TECHNICAL SCOPE OF WORK
FOR ADDITIONAL
VERTICAL PROFILE BORING AND
MONITORING WELL INSTALLATION

123 POST AVENUE SITE
OPERABLE UNIT 2
SITE REGISTRY NO. 130088
WESTBURY, NEW YORK

Prepared for:

NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION

Prepared by:

D&B ENGINEERS AND ARCHITECTS, P.C.
WOODBURY, NEW YORK

APRIL 2016

123 POST AVENUE SITE
SITE NO. 1-30-088
WESTBURY, NEW YORK

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

Section | Description | Page

List of Figures

1.0 GENERAL

1.1 Scope of Work

A. Furnish all labor, equipment, materials, supplies, facilities, power, and incidentals as necessary to complete up to thirteen vertical profile borings (VPBs) and construct up to four monitoring wells using sonic drilling methods at the 123 Post Avenue Site. See **Figure 1** for proposed VBP locations.

B. The Contractor shall identify, apply for, obtain and pay all fees for licenses, permits, approvals and insurance required from federal, state and local government and public agencies and authorities as necessary to perform the work.

C. All work shall be performed by the Contractor in accordance with all applicable federal, state and local laws, rules and regulations. The Contractor shall, at all times, maintain noise levels within the limits of local noise ordinances.

D. Provisions have been made for the use of the Westbury Department of Public Works (DPW) facility on Dover Street in Westbury for the storage of equipment and materials. However, the Contractor shall provide temporary electric power for equipment, lighting, sanitary facilities, potable water, etc., as necessary to perform the work.

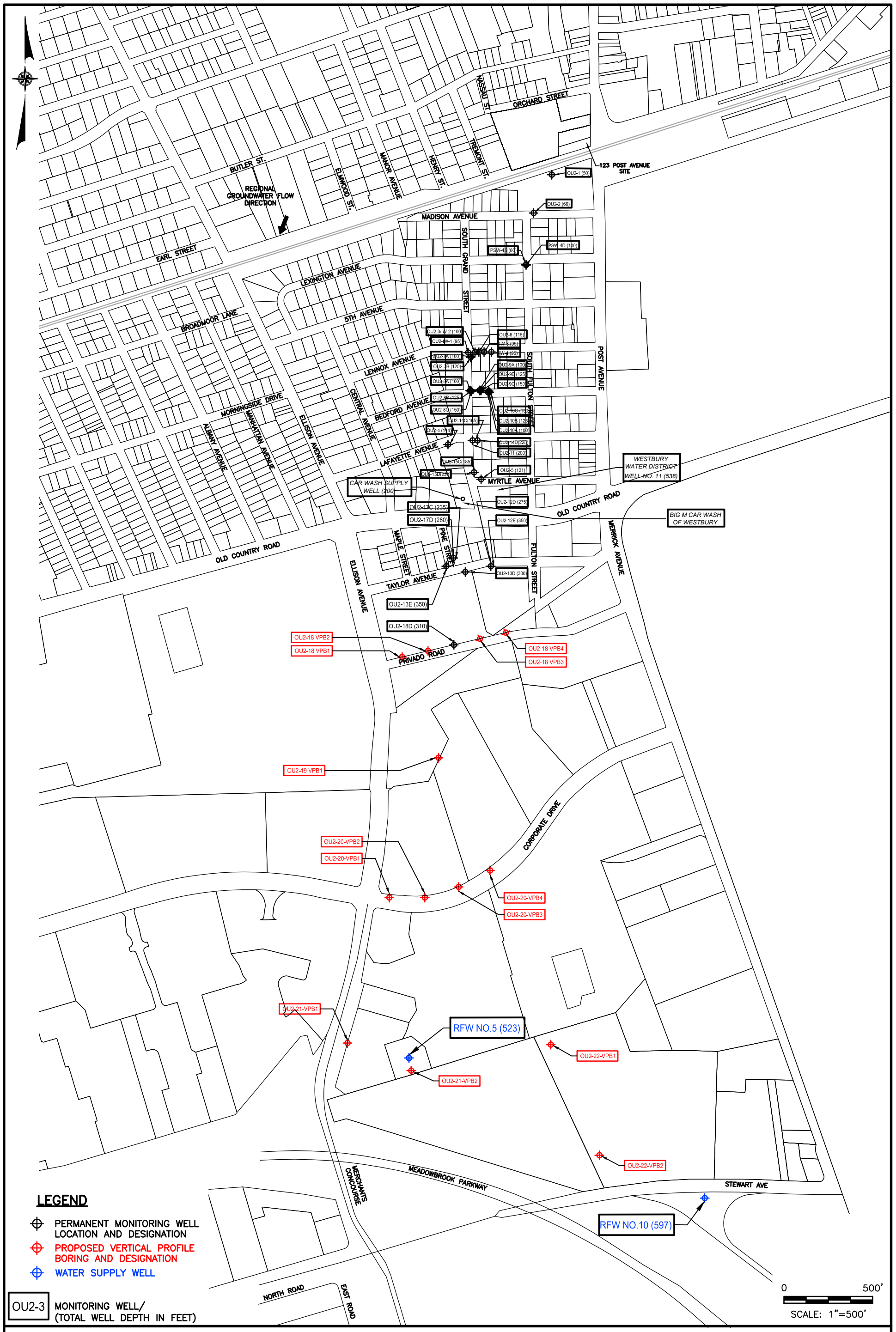
E. All electrical work shall be in accordance with the standards and guidance of the National Electrical Code, the National Electrical Safety Code and with local codes which apply, including the requirements for hazardous locations.

