STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

Petition of BNE Energy Inc. for a Declaratory Ruling for the Location, Construction and Operation of a 4.8 MW Wind Renewable Generating Project on Winsted-Norfolk Road in Colebrook, Connecticut ("Wind Colebrook North")	**Petition No. 984** **March 24, 2011**

PRE-FILED TESTIMONY OF DOUGLAS S. ROY, P.E.

Q1. Mr. Roy, please state your name and position.

A. Douglas S. Roy. I am the New York City office manager and an Associate Principal of GZA GeoEnvironmental, Inc. ("GZA"). GZA has offices located at 655 Wind Brook Drive, Suite 402, Glastonbury, Connecticut.

Q2. Please state your qualifications.

A. I have a B.S. in civil engineering technology from Wentworth Institute of Technology and a M.S. in civil engineering (geotechnical) from Polytechnic Institute of the New York University. I am a registered professional engineer in New York, New Jersey, Pennsylvania and Maryland.

I am a civil engineer with a broad spectrum of experience on geotechnical and instrumentation projects. I have over 22 years of experience in the fields of transportation, energy and urban building construction. I have worked on numerous projects requiring the excavation of bedrock for buildings, tunnels and industry. As a result I have extensive experience in the field of construction related vibration and its measurement, such as that caused by blasting and the impact to adjacent structures.

I also have extensive experience with the development of wind turbine projects across the country and in other countries. I have performed geotechnical investigations and studies for GE wind turbines projects in California, New York, Pennsylvania, Minnesota, Iowa, Texas, Germany, China and Brazil. In our capacity as a consultant, I assisted GE in the preparation of their in-house design documents for the geotechnical investigations of wind turbine foundations.

A copy of my resume is attached hereto as Exhibit 1.

Q3. Please describe your involvement in this matter.

A. GZA was retained by BNE Energy Inc. ("BNE") to provide geotechnical and groundwater consulting for BNE for its proposed project at Winsted-Norfolk Road in Colebrook known as Wind Colebrook North. BNE anticipates that blasting will be required for construction of the Wind Colebrook North project. Since final geotechnical analysis will not be conducted until after the Siting Council approves this project, GZA has prepared a pre-blasting survey and controlled blasting specification. The blasting specification report is attached hereto as Exhibit 2. In addition, GZA has prepared a pre- and post-blasting well survey specification. The well survey specification report is attached hereto as Exhibit 3.

Q4. Please describe the purpose of the blasting specification.

A. The blasting specification is intended to provide BNE, and the Siting Council, with the procedures that will be implemented to ensure that any blasting required for construction of roadways, crane assembly areas, crane pads, rotor assembly areas and turbine foundations will be done in a controlled manner in accordance with all applicable local and state regulations. The blasting specification also delineates the pre-blasting structural survey that will be implemented by BNE.

Q5. Please describe the purpose of the well survey specification.

A. The well survey specification is intended to provide BNE, and the Siting Council, with the procedures that will be implemented to ensure that any blasting required for construction purposes will have no impact on groundwater and existing wells in the vicinity of the Wind Colebrook North project. Pre-blasting well surveying will comply with all drinking water quality parameters established by the Department of Public Health.

Q6. Based on your current understanding of the geology in the vicinity of the Wind Colebrook North project, if this controlled blasting specification was implemented, would groundwater quality and existing wells be protected from significant environmental impact?

A. Yes, given the size of the project, groundwater depth and anticipated distance to adjacent wells, the groundwater would be protected from significant environmental impacts.

Q7. Does this conclude your testimony?

A. Yes.

March 24, 2011
Date

Douglas S. Roy

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EXHIBIT 1

Douglas S. Roy, P.E.
New York City Office Manager/Associate Principal

RESUME

Education

M.S., 2008, Civil Engineering (Geotechnical), Polytechnic Institute of the New York University, Brooklyn, New York

B.S., 1989, Civil Engineering Technology, Wentworth Institute of Technology, Boston, Massachusetts

Professional Registrations

Registered Professional Engineer, New York, 076368

Registered Professional Engineer, Pennsylvania, 05645

Registered Professional Engineer, New Jersey, 42788

Registered Professional Engineer, Maryland, 31053

Areas of Specialization

Geotechnical Engineering

Geotechnical/ Structural Instrumentation

Summary of Experience

Mr. Roy is a civil engineer with a broad spectrum of experience on geotechnical and instrumentation projects and serves as the New York City District Office Manager and Associate Principal. Mr. Roy has over 20 years of geotechnical engineering experience in the fields of transportation, energy and urban building construction. His specific experience includes site investigations in soil and rock, in-situ soil testing, remote access drilling, design of shallow, mat and deep foundations, rock fall support and bolting, blasting and vibration, ground improvement, retaining wall design, liquefaction analysis, underpinning, dynamic soil modeling, finite element analysis and support of excavation. His national and international experience has given Mr. Roy both design and construction experience with many unique soil and rock types including, varved silts, loess, karst, expansive clay, collapsible soil and expansive shale. In addition, Mr. Roy has spent much of his career in the measurement of deformation of soil, rock and related structures including the use of inclinometers, strain gages (vibrating wire and resistance type), crack meters, earth pressure cells, load cells, tilt meters, and robotic total stations. Relevant project experience includes:

Relevant Project Experience

LITIGATION SUPPORT

Associate Principal, Confidential Client, Lodi, New Jersey. Led engineering analysis and evaluations of damage claim regarding support of excavation installation, vibration and dewatering. Provided expert options regarding claim against designers professional liability policy.

Associate Principal, Confidential Client, New York, New York. Provided analysis and opinion regarding alleged damage caused by contractor means and methods for deep foundation (mini pile) installation.

Associate Principal, Confidential Client, New York, New York. Provided expert analysis and opinions regarding underpinning and damage to adjacent structures. Review vibration and settlement records.

Associate Principal, Confidential Client, New York, New York. Supported owners legal effort regarding damage to his historic building caused by adjacent lot foundation construction which included the installation of sheet piling, dewatering and H-piles. Reviewed crack promulgation data and appeared in court on owner's behalf as expert witness.

INSTRUMENTATION

Associate Principal, S3 II Tunnel Contractors, JV, Number 7 Line Subway Extension, New York, New York. The New York City Metropolitan Transit Authorities No. 7 Line Extension (Contract C-26503) will extend the existing No. 7 Line subway west along 41st Street from about Eighth Avenue to Eleventh Avenue, where it will turn south to 24th Street. The project includes approximately 6,000 feet of twin-bore tunnels, primarily in rock. The initial phase of the project also includes a mined cavern station entirely in rock on Eleventh Avenue between 33rd and 36th Streets.

Directly responsible for all aspects of a 10 plus million dollar geotechnical and structural instrumentation monitoring program, likely one of the largest single instrumentation contracts for urban construction at this time. The instrumentation program consisted of the innovative design covering an area of over 2 miles and network of 75 hard rock vertical MPBX's, 26 inclinometers, 12 Automated Motorized Total Stations, several within active railroad and subway lines, hundreds of survey monitoring points, strain gages, tiltmeters, seismographs and liquid level systems. Using both manually and automated (via. cellular and short haul modem) the monitoring system was fully automated with Internet access and alarms providing near real time deformation data.

One of the many unique parts of the project was the TBM retrieving location within the active lower level of the Port Authority of NY and NJ Bus Terminal requiring a TBM run under an active bus ramp and excavation of the retrieving pit to a depth of 45 feet within the building basement. During this operation we designed and provided specialty custom instrumentation as well as vibration monitoring and blasting consulting. Meet with the PANYNJ staff and MTA on a weekly basis during all operation with the PABT. The entire tunneling program fee was over 1 billion dollars with a duration of approximately 3 years.

Associate Principal, Kiewit Constructors Inc., Harlem River Tunnel, New York, New York. Overall project responsibility for the installation, monitoring and data analysis of geotechnical instrumentation for the Consolidated Edison (Con Ed) Harlem River Tunnel. This 18 foot diameter tunnel stretched between Manhattan and the Bronx, a distance of over 750 feet under the Harlem River. Tunnel construction consisted of 2 secant pile supported access shafts and 750 feet of drill and blast tunnel excavation in the Inwood Marble formation. The Bronx shaft was directly adjacent to a historic relieving platform which carried 3 commuter rail lines (MNRR). Value engineered the use of Automated Motorized Total Station use for monitoring the 3 rail lines. Other instrumentation installed consisting of optical prisms, inclinometers, borehole extensometers, tilt meters, in-place inclinometers, in-tunnel extensometers, convergence points and vibration monitoring equipment. Setup a central data management system for the storage and display of instrumentation data. Provided analysis of ground movement as shaft and tunnel were excavated adjacent to the rail lines with weekly review and reports of the instrumentation data.

Associate Principal, Kiewit-Reyes AJV, Block 37 Tunnels Instrumentation and Monitoring Program, Chicago, Illinois. In an ambitious undertaking of civil and railway engineering, the Chicago Transit Authority (CTA) embarked on a subway tunnel connection project linking two of its major subway lines, allowing single seat access between the two area airports, Midway and O'Hare. The excavation and demolition required to connect these two subway lines that directly abut two pre-1900 historic buildings, with sidewalk vaults, both founded on shallow foundations. The excavations through 15 feet of fill and 15 to 25 feet on soft to medium stiff Wisconsin stage glacial clay (Blodgett strata) utilized both slurry and solider pile & lagging techniques for excavation support. Mr. Roy planned and executed the extensive instrumentation program which was installed, not only monitors these two historic buildings but also focuses on the deformation of the four adjacent subway tunnels, a historic freight tunnels, utilities, and that of a slurry wall excavation which is being installed almost concurrently on an adjacent property. All work was performed directly for the contractor.

