBE	DATE FINISH 10-19-00
		DRILLER Jerry
		INSPECTOR S.C

DEPTH FT	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
1					ASPHALT and CONCRETE (DRILLED 1')	Was bore hole grouted? YES ____ NO ____ If yes what type of grout was used ____ How many bags? ____
2		1	2 3		Gray cf SAND, some cf Gravel, trace Silt, Brick fragment ((11-65 FILL)	
3	MUD DRILLING		3 3			
4		2	2 1		No Recovery	
5			1 5			
6		3	5 5		Gray cf SAND, some cf Gravel, little Silt, Brick fragment (11-65 FILL)	
7			5 14			
8		4	9 50/0"		Ditto (11-65 FILL)	
9						
10		5	15 12		Reddish brown cf GRAVEL, little Silt, little Sand, Brick fragment (11-65 FILL)	
11			9 12			
12						
13						
14						
15						
16		6	1 1		Black ORGANIC SILT (11-65)	
17			3 5			
18						
19						
20						
21		7	1 1		Ditto (11-65)	
22			2 2			
23						

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JERSEY BORING & DRILLING CO., INC.	TEST BORING LOG	BORING NO1
PROJECT Apartment Building		SHT.NO. 2 OF 4
CLIENT Kenneth Heller		PROJ. NO

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
24						
25		8	1		Ditto (11-65)	
26			1			
27			2			
28			2			
29						
30						
31		9	WOH		Ditto (11-65)	
32			WOH			WOH: Weight of hammer
33			WOH			
34			WOH			
35						
36		10	WOH		Ditto (11-65)	
37			WOH			
38			WOH			
39			WOH			
40						
41		11	WOH		Ditto (11-65)	
42			WOH			
43			WOH			
44			WOH			
45						
46		12	WOH		Ditto (11-65)	
47			WOH			
48			WOH			
49			WOH			

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JERSEY BORING & DRILLING CO., INC.	TEST BORING LOG	BORING NO. 1
PROJECT Apartment Building		SHT NO 3 OF 4
CLIENT Kenneth Heller		PROJ NO

DEPTH FT	CASING BLOWS	SAMPLE NO	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
50						
		13	WOH		Ditto (11-65)	
51			WOH			
			WOH			
52			WOH			
53						
54						
55		14	WOH		Ditto (11-65)	
			WOH			
56			WOH			
57			WOH			
58						
59						
60						
		15	WOH		Ditto (11-65)	
61			4			
			2			
62			2			
63						
64						
65						
		16	WOH		Reddish brown Clayey SILT (9-65)	
66			WOH			
			5			
67			9			
68						
69						
70						
		17T	7		Top: Reddish brown CLAY & SILT (9-65)	
71			7		Bottom: Reddish brown cf SAND, trace Silt, trace f Gravel (7-65)	
		17B	11			
72			9			
73						
74						
75						

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JERSEY BORING & DRILLING CO., INC.	TEST BORING LOG	BORING NO. 1
PROJECT Apartment Building		SHT NO. 4 OF 4
CLIENT Kenneth Heller		JOB NO.

DEPTH FT	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
76		18	10		Gray cf SAND, and cf Gravel, trace Silt (7-65)	
			11			
			21			
77			18			
78					Diamond core drilled 78' to 83' GRAY MICA SCHIST Recovery: 60"=100% RQD: 100% (1-65) End of boring at 83'	
79						
80						
81						
82						
83						
84						
85						
86						
87						
88						
89						
90						
91						
92						
93						
94						
95						
96						
97						
98						
99						
100						
101						

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JERSEY BORING & DRILLING CO., INC.