F. All work shall be performed during the hours designated by the Engineer. There shall be no work on state or federal holidays and weekends, unless specifically approved by the Engineer. No payment shall be made for equipment left by the Contractor during holidays and weekends and any other non-working days.

G. The Contractor shall store and protect all materials brought to the site. Materials shall be stored in accordance with all applicable federal, state and local laws, rules, regulations and manufacturer's instructions, with seals and labels intact and legible. The Contractor shall make periodic inspections of stored materials and equipment to assure that materials and equipment are maintained under specified conditions and free from damage or deterioration.

H. The Contractor is solely responsible for the safety and security of its materials, supplies, equipment and the work. The Contractor shall also make provision to have security for equipment that cannot be removed from the drilling location during the site work.

I. All work shall be performed in the presence of the Engineer.



D&B ENGINEERS AND ARCHITECTS, P.C.

123 POST AVENUE - OPERABLE UNIT 2
WESTBURY, NEW YORK

PHASE II REMEDIAL INVESTIGATION PROPOSED ADDITIONAL VERTICAL PROFILE BORING LOCATIONS

FIGURE 1

F:\3150-17C\dwg\3150-17C-LOCATIONS AND DEPTHS-400-MARCH 31 2016.dwg, 4/13/2016 3:41:44 PM, DWG to PDF.pc3

J. The Contractor shall be responsible for performing the work in a manner which minimizes exposure of personnel and the surrounding community to noise, dust, vapors, odor, etc., including implementing measures and controls as necessary to minimize potential impact.

K. The Contractor shall continuously maintain qualified personnel at the work site at all times when the work is being performed.

L. Immediately after mobilizing to the work area and prior to performing any intrusive work, the Contractor shall construct a temporary barricade along the perimeter of the limits of work using safety cones and caution tape or alternate approved equipment. Additionally, the Contractor shall be responsible for maintaining traffic and protecting the public from damage to persons and property for the duration of the project in accordance with all applicable federal, state and local laws, rules and regulations.

M. The work shall be performed in accordance with the project schedule prepared by the Contractor and approved by the Engineer.

N. In general, the overall sequence of work activities shall be as follows:

1. Apply for and obtain all licenses, permits, approvals and insurance required to perform the work;

2. Mobilize equipment to the site;

3. Secure limits of work area and install traffic control devices;

4. Construct a decontamination pad;

5. Decontaminate equipment and materials;

6. Drilling, sampling and logging of the boreholes;

7. Installing well casing (riser pipe) and screens;

8. Setting gravel pack and associated seals;

9. Sealing the annular space between the well casing (riser pipe) and borehole wall;

10. Installing a protective locking surface casing (or vault) and surface seal;

11. Developing and completing the wells; and

12. Site cleanup, restoration, and containment of cuttings/drillings, drilling fluid and well development water and staging of the containerized material at the DPW facility.

1.2 Description of the Site

The 123 Post Avenue Site is a New York State Class 2 Inactive Hazardous Waste Disposal Site (Registry No. 130088). The site is a dry cleaning facility located at 123 Post Avenue in Westbury, New York. The focus of this work is the downgradient groundwater contaminant plume. The work described in this Technical Scope of Work shall be performed south of the 123 Post Avenue Site and within the public rights-of-way or on select private properties.

1.3 Reference to Standards and Regulations

A. The Contractor shall comply with the latest revisions of:

1. Standards of AWWA and ASTM as referenced;

2. The New York State Environmental Conservation (NYSDEC) Law, Article 15;

3. Article XIX of the Nassau County Fire Prevention Ordinance; and,

4. The Occupation Safety and Health Act.

1.4 Permits

A. The Contractor shall be responsible for obtaining and purchasing any permits required for obtaining water, constructing the wells (i.e. road opening permits), etc. The Contractor shall comply with all requirements of the permits, including traffic management and pedestrian protection requirements.