Unique to this project is the quality of the pre-planning, engineering and automation of the project with limited manual monitoring. Instrumentation includes the use of Automated Total Stations, tunnel profiling system, closed loop liquid level systems, both bi-axial and uni-axial tilt sensors, in-place inclinometers, extensometers, piezometers and vibrating wire strain gages. The monitoring system was fully automated with Internet access and alarms providing near real time deformation data.

Associate Principal, Nicholson/EE Cruz JV, World Trade Center Memorial Liner Wall, New York, New York. Provided electronic instrumentation and monitoring of the existing "bathtub wall" along West Street during the construction and installation of a new liner wall and lateral earth support. In ground instrumentation included installation and monitoring of inclinometers, tiltmeters, and nested piezometers. Above ground instrumentation included an automated theodolite and mini-prisms. Instruments were monitored using a combination of automated systems and manual survey. Reporting was performed on a three-times weekly basis throughout construction.

Associate Principal, George Harms Construction Company, Replacement of Route 52 Causeway Bridge, Somers Point, New Jersey. Provided installation of instrumentation for two-phase in-place replacement of a causeway bridge between Somers Point and Ocean City, NJ. Work included installation of over 5000 lf of inclinometer casings, 1000 lf of vibrating wire piezometers, and observation wells over a three-year period. Also provided instrumentation of pre-cast pre-stressed concrete test piles including installation of strain gages at pre-casting yard and monitoring during load testing.

Associate Principal, Brooklyn-Battery Tunnel, Brooklyn, New York. Organized and managed vibration monitoring services of the vehicular tunnel between The Battery in Manhattan to Brooklyn, NY during installation of permanent spud piles for a passenger ferry barge. The piles were to be driven into the overlying mud and onto bedrock. The purpose of the monitoring was to have the ability to notify and stop the pile driving contractor if vibration levels on the tunnel exceeded ambient. We installed a seismograph on the maintenance walkway during a late night tunnel closure. The seismograph was connected via a wireless data modem and relayed to a laptop with wireless network card at the surface near the pile driving rig so that "real-time" monitoring could be provided.

Associate Principal, MTA/LIRR East Side Access, Roadheader Trial CM016, Manhattan, New York. Responsible for the planning, submittals, and installation oversight of geo-structural instrumentation of two (2) existing New York City Transit subway tunnels and two (2) new Long Island Railroad tunnels. Tunnel monitoring system consisted of resistant strain gages, seismographs, tiltmeters, automated total stations, optical prisms and tape extensometers points. Tunnel movement, strain and vibration data was accessed from a single remote location using a local area network system design by GZA. Upon completion of the system, trained construction manager staff on the acquisition and reporting of instrumentation data.

Associate Principal, MTA/LIRR East Side Access at Existing Bellmouth Structure CQ026, Queens, New York. Responsible for submittals, collection, evaluation and reporting of acquired instrumentation data, as well as managing and oversight of the installation of inclinometers, piezometers, extensometers, deep benchmarks, surface movement points and the first U.S. underground-automated monitoring system to monitor possible movement of four active New York City subway tunnels located in the vicinity of the proposed excavation. The tunnels were monitored by four Automated Total Stations (*or Theodolites*) in conjunction with 44 monitoring prisms. Tunnel movement data was accessed from a remote location on a real-time basis. Trained and provided support to client on acquiring and reporting instrumentation data.

Associate Principal, Slattery Skanska/Gottlieb Skanska JV, North River Railroad, Weehawken, New Jersey. Provided value engineered electronic instrumentation monitoring of deep excavation for the replacement of a railroad tunnel ventilation shaft. Contract specifications called for daily inclinometer and strain gage monitoring of temporary excavation structures. The contractor was provided with a value engineered solution including in-place-inclinometers and vibrating wire strain gages monitored remotely with an electronic data collection unit. Readings were taken remotely via telephone modem and reported to the contractor on a daily basis.

Associate Principal, Frontier-Kemper, Weehawken Tunnel Blasting Evaluation, Newark, New Jersey. Design, installation and evaluation of crack-meters, strain gages and geophones in the vicinity of the buildings adjacent to the excavation of Weehawken Tunnel as well as vibration and structural integrity monitoring inside the existing tunnel. Responsible for collections and evaluation of acquired data on daily basis.

Senior Project Manager, Doremus Avenue, Embankment Instrumentation, Newark, New Jersey. Project responsibility for the installation of various instrumentation units for a roadway embankment fill. Instruments included inclinometers, vibrating wire piezometers, monitoring wells and extensometers. Upon installation, staff was trained in instrumentation operation and data collection.

Project Engineer, Atlantic City Convention Center, Pedestrian Bridge, Atlantic City, New Jersey. Responsible for the vibration monitoring as part of pile driving program for the construction of a pedestrian bridge adjacent to sensitive masonry and glass structures.

Field Engineer, Central Artery North, Charleston, Massachusetts. Responsible for the installation and data collection of steel-rod rock extensometers, embedment vibrating wire strain gauges, and inclinometers during the construction of an experimental slab foundation system for a cut and cover tunnel. Also monitored installation of groundwater observation wells and vibrating wire piezometers.

Field Engineer, Central Artery/Tunnel Project, Boston, Massachusetts. Responsible for technical oversight of drilling operation in the soils investigation of the Boston Harbor Tunnel project. Duties included the observation and logging of approximately 50 overburden and bedrock borings from land and barge, installation of rock and groundwater instrumentation, preparation of cross-sections, and evaluation of earth retention systems.

TUNNELS AND RAIL

Senior Project Manager, Con Edison, 1st Avenue Steam Tunnel, New York, New York. Responsible for the geotechnical and environmental investigation phase of a hard rock tunnel design for a 4,000 foot long alignment under 1st Avenue. The investigation was part of a 30% design phase of the design-building project. Test boring extend to a depth of 140 or more with up to 120 feet of bedrock coring. Data and interpretive reports were generated for the design build team for use in the design and construction.

Project Manager, Pittsburgh Light Rail Project, Pittsburgh, Pennsylvania. Performed peer review and value engineering of geotechnical design for the reconstruction of 11 miles of light rail right-of-way. The majority of the right-of-way was located along valley walls with near failing slopes in difficult stratified soils and rock conditions. Personally reviewed 30% civil design plans and participated in value engineering process, as the geotechnical consultant. Geotechnical components in design included thousands of linear feet of earth retaining structures consisting of solider pile, cantilever and modular reinforced earth wall systems, and gravity walls as well as foundations of elevated platform and bridge structures.

POWER FACILITIES

Associate Principal, Siemens Energy, Inc., Hudson High Voltage Direct Current (HVDC) Converter Station, Ridgefield, New Jersey. Entire **p**roject responsibility for geotechnical subsurface exploration program with geotechnical and foundation recommendations, environmental studies included a Phase I Environmental Site Assessment (ESA), a Phase II Site Investigation. Managed the completion of a pre-demolition Hazardous Materials Survey of the site building, evaluated a Wetlands Mitigation Plan, and completed a Construction Contaminant Management Plan to present the extent and magnitude of contaminated soils and groundwater, in light of proposed construction activities.

The major structures for the proposed station include four transformer pads, one spare transformer pad, two valve halls, a control building, six AC filter banks consisting of a total of 18 foundation pads, and various other necessary support facilities including valve hall cooling fans, smoothing reactors, fire protection water storages and pump house, and a heavy transport access road.

Associate Principal, Competitive Power Ventures, The Valley, Wawayanda, New York. Planned and executed a preliminary subsurface exploration program for a greenfield development of a new power plant. Preliminary subsurface explorations included drilling soil borings, installation of monitoring wells, and field soil electrical resistivity testing. Conceptual design and site development recommendations report was provided with recommendations for future subsurface explorations.

Associate Principal, Pure Energy Resources, Bayonne Energy Center, Bayonne, New Jersey. Planned and supervised an exploratory program to investigate foundations of existing abandoned structures for the purpose of possible re-use of foundation elements within the proposed development. Work included mapping of existing columns and structures prior to demolition in order to develop estimated foundation locations and performing test pits around representative columns and walls to determine typical foundation elements. Managed two-phase subsurface exploration program including soil borings and three-phase cone penetrometer testing program. Provided conceptual foundation and geotechnical site development report. Provided consulting services on sub-marine cable routing from Bayonne to landfall in Gowanus section of Brooklyn, NY including oversight of marine borings by others and additional geotechnical borings by GZA for horizontal direction drilling in Brooklyn. Provided engineering design recommendations for bulkhead design, cable routing, and cable direction drilling installations.

Associate Principal, Dominion Transmission, Cove Point LNG Expansion Project, Lusby, Maryland. Responsible for site investigation and engineering design services for a two-tank expansion to an existing LNG facility located on the Maryland's Western Shore, one of three such facilities in the US. The tanks, which were 275 feet in diameter and 100 feet tall, required extensive safety analysis for seismic load and settlement. Tanks were surrounded by 50 foot height MSE containment dikes. Provided FEMA site specific seismic hazard study, bearing capacity recommendations, advanced settlement analysis in addition to pile design for pipe line structures.