TEST BORING LOG

BORING NO. 3

PROJECT Apartment Building
CLIENT Kenneth Heller
LOCATION W. 19th Street, NYC
GROUND WATER

DATE	TIME	DEPTH	CASING

	CAS.	SAMP.	CORE	TUBE
TYPE		SS	NX	
DIA.		1.5"		
WT.		140#		
FALL		30"		

SHT NO. 1 OF 4
JOB NO
ELEVATION
PERMIT NO
DATE START 10-19-00
DATE FINISH 10-19-00
DRILLER Frank
INSPECTOR S.C.

DEPTH FT	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
1		1	10		Gray cf GRAVEL, some mf Sand, little Silt, Concrete Fragment (11-65 FILL)	Was bore hole grouted? YES ____ NO ____
1			10			
2			10			If yes what type of grout was used ____
2			11			
3		2	6		Ditto (11-65 FILL)	How many bags? ____
3			9			
4			7			
4			8			
5		3	3		Black cf SAND, and mf Gravel, some Silt, rubble (11-65 FILL)	
5			2			
6			2			
6			2			
7	MUD DRILLING	4	2		Dark gray Organic SILT, some cf Gravel, Brick fragment (11-65 FILL)	
7			2			
8			4			
8		5	2		Ditto (11-65 FILL)	
9			4			
9			2			
10			2			
10		6	1		Black Organic SILT (11-65)	
11			1			
11			4			
12	88		8			
12						
13						
13						
14						
14						
15						
15		7	WOH		Do (11-65)	WOH: Weight of hammer
16			WOH			
16			WOH			
17			WOH			
17						
18						
18						
19						
19						
20						
20		8	2		Do (11-65)	
21			2			
21			1			
22			1			
22						
23						

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JERSEY BORING & DRILLING CO., INC.	TEST BORING LOG	BORING NO.
PROJECT Apartment Building		SHT NO 2 OF 4
CLIENT Kenneth Heller		PROJ NO

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
24						
25		9	2		No Recovery	
26			1			
27			2			
28			33			
29						
30		10	WOH		Black Organic SILT (11-65)	
31			WOH			
32			1			
33			2			
34						
35		11	WOH		Do (11-65)	
36			WOH			
37			WOH			
38			WOH			
39						
40		12	WOH		Do (11-65)	
41			WOH			
42			WOH			
43			WOH			
44						
45		13	WOH		DO (11-65)	
46			WOH			
47			WOH			
48			WOH			
49						

766 8/21

JERSEY BORING & DRILLING CO., INC.	TEST BORING LOG	BORING NO. 3
PROJECT Apartment Building		SHT. NO 3 OF 4
CLIENT Kenneth Heller		PROJ NO

DEPTH FT	CASING BLOWS	SAMPLE NO	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
50						
51		14	WOH		Do (11-65)	
52			WOH			
53			WOH			
54			WOH			
55						
56		15	WOH		Do (11-65)	
57			WOH			
58			WOH			
59			WOH			
60						
61		16	WOH		Do (11-65)	
62			WOH			
63			3			
64			5			
65						
66		17	4		Brownish dark gray ditto (11-65)	
67			4			
68			8			
69			4			
70						
71		18T	36		Reddish brown Silty CLAY (9-65)	
72			18			
73		18B	9		Bottom: dark reddish brown cf SAND, some cf Gravel, little Silt (7-65)	
74			9			
75						

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JERSEY BORING & DRILLING CO., INC.	TEST BORING LOG	BORING NO. 3
PROJECT Apartment Building		SHT NO 4 OF 4
CLIENT Kenneth Heller		JOB NO.

DEPTH FT	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
76					Diamond core drilled 75' to 80'	
77					GRAY MICA SCHIST	
78					Recovery: 58"= 96.6%	
79					RQD: 91.6%	
80					End of boring at 80' (1-65)	
81						
82						
83						
84						
85						
86						
87						
88						
89						
90						
91						
92						
93						
94						
95						
96						
97						
98						
99						
00						
01						

766 10/21

JERSEY BORING & DRILLING CO., INC.