B. The Contractor shall furnish separate copies of all permits to the Engineer and NYSDEC as the permits are received.

1.5 Utilities

A. The Contractor shall notify New York 811 at 1-800-524-7603 or 811 and the appropriate utility companies, including non-member companies, no less than 48 hours prior to any work.

B. The Contractor shall be responsible for identifying and protecting all aboveground and buried utilities and structures. As an added precaution, the Contractor shall be required to pre-clear each borehole location for buried utilities prior to drilling to a minimum depth of 5 feet below ground surface using hand tools, air-knife

and/or vacuum extraction technologies. In areas where drilling will be performed within 10 feet of a marked utility, or where site-specific conditions warrant, pre-clearing shall be to eight feet below ground surface. Any damage to utilities due to negligence, error or omission or failure to follow protocol on behalf of the Contractor shall be repaired by the Contractor at their expense.

1.6 Environmental Protection

A. The Contractor shall furnish all labor, materials, equipment and incidentals necessary to perform all work required for environmental protection in accordance with all federal, state and local laws and regulations, and as directed by the Engineer. For the purpose of this Technical Scope of Work, environmental protection is defined as the retention and restoration of the environment in its natural state to the greatest extent possible during the work. Environmental protection includes protection of air, water and land resources, and involves elimination of noise, dust and vapors, solid waste management and management of waste and pollutants.

B. The Contractor shall schedule and conduct all work in a manner that will prevent the erosion of soil and release of soil and water in the work area. Control measures shall be provided, such as diversion channels, berms, sedimentation or filtration systems, silt fences or other special surface treatments as required to prevent the release of soil and water, and silting, muddying and contamination of surface waters, drainage ways, storm water collection systems and recharge basins. All necessary control measures shall be in place prior to performing work.

C. The Contractor shall take all necessary measures to prevent the migration of dust outside the work area due to the work activities.

D. The Contractor shall be responsible for containerizing all Investigation Derived Waste (IDW) in leak proof, vapor tight Department of Transportation (DOT) approved 55-gallon ring top drums, or approved equal. This includes, but is not limited to, drill cuttings, drilling fluids, used personal protective equipment, decontamination wastewater, purge/development water and disposable sampling equipment. All IDW shall be segregated by physical state, containerized, labeled with the date, the well or boring number(s), the type of waste (i.e., soil boring cuttings or decontamination waste) and the name of a point-of-contact. At the completion of each day's work the Contractor shall remove and transport all IDW to the Westbury Department of Public Works (DPW) Yard located at Dover Street, Village of Westbury.

E. Disposal in and adjacent to the work area of any debris, wastes, effluent, trash, garbage, oil, grease, chemicals, etc. resulting from the work will not be permitted. If any waste material is placed in unauthorized areas, the Contractor shall remove the waste and restore the area to its original condition. If necessary, soil

contaminated from such unauthorized disposal operation shall be excavated, disposed as directed by the Engineer, replaced with suitable fill, compacted and restored at the surface with the same materials which existed prior to the start of work.

F. The Contractor shall take all necessary measures to control the release of odors and vapors. These measures will be employed at the Contractor's expense following approval by the Engineer.

G. The Contractor shall not pollute any surface waters or groundwater with substances including, but not limited to, fuels, oils, bitumens, calcium chloride, acids, insecticides, herbicides or other harmful materials.

H. The Contractor shall perform all work in strict compliance with all applicable requirements of governing authorities having jurisdiction.

1.7 Spill Control

A. The Contractor shall furnish all labor, materials, equipment and incidentals necessary to implement all required spill prevention and control measures during the work, including required secondary containment measures, as necessary to protect the site and adjacent properties. A "spill" shall include any release of any contaminant to air, land or water.

B. The Contractor shall devise methods, provide the means and take action to prevent further contamination and spread of contamination to soil, water, air, structures, equipment or material resulting from spills generated from the work.

C. Any material necessary for completion of work, which is contaminated as a result of a spill or Contractor negligence, shall be replaced at the expense of the Contractor.

D. In the event of a spill, the Contractor's Health and Safety Officer shall immediately notify all applicable federal, state and local agencies having jurisdiction.

E. When a spill occurs, the Contractor's Health and Safety Officer shall submit a written report to the Engineer within 48 hours of the incident. The report, at a minimum, shall include the following:

1. The date and type of incident;

2. A map delineating the area impacted by the incident;

3. Details of the cause and resolution of the incident;

4. Identification of all outside agencies contacted and involved in the spill control;

5. Descriptions of corrective action;

6. Impact on human health and the environment; and

7. Potential claims by third parties.

1.8 Health and Safety

A. The Contractor shall be solely responsible for the health and safety of his/her employees. All Contractor personnel shall have completed OSHA training and medical monitoring including requirements for work on hazardous waste sites.