Associate Principal, General Electric Power Systems, Inland Empire Energy Center, Romoland, California. Responsible for the preparation and implementation of the geotechnical investigation for a proposed GE 7H single shaft combined cycle power plant (the first installed in the US) that included geotechnical borings, suspension logging tests, resistivity tests, and an infiltration testing program. General geotechnical considerations for the site are the presence of a collapsible soils requiring ground improvement for structures with shallow foundation system. Because of the local seismic hazard zone extensive seismic site classification was performed and analyzed using Spits, cross-hole, down hole and suspension logging methods.

Associate Principal, Fairless Works Energy Center, Two Combined Cycle Power Plants, West bank of Delaware River, Fairless Hills, Pennsylvania. Tasks included review geotechnical report and test boring logs, evaluate alternative foundations systems, including ground improvement for some structures, plan and supervise the monitoring of a pile load test program for concrete-filled steel pipe piles, prepare foundation pile specifications, supervise the quality control monitoring for installation of production piling and the placement of reinforcing steel for foundation mats.

Associate Principal, GE Power Plant Engineering, Cannon Falls, Minnesota. Provide field subsurface investigation consisting of geotechnical, hydrogeological and geophysical data collection, design and report preparation for a GE Gas Fired Power Plant. Subsurface conditions at the site which influenced the design and the recommended foundation system, including the presents of loose liquefiable sands, high groundwater table, a varying compressive layer and the presents of karst at the site. Extensive settlement analysis was required to study the effect of differential settlement between various settlement sensitive structures. Final foundation design, after further site investigation, called for the use of large mat foundations for support of the turbine structures and the relocation of foundation away from karst suspected areas.

Associate Principal, Intrepid Mid-American Wind Project, General Electric Company, Schaller, Iowa. Provided engineering peer review services for a wind energy project consisting of more than one hundred wind turbines. Reviewed the geotechnical investigation, testing results and recommendations provided by others for relative approach, applicability, consistency, constructability and accuracy.

Associate Principal, General Electric Company, Jülech/Aldenhoven Windpark, Freialdenhoven, Germany. Provided consultant review of geotechnical report and test boring logs, and performed peer review to confirm parameters and methods utilized in the evaluation of foundations with regard to capacity, lateral deformations, cyclic response and differential settlements for 13 GE 1.5sl wind turbogenerators.

Associate Principal, General Electric Company, Tuoli Wind Farm Project, Xinjiang Urumchi Tuoli, Peoples Republic of China. Provided consultant review of geotechnical report and test boring logs, and perform peer review of foundation designs to confirm parameters and methods utilized in the evaluation of foundations with regard to capacity, lateral deformations, cyclic response and differential settlements for 30 GE 1.5se wind turbogenerators.

Associate Principal, General Electric Company, Zhangbei Wind Farm Project, Zhangjiakou Zhangbei, Peoples Republic of China. Provided consultant review of geotechnical report and test boring logs, and perform peer review of foundation designs to confirm parameters and methods utilized in the evaluation of foundations with regard to capacity, lateral deformations, cyclic response and differential settlements for 20 GE 1.5sle wind turbogenerators.

Associate Principal, General Electric Company, Shangyi II Wind Farm Project, Zhangjiakou, Peoples Republic of China. Reviewing of geotechnical report and test boring logs. Performed peer review of foundation designs to confirm parameters and methods utilized in the evaluation of foundations with regard to capacity, lateral deformations, cyclic response and differential settlements for 33 GE TW1.5s/TZ1.5 wind turbogenerators.

Associate Principal, General Electric Company, Brazil Wind Farms, Various Sites, Brazil. Reviewed geotechnical reports and test boring logs for geotechnical feasibility of wind farm developments at various sites.

Associate Principal, General Electric Company Wind Energy, Trent Mesa Wind Farm, Nolan County, TX. Supervised a planned geotechnical investigation including test borings and rock mapping survey. A report was prepared presenting results of the investigation with recommendations for foundation design and remediation for a wind farm consisting of 100 individual monopole foundations each supporting a 1.5 MW wind turbo-generator.

Associate Principal, China Bundled Buy, General Electric Company, Shanghai Region, China. Provided engineering design services for a multi-site project in China consisting of four sites in the Yangtze River Valley region of eastern China, south and west of Shanghai. Confirm that the specified pile would provide adequate support and that the settlement of the mat would meet GE's design criteria. Performed a review of the available information provided by others, made requests for additional information, and made assumptions for design parameters not provided. Analyses included: group lateral pile foundation analysis, consolidation settlement analysis for rigid and flexible foundations, pile capacity analysis for friction piles in clay, calculation of vertical and horizontal spring constants, drivability analysis and review of CAPWAP results.

Associate Principal, Stony Brook University, Calpine Corporation, Stony Brook, New York. Coordinated subsurface investigation that included traditional soil borings and Cone Penetration Test (CPT) probings. Coordinated laboratory testing program to confirm the visual identification of the subsurface profile. Provided geotechnical findings and shallow foundation recommendations for combined cycle turbine foundation and supporting skid mounted equipment.

Associate Principal, Water Pretreatment Facility, Dresden Energy Center, General Electric, Dresden, Ohio. Provided analysis and recommendations for alternative types of foundation design. Prepared ground improvement specifications and provided construction quality control for densification by means of Deep Dynamic Compaction for tank structures to permit use of shallow foundations.

Associate Principal, Indian Point Peaking Power Project, Entergy, Buchanan, New York. Coordination of the geotechnical subsurface investigation and preparation of geotechnical data report. Included both geotechnical and environmental borings, sampling and testing. Geophysical study performed over the 5-acre site using three integrated methods. Primary geotechnical consideration was the presence of two bedrock formations with severely weathered limestone and voids.

Associate Principal, Spagnoli Road Energy Center, Stone & Webster, Melville, New York. Coordination of the geotechnical subsurface investigation and preparation of geotechnical data report. Included geotechnical borings, cross-hole seismic testing and an infiltration testing program.

Associate Principal, Blue Spruce Energy Center, General Electric, Aurora, Colorado. Coordination of the geotechnical subsurface investigation and preparation of foundation recommendations for the proposed power facility. Primary geotechnical consideration was the presence of expansive clays extending to a soft sedimentary rock. The expansive clay required the design of drilled shafts for support of the settlement/uplift sensitive structures. Provided both shallow (with moisture conditioning) and deep foundation recommendations and specification review for the drilled shafts.

Associate Principal, Bowline 3 Expansion, Mirant, West Haverstraw, New York. Coordination of the geotechnical subsurface investigation and preparation of foundation recommendations for the proposed power facility. The primary geotechnical considerations were the presence of a former landfill extending 20 feet below grade and 40 feet of soft silts and clays. Provided both shallow and deep foundation recommendations and specification review for the driven H-piles. Performed cross-hole seismic survey of the site to evaluate the site classification.

Associate Principal, Elwood Power Plant, Dominion Energy, Elwood, Illinois. Coordination of the geotechnical subsurface investigation and preparation of preliminary recommendations for the proposed power facility for Dominion Energy.

Senior Project Manager, General Electric Power Systems, Dresden Energy Center, Dresden, Ohio. Responsible for the geotechnical design of the foundations for support of a 1,000 mw combined cycle gas fired power plant. Because of the extremes in the site topography, rock cuts of up to 50 feet and fills of 40 feet, consisting of on-site clay were required. The design called for a portion of the site structures to be founded of end-bearing H-piles while others would bear on rock cut. Subsurface information was collected and interpreted to calculate potential for settlement, downdrag and pile capacity. Because of the presence of interbedded shales and coal in the bedrock, extensive research into shale durability and loss of pile capacity was performed.

Senior Project Manager, General Electric Power System, Tullahoma, Tennessee. Responsible for the geotechnical and design phase of an 800 mw combined cycle power plant. Site was located with the Pedmond Formation of Central Tennessee with residual soils. Overall project responsibility for the implementation of geotechnical investigation and foundation recommendations. Final design called for the use of auger cast piles for power unit support.

Senior Project Manager, In-City Generation Stations, New York State Power Authority, Downstate, New York. Overall responsibility for geotechnical investigation and foundation design for two separate fast track simple cycle power stations. One of the foundations was designed for mat support with the other being supported on steel pipe piles.

Senior Project Manager, General Electric International, Baglan Generating Station, Port Talbot, Wales, United Kingdom. Overall project responsibility for the implementation of the geotechnical and dewatering investigation, foundation design, and foundation testing for this power station at an overseas location. Responsible for proposal preparation, contract negotiation, retention and contracting with local drilling and survey firms, project meetings, project management in the UK and in our home office, training of local engineers with ASTM field and laboratory standards, data evaluation and recommendations for the foundation system, as well a specification review. Subsurface conditions at the site consisting of loose sand as well a thin clayey silt layer required the use of non-prestressed, segmented concrete and H-pile foundation, and shallow foundation systems for lightly loaded structures.

Senior Project Manager, Pleasants Power Station, Waverly, West Virginia. Overall project responsibility for the implementation of geotechnical investigation and foundation recommendations for a two-unit simple cycle power facility. Final design called for the use of auger cast piles for power unit support. Slope stability issues were also addressed on several existing slopes on the site.