TEST BORING LOG

BORING NO. 4

PROJECT Apartment Building
CLIENT Kenneth Heller
LOCATION W. 19th Street, NYC
GROUND WATER

DATE	TIME	DEPTH	CASING

	CAS.	SAMP.	CORE	TUBE
TYPE		SS	NX	
DIA.		1.5"		
WT.		140#		
FALL		30"		

SHT.NO 1 OF 4
JOB NO
ELEVATION
PERMIT NO
DATE START 10-18-00
DATE FINISH 10-18-00
DRILLER Jerry
INSPECTOR S.C.

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
1					CONCRETE (drilled 1')	Was bore hole grouted? YES ____ NO ____ If yes what type of grout was used ____ How many bags? ____
2	DRILLING	1	12 10 10 7		dark reddish brown cf SAND, some mf Gravel, trace Silt, Brick fragment (11-65 FILL)	
3	MUD	2	10 10 10 5		Ditto (11-65 FILL)	
6		3	6 4 3 4		brown cf SAND, some mf Gravel, little Silt, Concrete fragment (11-65 FILL)	
8		4	2 3 4 5		No Recovery	
10		5	6 4 4 4		brown CONCRETE fragment, some cf Sand (11-65 FILL)	
15		6	7 6 6 5		Grayish brown cf SAND, some cf Gravel, Brick fragment (11-65 FILL)	
21		7	5 5 3 1		Grayish brown BRICK fragment, CRUSHED STONE, some mf Sand (11-65 FILL)	
22						

766 11/21

JERSEY BORING & DRILLING CO., INC.	TEST BORING LOG	BORING NO. 4
PROJECT Apartment Building		SHT NO 2 OF 4
CLIENT Kenneth Heller		PROJ NO

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
24						
25		8	3		Black Organic SILT (11-65)	
26			2			
27			2			
28						
29						
30		9	WOH		Do (11-65)	
31			WOH			
32			WOH			WOH: Weight of hammer
33			WOH			
34						
35						
36		10	WOH		Do (11-65)	
37			WOH			
38			WOH			
39			WOH			
40						
41		11	WOH		Do (11-65)	
42			WOH			
43			WOH			
44			WOH			
45						
46		12	WOH		Do (11-65)	
47			WOH			
48			WOH			
49			WOH			

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JERSEY BORING & DRILLING CO., INC.	TEST BORING LOG	BORING NO. 4
PROJECT Apartment Building		SHT. NO. 3 OF 4
CLIENT Kenneth Heller		PROJ. NO.

DEPTH FT	CASING BLOWS	SAMPLE NO	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
50						
		13	WOH		Do (11-65)	
51			WOH			
			WOH			
52			WOH			
53						
54						
55						
		14	6		Do (11-65)	
56			8			
			10			
57			8			
58						
59						
		15	2		Do (11-65)	
61			2			
			6			
62			9			
63						
64						
65		16	3		Reddish brown Silty CLAY (9-65)	
66						
67						
68						
69						
70						
		17	2		Do (9-65)	
71			5			
			7			
72			12			
73						
74						
75						

766 13/21

JERSEY BORING & DRILLING CO., INC.	TEST BORING LOG	BORING NO. 4
PROJECT Apartment Building		SHT.NO. 4 OF 4
CLIENT Kenneth Heller		JOB NO.

DEPTH FT	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
76					Diamond core drilled 74' to 79'	
77					Black MICA SCHIST	
78					Recovered: 54" = 90%	
79					RQD: 90% (1-65)	
80						
81						
82					Diamond core drilled 79' to 84'	
83					Black MICA SCHIST	
84					Recovered: 50: = 83.3%	
85					RQD : 76.6 % (2-65)	
86					End of boring at 84'	
87						
88						
89						
90						
91						
92						
93						
94						
95						
96						
97						
98						
99						
100						
101						

766 14/21

JERSEY BORING & DRILLING CO., INC.