B. The Contractor shall provide for his/her employees, and any subcontractor all necessary training, medical monitoring, equipment, protective clothing, sanitary facilities, etc. as required by federal, state, and local laws, codes and regulations. This equipment and clothing shall be readily available at the site to the Contractor's employees. The Contractor shall also provide traffic control and pedestrian protection measures as necessary, or as required by permit, law or regulation. Any costs resulting from delays in work due to appropriate health and safety equipment and clothing not being within the work area and ready for immediate use shall be borne by the Contractor, including the Engineer's labor and expense costs during the delay period.

1.9 Qualifications

A. The Contractor shall be a well driller registered with the State of New York to install wells as set forth under Section 15-1525 of the New York State Environmental Conservation Law.

B. The Contractor shall employ only competent work persons for the execution of this work, and all such work shall be performed under the direct supervision of experienced personnel satisfactory to the Engineer. The Contractor shall have at his immediate disposal, operational equipment in good working order rated to do the work required to install the VPBs and monitoring wells.

C. The well driller shall be capable of identifying geologic formations, maintaining complete and current well and boring logs and daily notes for a well completion report, and developing and testing the wells.

D. The Contractor shall furnish satisfactory evidence, upon request, that all materials to be furnished in performing the work are new and all equipment to be used is in good condition and working order.

E. The Contractor shall complete the work in accordance with all applicable requirements of the federal, state and local agencies including the New York State Department of Environmental Conservation.

F. The Contractor shall be responsible for the security of the Contractor's equipment, materials and supplies.

1.10 Submittals

A. Copies of all licenses, permits, approvals and insurance required from federal, state and local government and public agencies and authorities as necessary to perform the work.

B. Project schedule.

C. A sample, catalogue cut and specification for each of the materials listed in this specification shall be submitted to the Engineer upon request for approval prior to mobilization to the project site and the commencement of field operations.

D. During drilling of each well, a complete log shall be maintained by the Contractor and submitted to the Engineer. The report shall include the following:

1. The reference point for all depth measurements.

2. The depth at which each change of formation occurs.

3. The identification of the material of which each stratum is composed.

4. The depth interval from and method which formation samples were taken.

5. The depth at which borehole diameters (bit sizes) change.

6. Other pertinent data requested by the Engineer.

E. During drilling of each well, a detailed daily driller's report shall be maintained and submitted as requested by the Engineer. The report shall give a complete description of all formations encountered, number of feet drilled, number of hours on the job, shutdown due to breakdown, materials used, feet of casing set, and other pertinent data requested by the Engineer.

1.11 Handling of Materials

A. All equipment, parts and materials shall be properly protected so that no damage or deterioration will occur during a prolonged delay from time of shipment until installation is completed, and the units and equipment are ready for operation.

B. All equipment, parts and materials shall be properly protected against damage during a prolonged period at the site. Any equipment, parts and materials damaged, or deemed unacceptable by the Engineer, shall be removed from the site and replaced with new, like equipment, parts or materials by the Contractor at no additional cost to the Engineer.

C. If water for drilling is used, the Contractor shall provide potable water approved by the Engineer and a waste storage tank or container for each well. The storage capacity shall be 50% greater than the anticipated drilling waste generated per borehole. The Contractor is responsible for providing all water necessary for cleaning, well construction and any other purposes for the successful completion of the work.

D. The Contractor shall contain all cuttings, drilling fluids, flushing water and development water in a leak proof container. No cuttings, fluids or water shall be allowed to flow on the site surface. The Contractor shall supply and contain all cuttings, fluids and waters in DOT-approved 55-gallon "ring top" drums or approved equal.

E. The Contractor shall be responsible for containerizing all IDW in leak proof, vapor tight DOT-approved 55-gallon ring top drums, or approved equal. This includes, but is not limited to, drill cuttings, drilling fluids, used personal protective equipment, decontamination wastewater, purge/development water and disposable sampling equipment. All IDW shall be segregated by physical state, containerized, labeled with the date, the well or boring number(s), the type of waste (i.e., soil boring cuttings or decontamination waste) and the name of a point-of-contact. At the completion of each day's work the Contractor shall remove and transport all IDW to the Westbury DPW Yard located at Dover Street, Village of Westbury.

1.12 Site Cleanup

A. Immediately upon completion of the work, the Contractor shall remove all equipment, materials and supplies from the work area, remove all surplus materials and debris, fill in all holes or excavations, and grade the work area to elevations of the surface levels which existed before work started. The Contractor shall complete all pavement replacement as directed by the Engineer. The work area shall be thoroughly cleaned by the Contractor and approved by the Engineer.