Project Manager, General Electric Power Systems, John S. Rainey Generating Station, Anderson County, South Carolina. Responsibility foundation evaluation and report preparation for this power station. Subsurface conditions at the site consisted of residual rock overlain by a clayey silt layer. Site topography required power station shallow foundations to rest on both cuts within the residual rock as well as fills of the on-site soils of up to 22 feet. As GE was not responsible for site grading, visited the site to evaluate owner's consultant's soil testing procedures.

Staff Engineer, PSE&G Linden Generation Station, Linden, New Jersey. This project involved the timber pile foundation construction of two power generators by GE on highly compressible soils. Responsibilities included technical oversight during the driving of 400 wooden piles, Pile Dynamic Testing (PDA) as well as soils and concrete testing, and assisting in the preparation of a final report.

EDUCATIONAL FACILITIES

Associate Principal, DeMatteis Construction, Glen Oaks Schools Design-Build, Queens, New York. Responsible for the concept and design of deep dynamic compaction (DDC) to modify unsuitable soils as a cost saving measure to a design build contract. The 35-acre site was overlain by up to 15 feet of unsuitable granular fill which required removal by NYC building Code. Successfully negotiated with the SCA and NYC Building Department to allow DDC for the first school facility in NYC.

HOSPITALS/MEDICAL FACILITIES

Associate Principal, Memorial Sloan Kettering Cancer Center, Zuckerman Research Center Phase II, New York, New York. Provided construction specifications for foundations, excavation, and waterproofing. Provided construction support services for the below-ground construction work including review of contractor submittals and oversight of field staff providing inspection services for rock excavations within close proximity to adjacent laboratory and residential structures. Work included documenting rock anchor tieback installation and testing, monitoring vibrations with seismographs, monitoring structure deflections using liquid level system, and approval of subgrades for foundations.

Associate Principal, Memorial Sloan Kettering Cancer Center, New Research Laboratory, New York, New York. Directly responsible for the implementation of the geotechnical investigation, retaining system design, foundation recommendations, stability analysis, construction monitoring and instrumentation for a 26 story research laboratory in a dense urban setting. The subsurface condition consisted of a local schist of the Harland Rock formations. The design of the building foundation at a depth of 75 feet below grade called for oriented test boring to document folds and fracture in the rock which would affect the stability of adjacent historic structures. Designed rock bolting and dewatering system to reduce pressure on the foundation floor and walls. Also design the instrumentation system to monitor buildings movement caused by the excavation as well as blasting. The final excavation depth at 85 feet was one of the deepest building foundations in New York City.

Associate Principal, University of Maryland Medical Center, Baltimore, Maryland. Provided site investigation and conceptual design recommendations of a new 12 story ambulatory care facilities and 5 stories below grade parking garage located in Baltimore City. Project called for the demolition of a full city block of existing buildings and the reuse and subsurface expansion of an existing below grade parking garage. Site investigation included the use of low overhead drilling equipment within the existing garage. Conceptual foundations design called for slurry (diaphragm) walls extending into bedrock to act as groundwater cut off and vertical support of the 12 story facility.

Associate Principal, Memorial Sloan Kettering Cancer Center, Breast and Imaging Center, New York, New York. Provided engineering design recommendations of a new 14-story building for breast cancer research and treatment. Fronting Second Avenue, the site was occupied by existing structures to be demolished. Organized and managed a preliminary subsurface investigation performed in the sidewalks around the site in order to make preliminary foundation design recommendations. Additional subsurface investigations in order to meeting building code requirements were planned for after demolition. Provided preliminary caisson foundation design recommendations including size, strength, and reinforced concrete design.

Associate Principal, Weill Cornell Medical Center, York Avenue Ambulatory Care Building, New York, New York. Provided engineering design recommendations of a new 15 story building to house faculty medical practice facilities and other ancillary uses. The footprint of the structure is approximately 20,000 square feet extending up to 50 feet into bedrock, and is to be constructed adjacent to two Cornell campus buildings, F. W. Olin Hall and the Jacob S. Lasdon House. Provided office support to field personnel overseeing a soil boring program requiring four rig mobilizations due to restricted space drilling in parking garages and existing basements. Provided client with geotechnical design recommendation report including rock excavation stability and foundation design criteria.

Associate Principal, Weill Cornell Medical Center, 5th Electrical Service Vault, New York, New York. Provided engineering design recommendations of a new electrical vault to be constructed within the property limits of existing hospital. Provided office support to field personnel overseeing a soil-boring program and provided client with geotechnical design recommendation report including rock excavation stability and foundation design criteria.

AVIATION

Senior Project Manager, American Airline Tunnel Cut, Queens, New York. Overall responsibility for the installation, monitoring, and reporting of inclinometers and piezometers of a cut and cover tunnel between two new terminals.

Senior Project Manager, American Airlines, Temporary Structure and Jet Bridges, JFK International Airport, Jamaica, New York. Responsible for the design of a cost effective foundation system for temporary airport structures. Temporary structures were founded on existing apron with settlement monitoring. Probing of apron subgrade and limited mud jacking was accomplished prior to footing construction.

Project Manager, American Airlines, John F. Kennedy International and LaGuardia Airports, Queens, New York. Responsible for all aspects of environmental projects at LaGuardia and John F. Kennedy International Airports as part of the UST closure and replacement program. Project elements include development of risk-based cleanup criteria for soil and groundwater, remediation of Jet (A) fuel contaminated soil and groundwater, soil/groundwater investigations, hangar modifications, contractor supervision, Tenant Alteration Application preparation and administration, UST and AST system designs and construction administration, and NYSDEC permitting and compliance.

Field Engineer, JFK International Airport, Jamaica, New York, Responsible for the scheduling, installation, reading and data interpretation of various geotechnical instrumentation including inclinometers, piezometers, and optical settlement points as part of a geophysical study during the construction of two micro-tunnels under an active runway. All data was interpreted on a real time daily basis to track soil movement as the tunnel progressed under the runway.

RECREATIONAL FACILITIES

Project Manager, CSX Rail Property/ Minor League Baseball Stratum, Staten Island, New York. Responsible for the preparation and implementation of preliminary geotechnical investigation and foundation evaluation report. This waterfront project involved the advancement of land borings, collection of undisturbed samples, laboratory index testing, and the screening and evaluation of various foundation designs and layouts. This preliminary site design also considered consolidation and settlement of marine silt deposits, which underlie a large portion of the site.

Staff Engineer, Atlantic City Convention Center, Atlantic City, New Jersey. This project consisted of the driving of 3,000 steel pipe piles in various subsurface conditions. Responsibilities included observation of cone penetration tests (CPT's), pile load testing, daily monitoring of pile driving, as well as the implementation of vibration monitoring of adjacent buildings. Also interpreted and evaluated data obtained during this field program.

Associate Principal, Athletic Recreation Center, John Ciardullo Associates, Queens, New York. Coordination of subsurface investigation and laboratory program to evaluate the subsurface conditions. Provided geotechnical findings and deep foundation recommendations to support new sports center between two existing airplane hangars.

MARINE STRUCTURES/FACILITIES

Project Manager, 69th Street Pier, Brooklyn, New York. Responsible for the preparation and implementation of geotechnical investigation and foundation design report. This waterfront project involved the advancement of water-based borings, collection of undisturbed samples, laboratory index testing, and design of a reinforced concrete pile foundation.

Project Engineer, Harbor Charlie Police Facility, Brooklyn, New York. Responsible for the preparation and implementation of geotechnical investigation and foundation design report. This waterfront project involved the advancement of land- and water-based borings, collection of undisturbed samples, laboratory index testing, and design of building, pier, and wave screen pile foundation (using WEAP) as well as deep cantilever sheet pile retaining walls.

Associate Principal, Retail Development, Stop & Shop, Brooklyn, New York. Coordination of subsurface investigation and laboratory program to evaluate the subsurface conditions. Reported geotechnical findings and provided preliminary deep foundation recommendations to support new grocery store, parking lot and pierhead rehabilitation.

Associate Principal, Bulkhead Rehabilitation at Vernon Boulevard, New York Power Authority (NYPA), Queens, New York. Coordination of a landside and waterside subsurface investigation program; topographic and hydrographic surveys; and, laboratory testing program. Performed an evaluation of both the surface and subsurface conditions to provide engineering recommendations to NYPA for the rehabilitation of the existing bulkhead. Prepared design and construction documents for a stone revetment to replace the existing drawings. Assisted NYPA with permit applications to the Department of Environmental Protection (DEP).

INDUSTRIAL FACILITIES

Staff Engineer, Chemical Manufacturing Facility, New Jersey. Responsible for the preparation and implementation of a Corrective Measures Study. The study involved evaluation of various remedial technologies for containment and treatment of soil and groundwater impacted by four inactive landfills, at a chemical manufacturing facility in New Jersey. Tasks included calculation of waste volumes, the study of various groundwater barriers and landfill capping options, and the evaluation of various groundwater recovery/treatment/ discharge technologies. Performed construction cost estimates of viable technologies to recommend a cost-effective approach and prepared a final report. After acceptance by the Client, implemented and oversaw the soils investigation using both cone penetration testing (CPT) and conventional soil borings to evaluate the location and geohydraulic qualities of the underling confining layer for slurry wall design.

Staff Engineer, Nabisco Brands, Inc., East Hanover, New Jersey. Responsible for the preparation of plans and specifications used in the modification and upgrading of an existing large capacity irrigation system.