TEST BORING LOG

BORING NO. 6

PROJECT Apartment Building
CLIENT Kenneth Heller
LOCATION W. 19th Street, NYC
GROUND WATER

DATE	TIME	DEPTH	CASING

	CAS.	SAMP.	CORE	TUBE
TYPE		SS	NX	
DIA.		1.5"		
WT.		140#		
FALL		30"		

SHT.NO. 1 OF 4
JOB NO.
ELEVATION
PERMIT NO.
DATE START 10-18-00
DATE FINISH 10-18-00
DRILLER Frank C.
INSPECTOR S.C.

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
1					CONCRETE (drilled 1')	Was bore hole grouted? YES ____ NO ____ If yes what type of grout was used ____ How many bags? ____
2		1	5		Black Organic SILT, Rock fragment (11-65 FILL)	
3			4			
			3			
4		2	4			
			1		Black Organic SILT (11-65 FILL)	
5	MUD DRILLED		2			
			2			
6		3	2			
			2		Black Organic SILT, some cf Sand, little f Gravel (11-65 FILL)	
7			2			
		4	2			
8			1		Black Organic SILT, Cinder, Coal (11-65 FILL)	
			1			
9			2			
		5	3			
10			3		Black Organic SILT, some cf Sand, little f Gravel (11-65 FILL)	
			3			
11			1			
			3			
12						
13						
14						
15						
		6	3		No Recovery	
16			3			
			2			
17			3			
18						
19						
20						
		7	2		Dark gray cf SAND and Organic SILT (11-65 FILL)	
			1			
21			3			
22			2			
23						

766 15/21

JERSEY BORING & DRILLING CO., INC.	TEST BORING LOG	BORING NO. 6
PROJECT Apartment Building		SHT.NO. 2 OF 4
CLIENT Kenneth Heller		PROJ. NO.

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
24						
25		8	1		Black Organic SILT (11-65)	
26			1			
			1			
27			3			
28						
29						
30		9	WOH		Do (11-65)	WOH: Weight of hammer
31			WOH			
			WOH			
32			WOH			
34						
35		10	WOH		Do (11-65)	
36			WOH			
			WOH			
37			WOH			
38						
39						
40		11	WOH		Do (11-65)	
41			WOH			
			WOH			
42			WOH			
43						
44						
45		12	WOH		Do (11-65)	
			WOH			
47			WOH			
			WOH			
48						
49						

766 16/21

JERSEY BORING & DRILLING CO., INC.	TEST BORING LOG	BORING NO. 6
PROJECT Apartment Building		SHT. NO. 3 OF 4
CLIENT Kenneth Heller		PROJ. NO.

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
50		13	WOH		Do (11-65)	
51			WOH			
52			WOH			
53			WOH			
54						
55						
56		14	3		Black cf SAND, some Organic SILT (11-65)	
57			4			
58			6			
59			10			
61		15	4		Do (11-65)	
62			6			
63			6			
64			7			
65		16	3		Black SILT, little mf Sand (8-65)	
66			4			
67			3			
68			3			
69						
70		17	4		Dark gray cf SAND some mf Gravel, little Silt (7-65)	
71			5			
72			8			
74			6			
75						

766 17/21

JERSEY BORING & DRILLING CO., INC.	TEST BORING LOG	BORING NO. 6
PROJECT Apartment Building		SHT.NO4 OF 4
CLIENT Kenneth Heller		JOB NO.

DEPTH FT	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
76					Diamond cored drilled 75' to 80'	
77					BLACK MICA SCHIST with layer of QUARTZ	
78					Recovered: 57"= 95%	
79					RQD: 84% (1-65)	
80					End boring at 80'	
81						
82						
83						
84						
85						
86						
87						
88						
89						
90						
91						
92						
93						
94						
95						
96						
97						
98						
10						
101						

766 18/21

JERSEY BORING & DRILLING CO., INC.