B. Upon completion of the work, the Contractor shall remove all equipment, materials, supplies and waste material (except IDW) from the DPW facility and restore the area to pre-existing conditions.

1.13 Warranty

A. All equipment supplied under this Section shall be warranted by the Contractor and equipment manufacturers for a period of 1 year from date of acceptance by the Engineer. The manufacturer's warranty period shall run concurrently with the Contractor's warranty period.

B. The Contractor shall guarantee the wells to be free from defects in workmanship and materials. If any part of the wells should fail during the warranty period due to the fault of the Contractor, it shall be replaced and the wells restored to service at no additional expense to the Engineer.

2.0 VERTICAL PROFILE BORING AND MONITORING WELL INSTALLATION

2.1 Specifications for Vertical Profile Boring/Monitoring Well Construction

A. Vertical profile borings shall be advanced at the approximate locations shown on **Figure 1** using sonic drilling methods or utilizing an alternate method proposed by the Contractor and approved by the Engineer. The Contractor shall use a drilling rig equipped with a Sonicor Model 50K drill head or equivalent (as approved by the Engineer) capable of achieving depths up to 650 feet below ground surface. Sonic drilling shall be performed using a 6-inch diameter casing. All drilling shall be conducted utilizing the minimal amount of drilling fluid possible.

B. Use of any drilling additive shall be approved by the Engineer prior to use. The Contractor shall provide the Engineer with sufficient detail regarding the use of an additive prior to approval.

C. At each VPB location the Contractor shall install temporary well screens, as directed by the Engineer, utilizing Hole Products' Sonic Water Sampler system or equivalent system (as approved by the Engineer). The sampler shall be advanced a minimum of 10 feet beyond the cased borehole into undisturbed soils using oscillation only and without addition of any drilling fluid.

D. Within each VPB it is anticipated that groundwater samples shall be collected at discrete depths as specified in the table below and as directed by the Engineer. If necessary, based on sample results and at the discretion of the Engineer, additional groundwater samples may be collected to a depth of up to 650 feet bgs using the same method specified above. Additionally, all sampling equipment shall be properly decontaminated prior to collection of all samples.

VPB	Quantity of Samples	Distance Between Samples	Sampling Interval
OU2-18-VPB1	7	25 feet	175-375 feet
OU2-18-VPB2	7	25 feet	175-375 feet
OU2-18-VPB3	7	25 feet	175-375 feet
OU2-18-VPB4	7	25 feet	175-375 feet
OU2-19-VPB1	15	15 feet	205-415 feet
OU2-20-VPB1	7	25 feet	250-450 feet
OU2-20-VPB2	15	15 feet	260-470 feet
OU2-20-VPB3	7	25 feet	250-450 feet
OU2-20-VPB4	7	25 feet	250-450 feet

VPB	Quantity of Samples	Distance Between Samples	Sampling Interval
OU2-21-VPB1	12	25 feet	325-600 feet
OU2-21-VPB2	12	25 feet	325-600 feet
OU2-22-VPB1	12	25 feet	325-600 feet
OU2-22-VPB2	12	25 feet	350-625 feet

E. The Engineer shall collect and submit the samples for laboratory analysis of volatile organic compounds using a 24-hour turnaround time. Analytical results from the groundwater samples shall be used to determine the final depth of each soil boring and the associated monitoring well(s) screen interval(s).

F. The Contractor shall be prepared to collect soil samples from the depth interval(s) specified by the Engineer at each VPB. Soil samples shall be collected via coring, spilt spoon sampling, or other means acceptable to the Engineer. Upon retrieval, the soil samples shall be provided to the Engineer.

G. It is anticipated that up to one monitoring well will be installed at select VPB locations and the monitoring wells will be installed within the original VPB. In no instance shall any boreholes be installed within 5-feet of each other without prior approval of the Engineer.

H. Monitoring Wells

1. A 2.5-inch monitoring well shall be installed in up to four of the twelve boreholes. Each well shall be constructed of 2.5-inch diameter Schedule 80 PVC riser and 10-feet of Schedule 80 PVC well screen. Actual final well depths and screen lengths may vary based on the groundwater sampling results.