Field Engineer, Deer Island Project, Winthrop, Massachusetts. Responsible for the oversight of construction of drilled shafts. The shafts were designed for end bearing on bedrock or for skin friction in glacial till deposit, with capacity of up to 300 tons per shaft. Duties included instrumentation and load-testing of test shafts using an Osterberg reversed load cell, training of construction managers and field engineers in drilled shaft construction, daily monitoring of construction activities, and soil and instrumentation data evaluation.

Project Manager, Industrial Client, New Jersey. Responsible for a remedial cleanup program evaluation of site impacted by historic uranium fills. Project tasks included implementation of a limited site investigation used to confirm the completeness of a federally funded remediation of the site. As project manager interfaced directly with the Clients legal counsel, directed all aspects of the project and the evaluation which followed for preparation of deposition.

Staff Engineer, Coal Gasification Facility, Mt. Holly, New Jersey. Involved in the field component of the Phase II environmental investigation of a former coal gasification facility. Responsibilities included observation of soil borings and field survey, coordination of field actives with subcontractors, collection of groundwater, soil and sediment samples for laboratory analysis, aquifer instrumentation and testing, geotechnical laboratory testing, and final report preparation.

Associate Principal, Coca-Cola Warehouse, The Facility Group, Greenburgh, New York. Coordinated subsurface investigation that included traditional soil borings and Cone Penetration Test (CPT) probings. Provided geotechnical findings and foundation recommendations for warehouse proposed to connect two existing warehouse structures into one.

DAMS

Resident Field Engineer, Rising Paper Dam, Housatonic, Massachusetts. Responsible for the construction oversight of the Phase I rehabilitation of a 100-year old, rock-filled, timber crib dam with upstream PCB-contaminated sediments. The Phase I project involved sealing of a non-functioning penstock gate and the subsequent construction of a new surge chamber and channel around the dam to facilitate working in the dry. Duties during the construction included scheduling and monitoring of the contractors (i.e., demolition, diving and general), progress payment review, daily river level, flow and turgidity monitoring, and settlement monitoring by survey of existing structures.

LANDFILL

Associate Principal, Keegan Landfill, Kearny, New Jersey. Provided design support and field QA for a soil-bentonite cutoff wall constructed at the Keegan Landfill. The laboratory testing program included leachate compatibility tests to assess the behavior of the soil-bentonite cutoff wall under permeation with landfill leachate. The soil material used for the backfill consisted of non-plastic silt cuttings obtained from rock tunnel excavation.

Associate Principal, ENCAPS Landfill, East Rutherford, New Jersey. Assisted insurance carrier in evaluating contractor's claims of extra work caused by unexpected conditions. The scope of work of the contractor was to perform dynamic consolidation to improve a surficial layer of heterogeneous fill material present at the site. The fill material is underlain by soft and cohesive soils for which the design engineer recommended surcharging.

Field Engineer, Wheelabrator Residual Landfill, Shrewsbury, Massachusetts. Responsible for the installation of monitoring wells around a 50-acre active landfill to monitor leachate flow. Duties included logging of 18 borings advanced up to 110 feet into bedrock and supervision during the installation of open stand pipe piezometers.

Resident Field Engineer, WDI Landfill Closure, Howell Township, New Jersey. Responsible for the testing and oversight earthwork, HDPE, geotextiles and soils at a 13-acre landfill closure using a geosynthetic cap. Supervised three technicians in the field and upon returning to the office from the field, participated in the review and preparation of the final report.

Publications and Presentations

Roy, D. "Geotechnical Instrumentation for Urban Underground", ACEC New York Lecture, February 2010.

Roy, D. "A Solid Link". Point of Beginning. http://www.pobonline.com, November 2009.

Roy, D, and Gouvin, P. "Applications and Limitations of Automated Motorized Total Stations", Seventh International Symposium on Field Measurements in Geomechanics, FMGM 2007.

Roy, D, "Automated Motorized Total Stations for Deformation Monitoring", BSCE News, February 2007.

Jensen, N., Wanless, T., Roy, D., "Observations of Ground Movement During Pipe Ramming Operations Under a Railway Embankment", ASCE Met Section, Special Seminar, May 2006

Roy, D., and Guertin, J., "Manhattan Rock Excavation and Building Instrumentation, A Case Study", ASCE Metropolitan Section, Geotechnical Group Lecture, 2003.

Iskander M., Roy, D., Kelley S., and Ealy C., "Drilled Shaft Defects: Detection, and Effect on Capacity in Varved Clay", Journal of Geotechnical and Geoenvironmental Engineering, December 2003.

Iskander, M., and Roy, D., "Class-A Prediction of Construction Defect in Drilled Shafts", Transportation Research Board, 80th Annual Meeting, 2001

Professional Activities

Member, American Society of Civil Engineers
Member, Deep Foundation Institute
Member, International Society of Explosive Engineers

Professional Development

OSHA 29 CFR 1910.120 Supervisor Training
Troxler Nuclear Moisture-Density Gauge Trained
GRL WEAP, Pile Driving Analyzer (PDA), and CAPWAP Training
Amtrak, NYCT, LIRR, MNRR, CTA and Mobil Safety Trained
Red Cross, Basic First Aid and CPR

EXHIBIT 2

SECTION 02211

CONTROLLED BLASTING

PART 1 - GENERAL

1.01 GENERAL

A. General provisions of Contract, including GENERAL and SUPPLEMENTARY CONDITIONS and Division I, GENERAL REQUIREMENTS, apply to work specified in this Section.

B. Examine all Drawings and all other Sections of the specifications for requirements therein affecting the Work of this Section.

1.02 WORK INCLUDED

A. This Section specifies the removal of rock during excavation to the limits and elevations described herein and as indicated on the Contract Drawings, including test blasts.

B. The Work covered by this Section consists of furnishing all supervision, labor, equipment, tools, materials, and other related services for the safe removal of rock. Excavation, on-site transportation, backfill placement and compaction and related earthwork are addressed in other sections of the Specifications.

C. The Contractor shall obtain written permission, approvals, and all required permits or licenses from all authorities as required before proceeding with rock removal using blasting methods.

D. Site preparation will be the responsibility of the Contractor. The Contractor shall strip overlying soil and excavatable rock to the limits shown on the Contract Drawings, and survey the bedrock surface on a 10-foot grid, or less as appropriate. The Contractor shall submit the survey data to the Engineer a minimum of five (5) working days before rock excavation is scheduled to commence. Once provided with this information, the Engineer will give authorization to proceed with rock removal to the lines and grades indicated on the Contract Drawings or will provide a revised rock removal plan.

E. Definitions:

1. Rock: Solid mineral material with a volume in excess of two cubic yards (2 cu yd) in open areas and one cubic yard (1 cu yd) in trenches or solid material that cannot be loosened or broken by the use of modern construction earth excavation equipment for its removal, such as a three-quarter cubic yard (3/4 cu yd) capacity power shovel.

2. Controlled Blasting: Excavation in rock in which the various elements of the blast, including hole size, depth, spacing, burden, charge size distribution, and delay sequence are carefully controlled to excavate the rock to the desired lines without overbreak while maintaining resulting ground vibrations and air blast overpressure within specified maximum limits. Smooth wall blasting, pre-splitting, cushion blasting, and line drilling are examples of operations included in the term “controlled blasting”.

3. Overblast is defined as rock outside the lines of rock removal shown on the drawings that is damaged due to the Contractor’s operations. Overbreak is defined as rock outside the limits of rock removal shown on the Drawings that is loosened due to the Contractor’s operations.

4. Peak particle velocity is defined as the instantaneous maximum velocity sum of the velocity vectors in three mutually perpendicular directions at the point of interest.

5. Structures are defined as habitable structures such as single family dwellings or business concerns.

F. Limits of Work: Rock above proposed final grades within the limits of work shall be loosened by blasting or other non-blasting techniques and removed with conventional equipment to the lines and grades shown on the Contract Drawings.

1.03 RELATED WORK

A. Section 02200 – Earthwork
B. Section 02222 - Well Inventories and water quality testing as specified in related documents.

1.04 APPLICABLE STANDARDS

A. The Contractor shall comply with the provisions of the following Codes and Standards, except as otherwise noted:

1. Applicable ordinances, codes, statutes, rules and regulations, and approvals of the Town of Colebrook.

2. Occupational Safety and Health Act of 1970 (Public Law 91-596 of the United States, 29 USC Section 651 et seq.)

3. State of Connecticut: Storage, Transportation, and Use of Explosives and Blasting Agents, Connecticut General Statute 29-349-106 through 29-349-378, April 18, 1972.

4. National Fire Protection Association (NFPA) – 495 Code for the Manufacture, Transportation, Storage, and use of Explosive Materials.

5. Associated General Contractors of America, Inc. – Manual of Accident Prevention in Construction.

B. In case of conflict between regulations, codes or specifications, Contractor shall comply with the strictest applicable codes, regulations or specifications.

1.05 QUALITY ASSURANCE

A. Explosives Firm: Company specializing in explosives for disintegration of subsurface rock with a minimum of five (5) years documented experience. Personnel will be required to demonstrate experience.

B. Preconstruction surveys shall be performed by personnel experienced in performing such surveys for structures within 500 feet of blasting.