TEST BORING LOG

BORING NO. 8

PROJECT Apartment Building
CLIENT Kenneth Heller
LOCATION
GROUND WATER

DATE	TIME	DEPTH	CASING

	CAS.	SAMP.	CORE	TUBE
TYPE		SS	NX	
DIA.		1.5"		
WT.		140#		
FALL		30"		

SHT.NO. 1 OF 4
JOB NO.
ELEVATION
PERMIT NO.
DATE START 10-16-00
DATE FINISH 10-16-00
DRILLER Frank C.
INSPECTOR S.C.

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
1	MUD DRILLING	1	15 9 7 7		Dark gray SILT, some cf Sand, some cf Gravel (11-65 FILL)	Was bore hole grouted? YES ____ NO ____ If yes what type of grout was used ____ How many bags? ____
3		2	3 4 4 3		Top: brown cf SAND, some mf Gravel, little Silt (11-65 FILL) Bottom: black Organic SILT (11-65)	
5		3	3 2 4 4		Black Organic SILT (11-65)	
7		4	2 2 2 1		Do, some mf Gravel (11-65)	
9		5	1 1 1 2		Black Organic SILT, Shell fragment (11-65)	
11		6	1 1 3 2		Black Organic SILT (11-65)	
15		7	1 1 1 2		No Recovery	
20		8	8 5 5 5		Black cf SAND, some mf Gravel, little Silt (7-65)	

766 19/21

JERSEY BORING & DRILLING CO., INC.	TEST BORING LOG	BORING NO. 8
PROJECT Apartment Building		SHT.NO. 2 OF 4
CLIENT Kenneth Heller		PROJ. NO.

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
24						
25		9	1		Dark gray SILT, trace f Sand (8-65)	
26			4			
27			5			
28			4			
29						
30						
31		10	1		Black Organic SILT (11-65)	
32			1			
33			1			
34			1			
35						
36						
37		11	WOH		Do (11-65)	
38			WOH			
39			WOH			
40			WOH			WOH: Weight of hammer
41						
42						
43		12	4		Do (11-65)	
44			1			
45			1			
46			1			
47						
48						
49						
		13	WOH		Do (11-65)	
			WOH			
			WOH			
			WOH			

766 20/21

JERSEY BORING & DRILLING CO., INC.	TEST BORING LOG	BORING NO. 8
PROJECT Apartment Building		SHT. NO. 3 OF 4
CLIENT Kenneth Heller		PROJ. NO.

DEPTH IN FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
50						
		14	WOH		Do (11-65)	
51			WOH			
			WOH			
52			WOH			
53						
54						
55						
		15	4		Black Organic SILT, little f Sand (11-65)	
56			3			
			4			
57			4			
58						
59						
		16	6		Top: Black PEAT (11-65)	
61			7		Bottom: gray mf SAND, some Silt (7-65)	
			9			
62			13			
63						
64						
65						
		17	7		Brownish Gray SILT and CLAY, little mf Sand (9-65)	
66			10			
			16			
67			14			
68						
69						
70						
		18	4		Brown mf SAND, some Silt (7-65)	
71			7			
			8			
72			9			
74						
75						

766 21/24

JERSEY BORING & DRILLING CO., INC.

TEST BORING LOG

BORING NO. 8

PROJECT Apartmen Building

CLIENT Kenneth Heller

SHT.NO. 4 OF 4

JOB NO.

DEPT FT	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SAMPLE RECOVERY	IDENTIFICATION	REMARKS
76		19	11		Reddish brown cf GRAVEL, some Silt (6-65)	
			11			
77			8			
			9			
78						
79						
80						
		20	8			
81			100/6"		Brownish gray cf SAND, little Silt, trace f Gravel (7-65)	
82						
83						
84					Diamond core drilled 82' to 87' LIME STONE Recovered: 45" = 75% RQD: 71.66% End of boring at 87' (2-65)	
85						
86						
87						
88						
89						
90						
91						
92						
93						
94						
95						
96						
97						
98						
99						
0						
1						