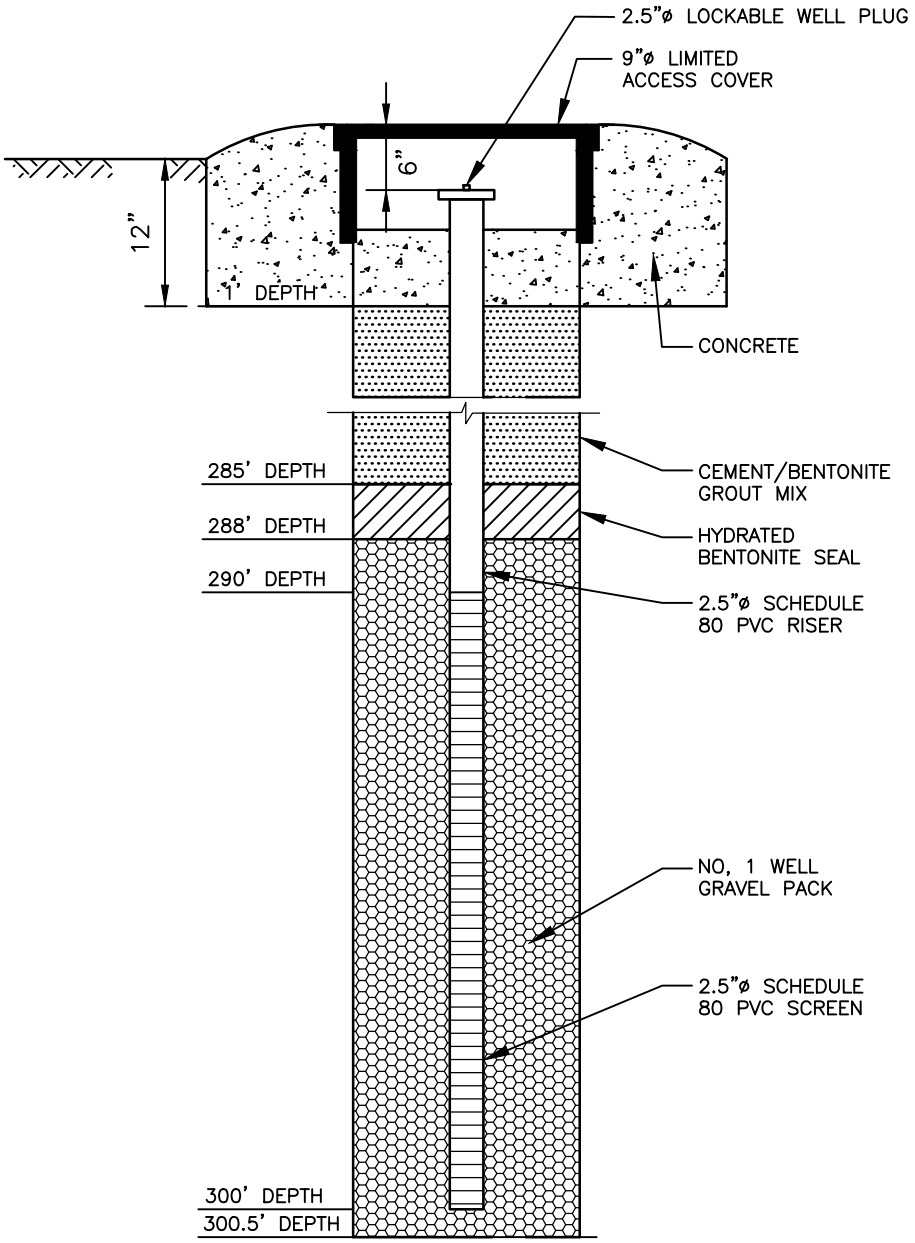
2.2 Well Construction

A. The monitoring wells shall be installed at select locations shown on **Figure 1**. The exact locations of the monitoring wells shall be determined in the field based on site-specific conditions. Well locations shall be approved by the Engineer prior to initiation of drilling activities. Well construction details are shown on **Figure 2**.

B. All equipment, materials and tools shall be cleaned as per Section 2.8.

C. Construction of monitoring wells may include the removal and excavation of pavement and/or concrete prior to initiation of drilling activities.

D. Drill pipe lubrication if any shall be limited to vegetable shortening or approved equal.



D&B ENGINEERS AND ARCHITECTS, P.C.

123 POST AVENUE - OPERABLE UNIT 2
WESTBURY, NEW YORK

MONITORING WELL SCHEMATIC

N.T.S.

FIGURE 2

E. Drilling fluid shall only consist of potable water approved by the Engineer. No other fluids or additives shall be used unless approved by the Engineer in advance of the work. The Contractor shall be responsible for providing all water necessary for borehole and well construction. At the Engineer's request, the Contractor shall provide proof of the potability of the water source.

2.3 Well Casing and Screen

A. Well casing shall be 2.5-inch inner diameter (I.D.) Schedule 80 PVC conforming to ASTM D1784 and ASTM D1785, as manufactured by Atlantic Screen and Manufacturing, Inc., or approved equal. The riser shall be adjoined using internally threaded flush joints. Solvent weld pipe shall not be permitted.