C. Blast monitoring will be performed at existing structures that are within 500 feet of active blasting.

1.06 PRE-BLAST SURVEY

A. Prior to the start of rock removal by use of controlled blasting methods, the Contractor or his authorized representative, shall perform a pre-blast survey of habitable structures that are within 500 feet of proposed blasting. The pre-blast survey shall consist of narrated videotape and or still photographs accompanied by a written narrative and shall include the exposed interior and exterior portions of the structures. The photographic documentation shall be of sufficient quality that existing defects are clearly visible and are identified by commentary or written descriptions. Two copies of the surveys, each stamped by a Professional Engineering in the State of Connecticut shall be provided to the Engineer for review prior to commencing blasting.

B. Give notice in writing to the Owner of the property concerned, tenants of the property and any representative of local authorities required to be present at such a survey. Notice to include the dates on which survey is to be made.

C. Upon completion of all earth/rock excavation and blasting work, make a similar examination of any properties, structures and conditions where complaints of damage have been received or damage claims have been filed. Give sufficient notice to all interested parties so that they may be present during the final examination.

1.07 SUBMITTALS

A. At least two (2) weeks prior to the start of rock removal operations, submit description of methods, equipment, information, personnel qualifications and field reports for review by the Engineer.

B. At least two (2) weeks prior to the start of rock removal using blasting techniques, present proof of the necessary approvals and evidence that the Blasting Contractor's insurance includes coverage for blasting operations.

C. Provide the following information for both production blasting and for the test blast program at least two (2) weeks prior to the start of drilling and blasting:

1. Indicate proposed method of blasting, delay pattern, explosive types, type of blasting mat or cover, and intended rock recovery method.

2. Diameter, spacing, burden, depth, pattern, and inclination of blast holes.

3. Type, strength, amount in terms of weight and cartridges of explosives to be used in each hole, on each delay and the total for the blast.

4. The distribution of the charge in the holes and the priming of each hole.

5. Type, sequence and number of delays, delay pattern; wiring diagram for blast; size and type of hookup lines and lead lines; type and capacity of firing source; type, size and location of safety switches, and lightning gaps.

6. Stemming of holes and matting or covering of blast area.

7. Best estimate of gradation of resulting blast rock.

8. Written evidence of the licensing, experience, and qualifications of the blaster(s) who will be directly responsible for loading and firing of each shot.

9. Written qualifications of explosives firm.

10. Details of the audible advance signal system to be employed at the job site as a means of informing workers, the Owner, and his representatives, and the general public that a blast is about to occur.

11. A copy of the blasting permit(s) obtained to conduct blasting on the site as well as copies of all other permits required.

12. Copies of the pre-blast surveys.

13. A listing of instrumentation which the Contractor proposes to use to monitor vibrations and air blast overpressure levels, together with performance specifications and user's manual supplied by the manufacturers, and a recent calibration on a shaking table (within the previous six (6) months) to a standard traceable to the National Bureau of Standards.

D. If the blast design results in ground vibrations or air blast overpressures that exceed the blasting limit criteria specified, review the design immediately and submit the revised design for review, allowing sufficient time for the review prior to resuming blasting operations. Alternatively, resume rock removal using non-blasting techniques.

E. Review of blast design and techniques does not relieve the Contractor of responsibility for the accuracy, adequacy and safety of the blasting for exercising proper supervision and field judgment and for producing the results within the blasting limits specified.

F. If chemical methods are proposed for rock removal, Contractor shall submit procedures and manufacturers technical and safety literature for the proposed material to the Engineer for review and acceptance at least two (2) weeks prior to its use.

1.08 PROJECT RECORD DOCUMENTS

A. Submit copies of project records and drawings to the Engineer.

B. Complete, maintain and submit permanent blast reports including logs of each blast. Reports shall be submitted in a timely manner, but in no case more than two (2) working days following each blast. The records shall include, as a minimum:

1. Date, exact firing time and limits of blast by station, offset and elevation and as indicated on the project plans.

2. Name of person in responsible charge; blasting permit number.

3. Unusual joint or seam conditions encountered in the rock.

4. Type and strength of explosives, blasting caps, and distribution of delay periods used.

5. Total explosive loading per round and per group of delays.

6. On a diagram of the approved test pattern, indicate any holes not drilled, drilled but not loaded, changes in spacing or in pattern of delays or in loading of holes.

7. Prevailing weather conditions, including direction and approximate velocity of wind, atmospheric temperature, relative humidity and cloud conditions at the time of blast.

8. Comments by blaster in charge regarding any misfires, unusual results or effects.

9. An evaluation of the blast indicating tights, areas of significant overbreak and any recommended adjustments for the next blast.

10. Seismograph readings including peak particle velocity, frequency, and air blast overpressure readings. Include location of seismographs including distance and direction to the closest borehole.

11. Signature and title of person at the site making record entries.

C. Submit summary of complaints.

1.09 COMPLAINTS

A. Report all blasting complaints to the Engineer within 24 hours of receipt thereof. Include the name, address, date, time received, date and time of blast complained about, and a brief description of the alleged damages or other circumstances upon which the complaint is predicated. Assign each complaint a number, and number all complaints consecutively in order of receipt.

B. Perform a post-blast survey at the structure associated with a complaint. The post-blast survey shall be performed in accordance with the requirements herein for pre-blast surveys and shall be performed within 24 hours of receipt of complaint.

C. Immediately notify the Engineer of any formal claims or demands made by attorneys on behalf of claimants, or of serving of any notice, summons, subpoena, or other legal documents incidental to litigation, and of any out-of-court settlement or court verdict resulting from litigation.

D. Immediately notify the Engineer of any investigations, hearings, or orders received from any Governmental agency, board or body claiming to have authority to regulate blasting operations.

1.10 PROJECT CONDITIONS

A. Perform Work in a manner to minimize safety hazards and exposure of people and equipment in hazardous and potentially hazardous conditions.

B. During the progress and approach of a thunderstorm, the handling and use of explosives shall be discontinued, and all personnel shall be moved to a place of safety until the storm has passed. All parts of an electrical blasting circuit shall be effectively insulated or protected from grounds or short circuits so as to prevent any possibility of electrical contact or entrance of stray current into the blast circuit. Mobile transmitters shall not be energized near electric caps or delays being handled or used. If electric blasting caps are used, every effort shall be made to ensure that they are properly wired into the circuit and that ample current is supplied to fire the blast.

C. The Contractor shall be responsible for determining any other safety requirements unique to his blasting operation on this site so as not to endanger life, property, utility services, any existing or new construction, or any property adjacent to the site. The Contractor shall be responsible for and pay for any damage to adjacent structures and injury to all persons resulting from Work executed under this Contract.

D. Perform blasting work only during the hours permitted by the permit issued by the Fire Marshall of the Town of Colebrook.

E. Safety Requirements

1. Perform work in a manner to minimize safety hazards and exposure of men and equipment in hazardous and potentially hazardous conditions.

2. During the progress and approach of a thunderstorm, the handling or use of explosives shall be discontinued, and all personnel shall be moved to a place of safety until the danger has passed.

3. All parts of electrical blasting circuits shall be insulated or protected from grounds or short circuits. Possibility of electrical contact or entrance of stray current into the blast circuit shall be prevented.

4. Mobile transmitters shall not be energized near electric caps or delays being handled or used. If electric blasting caps are used, every effort shall be made to ensure that they are properly wired into the circuit and that ample current is supplied to fire the blast. It is equally important, when using a straight parallel hookup, to follow the manufacturer's instructions explicitly as to cutting off the current supply with the first cap or caps to fire in order to prevent possible arcing, which could result in a "hang-fire" (delay explosion).

5. The Contractor shall be responsible for determining any other safety requirements unique to his blasting operation on this particular site so as not to endanger life, property, utility services, any existing or new construction, or any property adjacent to the site.

6. The Contractor shall at all times maintain adequate protection to safeguard the public and all persons engaged in the Work, and shall take such precautions as will accomplish such end, without undue interference with the public. The Contractor shall be responsible for and pay for any damage to adjacent structures and injury to all persons resulting from work executed under this Contract.

F. Warning Signs

1. Erect signboards of adequate size stating that blasting operations are taking place in the area. Such signs shall be clearly visible at all points of access to the area and contain information similar to:

   "KEEP OUT - DANGER"
   "BLASTING AREA"

2. Utilize a reliable warning system, incorporating audible signals established for the project, to ensure that all personnel in the area are forewarned of the impending detonation of explosives. First warning signal shall be sounded a minimum of three (3) minutes prior to blast.

3. Any site where electrical blasting caps are located or where explosive charges are being placed or have been placed shall be designated as a "Blasting Area".

A "Blasting Area" within three hundred feet (300') of any traveled way shall be marked by approved signs with information similar to the following:

"BLASTING AREA. TURN OFF RADIO TRANSMITTERS"
and on the reverse side:
"ENDING OF BLASTING AREA"

4. No blasting shall be permitted until all personnel in the danger zone have been moved to a place of safety. A warning system shall be devised and implemented by the Contractor. The danger zone shall be patrolled before each blast to make certain that it has been completely cleared, and personnel shall be stationed to prevent entry until the area has been inspected by the blaster following the blasts.

1.11 SUBSURFACE DATA

A. Logs of test pits, borings and probes performed at the site are available to the Contractor. Approximate locations of these subsurface explorations are shown on a plan included with the logs.

B. The aforementioned data is for general information and is accurate only at the particular locations and times the subsurface explorations were made. It is the Contractor's responsibility to make interpretations and draw conclusions based on the character of materials to be encountered and the impact on his work based on his expert knowledge of the area and of earthwork techniques. The Contractor shall review test pit, boring and probe logs and locations and other pertinent data for the site. The Contractor, at his own expense, may conduct additional subsurface explorations for his own information after obtaining the Owner’s permission.

1.12 FIELD QUALITY CONTROL

A. Provide for visual inspection of bearing surfaces and cavities formed by removed rock.

B. Blasting may additionally be monitored for vibration and air overpressure by the Engineer on behalf of the Owner at no expense to the Contractor.

C. Coordinate all blasts with the Engineer.

D. In the event that a blasting round results in ground vibrations or airblast overpressures that exceed specified limits, Contractor shall, prior to detonating any subsequent round, revise his round design appropriately to reduce the vibrations and airblast overpressures and shall submit the revised round design for review by the Engineer. Contractor shall allow ten (10) working days for Engineer to review the submittal.

E. The presence of the Engineer does not include supervision or direction of the actual work by the Contractor, his employees, or agents. Neither the presence of the Engineer, nor any observations and testing performed by Engineer, shall excuse the Contractor from defects discovered in his Work or damage to third parties.

1.13 INDEMNITY

A. Notwithstanding full compliance with these specifications, approval of blasting plan, and successful limitation to maximum peak particle velocities and air blast overpressures as specified herein, the Contractor shall be solely responsible for any damage, direct, indirect, or consequential arising from blasting and shall defend and hold the Owner and Engineer and their consultants harmless from any costs, liens, charges, claims, or suits, including the costs of defense, arising from such damage, real or alleged.

B. Review of the blast design and techniques by the Engineer and representatives shall not relieve the Contractor of total responsibility for the accuracy, adequacy, and safety of the blasting, exercising proper supervision and field judgment, and producing the results within the blasting limits required by these specifications.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Explosives: Type recommended by explosives firm and in conformance with NFPA 495. Only prepackaged cartridge type explosives shall be used. Loose explosives such as ANFO will not be allowed.

B. Delay Devices: Type recommended by explosives firm.

C. Blasting Mat Materials: Type recommended by explosives firm.

PART 3 - EXECUTION

3.01 PREPARATION

A. Identify required lines, levels, contours and datum. Locate, identify and protect utilities that remain from damage. Verify site conditions and note irregularities affecting Work of this Section.

B. Perform pre-blast survey of identified structures.

C. Provide certificate of suitable blasting insurance coverage before commencing blasting work.

3.02 ROCK REMOVAL

A. Remove rock to the level and limit shown on the drawings.

B. Notify the Engineer at least forty-eight (48) hours before any intended blasting. Blasting shall not be conducted without specific approval of the Engineer for each blasting operation.

C. Notify owners of adjacent buildings or structures within five hundred feet (500') of project limits in writing seventy-two (72) hours prior to commencing blasting operations and installing seismographs. Describe blasting and seismic monitoring operations.

D. Obtain vibration and air overpressure monitoring data during test blast program to characterize vibration transmission characteristics and to determine maximum charges that can be used at different locations in area of excavation without damaging adjacent properties.

E. All rock blasting shall be well covered with heavy mats or timbers chained together and the Contractor shall take great care to do no damage to existing structures, utility lines and trees to remain. Fly rock and debris shall not escape the blast area. Any damage caused by the Work of this Contractor shall be repaired to the full satisfaction of the Owner and Engineer at no additional cost to the Owner.

F. Use controlled blasting techniques to reduce overbreak to a minimum and keep vibrations and noise within specified limits. Modify the blasting round as necessary to achieve the best obtainable results and to keep the vibrations and noise within the limits specified herein.

G. In the event that vibrations in the adjacent structures exceed safe limits as established herein, the Engineer may order the reduction of the size of the loads, or other appropriate measures to be taken to reduce resulting vibrations to safe limits.

H. For permanent rock slopes, pre-split hole spacing shall not exceed 18 inches. The Contractor shall reduce the pre-split spacing as required to achieve the desired final cut-face surface.

I. Remove shattered layers to provide sound and unshattered base for footing foundations.

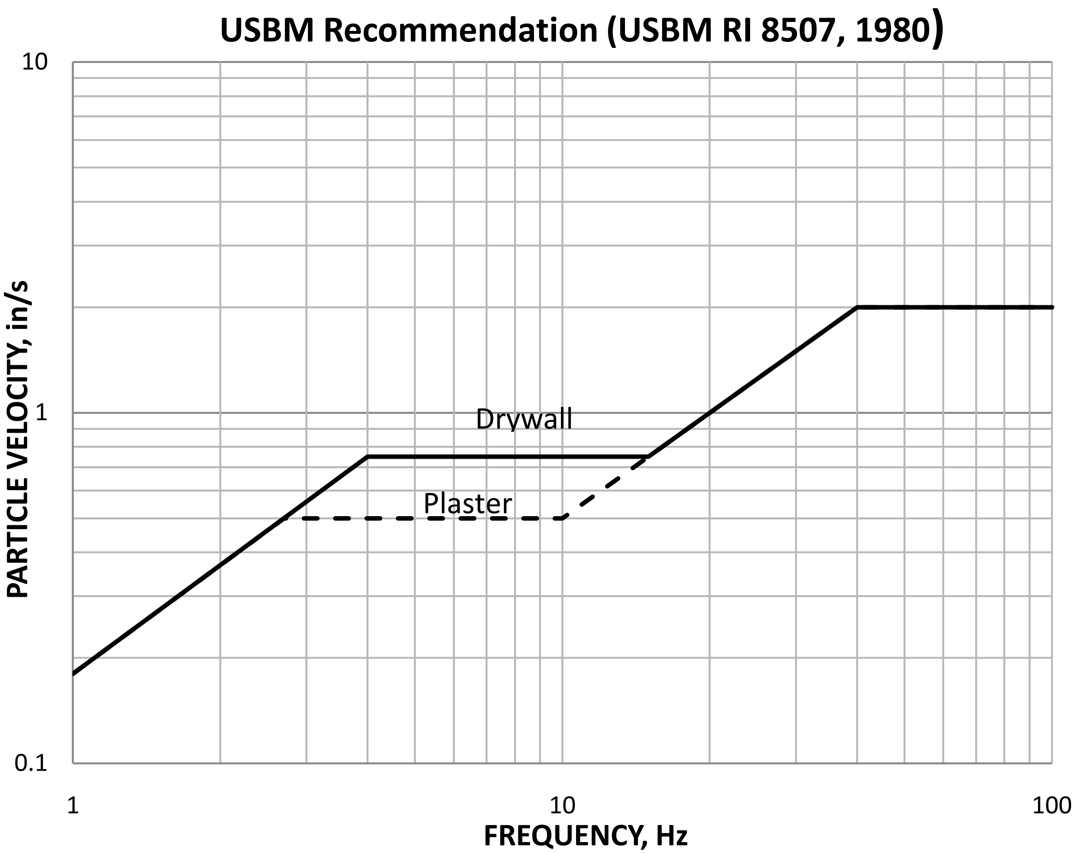
J. Remove excavated material from site in a legal manner.

K. Correct unauthorized rock removal or overbreak with lean concrete fill or properly graded structural fill in accordance with the earthwork specifications or as otherwise directed by the Engineer.

L. <u>Test Blasts</u> - Perform at least three (3) small charge test blasts at selected locations at the excavation site prior to commencement of production blasting. The purpose is to establish local ground-borne vibration and airborne overpressure propagation characteristics and anomalies to aid in determination of efficient charges that will not cause the vibration and overpressure limits to be exceeded. The test blasts will also provide information regarding how close blasting and pre-splitting can be performed adjacent to the existing structures. Coordinate scheduling of each test blast with the Engineer.

3.03 GROUND VIBRATIONS AND NOISE (AIR OVERPRESSURE)

A. Peak particle velocity of blast induced motion shall not exceed the values, depending upon frequency, as defined by the USBM RI 8507 recommendation as shown in the chart below:



Peak particle velocity is defined as the instantaneous maximum velocity sum of the velocity vectors at a point between the structure and the blast site.

B. Limit instantaneous overpressure from blasting operations to 0.010 pounds per square inch (psi).

C. Protect new concrete. Do not blast within twenty-five feet (25') of concrete less than five (5) days old.

F. Monitoring

1. The Owner's Engineer will perform vibration and air blast overpressure monitoring during blasting.

2. The Contractor shall supply and operate at least two (2) additional seismographs at all times blasting is conducted to monitor ground

vibrations and air blast overpressure created by the blasting for compliance with the criteria specified herein. Provide monitoring results to the Engineer within four (4) hours of performing each blast. Inform the Engineer and Owner immediately if vibrations or air overpressure values exceed the limits specified herein.

*** * * END OF SECTION * * ***

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EXHIBIT 3

SECTION 02222

BLASTING - WELL SURVEY

PART 1 - GENERAL

1.01 GENERAL

A. General provisions of Contract, including GENERAL and SUPPLEMENTARY CONDITIONS and Division I, GENERAL REQUIREMENTS, apply to work specified in this Section.

B. Examine all Drawings and all other Sections of the specifications for requirements therein affecting the Work of this Section.