B. Well screen shall be 2.5-inch I.D. 0.010-inch slotted Schedule 80 PVC threaded flush joint manufactured by Atlantic Screen and Manufacturing, Inc., or approved equal. The bottom of the screen shall be fitted with an internally threaded, flush joint PVC plug fabricated from solid stock. Solvent weld pipe shall not be acceptable.

C. The Contractor shall provide all casing (riser pipe), well screen, together with required couplings, plugs, caps, fittings and other parts necessary to satisfactorily complete the well installation. Casing and appurtenances shall be clean and free of all oil, grease and any other organic contamination. All casing must be contained in factory sealed, individually wrapped packaging prior to use. Casing that is not packaged or is removed from damaged packing must be decontaminated prior to installation. All persons handling screens shall wear clean, disposable nitrile gloves, or equivalent, to prevent possible cross contamination.

D. Every effort shall be made on the part of the Contractor to assure casing plumbness and centralization within the borehole.

E. Centralizers may be employed by the Contractor as an optional method of assuring centralization and plumbness with approval of the Engineer.

F. All drilling and well construction methods shall be as approved by the Engineer.

2.4 Sand Pack

A. Screen sand pack shall be a No. 1 well gravel pack, 100 percent passing the No. 8 sieve and less than 2 percent passing the No. 25 sieve, as supplied by the U.S.

Silica Company, or approved equal. The No. 1 well gravel pack shall be clean, washed and graded silica sand supplied in sealed bags.

B. The sand pack shall be placed around the outside of the well screen by means of a tremie pipe or other method approved by the Engineer to ensure that no bridging of the hole occurs and shall extend from the bottom of the borehole to a minimum of 2 feet above the top of the screen or as otherwise directed by the Engineer.

2.5 Bentonite Seal

A. The bentonite shall be 1/2-inch diameter with a dry bulk density of 82 lbs. per cubic foot and containing a minimum of 90 percent sodium montmorillonite. The pellets shall be capable of swelling to 10 to 15 times their dry volume when hydrated with potable water. The bentonite pellets shall be CETCO Tablets as manufactured by CETCO, or approved equal.

B. A bentonite seal shall be placed in the well by means of a tremie pipe or other method approved by the Engineer to ensure that no bridging of the hole occurs and shall extend from the top of the sand pack to a minimum of three feet above the sand pack, or as otherwise directed by the Engineer.

C. The bentonite seal shall be allowed to hydrate for a minimum of 1 hour prior to grouting of the well annulus.

2.6 Cement/Bentonite Grout Mix

A. The bentonite shall be CETCO High-Solids Powered Bentonite Grout, or approved equal.

B. The cement shall be Type I Portland Cement as manufactured by Quikrete, or approved equal.

C. The cement/bentonite grout mix shall be prepared in the following proportion and in accordance with the manufacturer's specifications:

1. 8.3 gallons of potable water;

2. 5.0 lbs. of bentonite; and,

3. One 94-lbs bag of Type I Portland cement.

D. The cement/bentonite grout shall be placed between the well casing and formation above the bentonite seal of the well in each borehole. All cement/bentonite grout shall be installed using a tremie pipe.

E. All grout shall be allowed to cure for a minimum of 12 hours or as necessary to provide a proper cure prior to performing well development.

2.7 Well Plugs and Limited Access Covers

A. Each well casing shall be protected from entry of foreign materials at all times. Temporary well guards and identifying flagging shall be provided and installed immediately upon well completion and prior to development and removal of the Contractor's drill rig from the well site.

B. If the well is not complete at the end of the work day, the Contractor shall be responsible for securing the uncompleted borehole/well.

C. Upon completion, each well shall be fitted with a 2.5-inch liquid tight lockable well plug as manufactured by Wattera, or approved equal.

D. The Contractor shall furnish and install a 9-inch diameter watertight limited access well cover Model 519 as manufactured Morrison Bros., Co., or approved equal, at each well location.

E. Each well cover shall be installed flush to grade in a concrete surface pad having the dimensions 2 feet wide by 2 feet long by 1 foot deep. Concrete shall be Quikrete Concrete Mix 1101 or approved equal mixed in accordance with the manufacturer's specification.

F. Each limited access cover and concrete surface pad shall be protected until the concrete has cured.

2.8 Cleaning Procedures

A. Sampling Equipment - All sampling equipment shall be, at a minimum, cleaned of all foreign matter, washed with a nonphosphate detergent, rinsed with potable water, then followed by a final rinse with distilled/deionized water in that order, or cleaned of foreign matter and steam cleaned at a temperature of 212°F and void of any external oils and greases prior to use in each well.

B. Contact Equipment - All contact equipment including sample pumps and hoses shall be cleaned and flushed between uses. This cleaning process will consist of steam cleaning of pump casing and cables followed by a 10-gallon flush of potable water through the pump. A new length of dedicated polyethylene tubing shall be used for each well and disposed of after use. The pump, tubing and cables shall always be placed on clean polyethylene sheeting to avoid contact with ground surface.

C. Drilling - Heavy Equipment - All drilling and heavy equipment including drill rigs, tooling and well casing shall be cleaned after mobilization to and prior to demobilization from the project site and between individual locations on the site. The two options that are available and allowable to accomplish cleaning the heavy equipment include steam cleaning and manual scrub brushing and washing.

D. All equipment shall be stored above ground in a clean manner as approved by the Engineer. All downhole equipment shall be stored in such a manner as to prevent contact with the ground surface.

E. Drilling fluid changes during borehole construction shall include cleaning of all drilling equipment in the manner described in this Section, in addition to the removal of drilling fluid in the borehole by flushing, bailing or air lift, as necessary to ensure clean fluid in the borehole, as approved by the Engineer.

F. All cleaning equipment shall be provided by the Contractor.

G. All water used in the drilling operation shall be provided or obtained by the Contractor. Transport and storage of all water will be the responsibility of the Contractor. All water used for drilling and cleaning must be potable and as approved by the Engineer.

H. The Contractor shall provide/construct a decontamination pad on which to clean all equipment, materials and supplies. The Contractor shall also be responsible for removing the decontamination pad at the end of the drilling program.

2.9 Well Development

A. The Contractor shall develop each monitoring well installed. Development shall be by overpumping with a submersible pump, pump and surge, bailing, or air-lift as determined by the Engineer. Development shall continue until the well water is less than 50 NTUs as measured with a turbidity meter or until the Engineer approves cessation of development. The sediment-free condition is to be measured within the first 15 minutes of pumping following start-up. In the case of monitoring wells screened in either silt or clay formations, only gentle development methods shall be used (i.e., low pumping of less than 5 gallons per minute). For cases in which the 50 NTU turbidity requirement is unattainable due to the high percentage of fines in the formation, development will proceed until turbidity values stabilize with no evidence that further development will reduce turbidity. If the sediment has not been effectively and satisfactorily developed out, a determination will be made by the Engineer, taking into account the nature of the formation materials, whether or not to continue development. Development water must be collected in 55-gallon drums and removed from the work area at the end of each day.

2.10 Well Acceptance Criteria

A. If the Contractor installs a well which is not functional or does not perform in accordance with the requirements of this Technical Scope of Work as determined by the Engineer, the Contractor shall repair the well, or replace the well and abandon the disapproved wells in accordance with the Technical Scope of Work as directed by the Engineer at no additional cost.

B. To be accepted by the Engineer:

1. A well shall be completed to the depth specified;

2. Well casings and screens shall be installed straight, plumb and concentric in the borehole and at the proper depth intervals. In order to ensure that all wells are sufficiently straight and acceptable to the Engineer, the Contractor shall pass a 1.66-inch diameter by 36-inch long submersible pump or pump replica to the bottom of the 2.5-inch well; and,

3. A well shall be developed to the point that it is producing water free of drilling fluid additives (if used), and is sediment free. Sediment free shall be defined as not more than 50 NTUs as measured with turbidity meter.

2.11 Vertical Profile Boring and Well Abandonment

A. In the event that the Contractor shall fail to install a VPB and/or well to the depth specified or to such lesser depth as directed by the Engineer, or should the Contractor abandon the VPB/well because of loss of tools or for any other cause, through the fault of the Contractor, the Contractor shall, plug the VPB/well using a cement/bentonite grout mix, as directed by the Engineer. The cement/bentonite grout mix shall be prepared as specified in Section 2.6. This work shall be completed at no additional cost to the Engineer.

B. Prior to plugging the VPB/well, and if present, the concrete surface pad and access cover shall be removed, followed by hand digging soil and grout to expose the PVC well casing, if installed, below the ground surface. The PVC well casing shall be cut at depth of approximately 2 feet below the ground surface and removed, as necessary.

C. The VPB/well shall be plugged with the cement/bentonite grout mix. The gout mix shall be pumped, through a tremie/grout pipe, in one continuous operation, from the bottom to the top of the VPB/well. The tremie/grout pipe may be slowly raised as the grout is being placed but the discharge end of the pipe shall remain submerged in the grout at all times until grouting is complete.

D. The Contractor shall restore the VPB/well location at the surface with the same materials which existed prior to the start of work.