C. Identify those wells on surrounding properties within a 500 foot radius of the zone to be blasted.

1.02 WORK INCLUDED

A. This Section specifies pre and post blasting well surveys to assess baseline water quality of well, water levels, capacity of the individual well and obtaining available well installation documentation. The post blasting survey is to confirm that these conditions were not adversely effected by the blasting.

B. The Work covered by this Section consists of furnishing all supervision, labor, equipment, tools, materials, and other related services for the evaluation of wells within the 500 foot blasting area prior to commencing any blasting activities. Blasting, excavation, on-site transportation, backfill placement and compaction and related earthwork are addressed in other sections of the Specifications.

C. The Contractor shall obtain written permission, approvals, and access agreements from all property owners and/or authorities as required before conducting the well survey. Contractor will obtain all required permits to undertake the testing and sampling activities.

D. Site preparation prior to any blasting will be the responsibility of the Contractor or its environmental subcontractor. The Contractor shall review available well construction information, inspect the condition of the existing well, collect a well water sample from near the point of entry into the structure (prior to treatment), and evaluate the capacity of the well. The Contractor shall submit the pre-blasting well survey data to the Engineer a minimum of ten (10)working days before rock excavation, by blasting is scheduled to commence. Once provided with this information, the Architect will give authorization to proceed with rock removal to the lines and grades indicated on the Contract Drawings or will provide a revised rock removal plan.

E. Definitions:

1. Water level measurement: water level is measured directly by lowering an electronic devise into the well casing until it comes in contact with the apparent water in the well casing or indirectly using acoustic techniques. The depth at which water is encountered is the reported water level measurement. Water level measurements will vary based upon pump operations within the well casing.

2. Well Yield: is the stabilized volume of water discharged from a well either by pumping or free flow over a period of time. It is commonly refered to as a pumping rate in gallons per minute.

3. Capacity: is the stabilized yield of water per unit of drawdown and is expressed as gallons of water per minute per foot of drawdown after a given period of time.

4. Rock: Solid mineral material with a volume in excess of two cubic yards (2 cu yd) in open areas and one cubic yard (1 cu yd) in trenches or solid material that cannot be loosened or broken by the use of modern construction earth excavation equipment for its removal, such as a three-quarter cubic yard (3/4 cu yd) capacity power shovel (see Section 02211).

5. Controlled Blasting: Excavation in rock in which the various elements of the blast, including hole size, depth, spacing, burden, charge size distribution, and delay sequence are carefully controlled to excavate the rock to the desired lines without overbreak while maintaining resulting ground vibrations and air blast overpressure within specified maximum limits. Smooth wall blasting, pre-splitting, cushion blasting, and line drilling are examples of operations included in the term "controlled blasting" (see Section 02211).

F. Limits of Work: At locations for which access is granted, wells will be surveyed and tested within a 500 foot radius from the limits of the proposed blasting or other non-blasting techniques as shown on the Contract Drawings.

1.03 RELATED WORK

A. Section 02200 – Earthwork

B. Section 02211 – Controlled Blasting

1.04 APPLICABLE STANDARDS

A. The Contractor shall comply with the provisions of the following Codes and Standards, except as otherwise noted:

1. Applicable ordinances, codes, statutes, rules and regulations, and approvals from State, Federal and the Town of Colebrook.

2. Occupational Safety and Health Act of 1970 (Public Law 91-596 of the United States, 29 USC Section 651 et seq.)

3. Chemical parameters identified within the water quality standards for private water systems as specified by the Connecticut Department of Public Health

4. National Fire Protection Association (NFPA) – 495 Code for the Manufacture, Transportation, Storage, and use of Explosive Materials.

5. Associated General Contractors of America, Inc. – Manual of Accident Prevention in Construction.

B. In case of conflict between regulations, codes or specifications, Contractor shall comply with the strictest applicable codes, regulations or specifications.

1.05 QUALITY ASSURANCE

A. All equipment that will come in contact with well water will be pre-cleaned prior to use. Equipment blanks will be collected and analyzed to demonstrate cleanliness.

B. Pre-blasting well surveys shall be performed by qualified personnel in each aspect of performing such surveys.

C. Pre-blasting well surveys will be performed at those properties within a 500 foot radius of the active blasting areas.

1.06 PRE-BLAST SURVEY

A. Prior to the start of rock removal by use of controlled blasting methods, the Contractor or his authorized representative, shall identify those wells that are located within a 500 foot radius of the of proposed blasting sites.

B. Contractor will submit a well survey questionnaire, in writing via. certified mail to the property owners in an effort to obtain general information on the well construction (year installed, driller, depth of well, location of the well, type and date the well pump was installed, depth of well pump, estimate of well yield, are there any water quality treatment systems installed, if so what type, type of surface completion (above or below grade) and obtain access agreements and permissions to perform the testing services.

C. Contractor will give notice in writing, via certified mail to the Owner of the property concerned, tenants of the property and any representative of local authorities required to be present at such a survey. Notice to include the dates on which survey is to be made.

D. Contractor will conduct an inspection of the well casing and will identify the point of entry into the structure; prior to blasting.

E. Contractor will identify if the well has a pitless adapter (allowing for direct access for measurements by just removing the well cover) or if the well pump has to be disturbed (lifted) prior to the test.

F. Contractor will collect a water sample from the nearest point of entry into the structure before the holding tank and any pre-treatment water quality system that might be present. If this point is unavailable, the next nearest point will be used.

G. Representative water samples will be collected into glassware provide by a state certified laboratory. The water quality parameters to be analyzed would include those drinking water quality parameters as required by the Department of Public Health to include select organic, inorganic and bacteriological parameters as discussed in Section 3.02.

H. Document general condition via digital photos of all wells and sampling spigots.

I. To estimate the well capacity, the Contractor will conduct a short duration pumping test (capacity test) to determine the drawdown in the well. The well pump will be shut down for a period of one hour prior to the test to allow the water level in the well to recover to static conditions. The exterior spigot (unless not present) will be opened for a period of one hour to drawdown the water level in the well. During this period periodic measurements will be recorded of the yield of water (gallons per minute and total gallons pumped) from spigot with periodic measurements of the depth to water within the well casing. The goal is to determine gallons of water per minute per foot of drawdown. If excessive drawdown is observed, the test will be stopped so that the water level is always maintained above the depth of the pump. Once the test is completed the well pump will be shut down and water levels in the well will be recorded for 30 minutes to measure the recovery of the water level. Note that all water will be directed to a low spot on the property or as designated by the property owner.

J. When temperatures are anticipated to be below 32 degrees and there is a risk of freezing take special precautions to avoid freezing of pipes and/or discharge water.

K. Restore in kind including any pumps and or spigots damaged during sampling. If equipment is placed in the wells then the well will be chlorinated to disinfect the well and the well will be resampled after the chlorinization.

L. Upon completion of all earth/rock excavation and blasting work, Contractor will conduct a post-blast well survey. Contractor will give sufficient notice to all interested parties so that they may be present during the final examination. The post-blasting survey will involve repeating the pre-blast survey to document if there were any changes within the water quality or capacity at the well.

1.07 SUBMITTALS

A. Provide the following information to support Section 1.06 at least ten (10) weeks prior to the start of the blasting:

1. Copy of the residential access agreements well survey questionnaire and cover letter that will be sent to the property owners within a 500 foot radius of the blast areas.

B. At least eight (8) weeks prior to the start of rock removal operations, obtain access agreement and submit the residential well survey questionnaires to those properties within the 500 foot radius of the proposed blasting via certified mail.

C. At least eight (8) weeks prior to the start of rock removal operations, submit name of stated certified laboratory, description of analytical and sampling methods, identify equipment types, information, personnel qualifications and field reports for review by the Engineer.

D. At least 30 days prior to blasting, commence the pre-blasting well survey. The well survey shall be completed and submitted to the Engineer at least 10 days before the first scheduled blasting.

E. All pre-blasting well survey reports will be submitted to the Engineer at least 10 days prior to blasting. If any water quality parameters are detected outside the maximum allowable level by the Department of Public Health the contractor will be immediately be contacted. The Contractor will then notify the property owner of these results and provide the home owner a copy of their wells report.

F. Submit a post blasting well survey report(s) 30 days after the final controlled blast.

G. Prepare individual post blasting reports for each well location containing a summary of the pre and post blast well survey (background information, well capacity, water quality) data collected.

1.08 PROJECT RECORD DOCUMENTS

A. Submit copies of project records and drawings to the Engineer.

B. Complete, maintain and submit permanent well survey reports including logs of each blast. Reports shall be submitted in a timely manner, but in no case more than two (2) working days following each survey. The records shall include, as a minimum:

1. Date when the well survey was completed. Date and time when the water sample was collected. Date and duration of the capacity test.

2. Name of person completing the well survey.

3. Unusual conditions encountered related to the well or plumbing or if the sampling point was not at the point of entry.

4. Completion of a Chain-of-Custody to transmit the water samples collected.

5. Pump test information related to the rate of flow from the spigot, drawdown and recovery levels observed in the well casing along with any unusual discoloration or odors.

6. A sketch will be completed to identify the location of the well on the property and the location where the water sample was collected.

7. Comments by the property owner during the well survey.

8. Signature and title of person at the site making record entries.

C. Submit summary of complaints.

1.09 COMPLAINTS

A. Report all water quality complaints to the Engineer within 24 hours of receipt thereof. Include the name, address, date, time received, date and time of blast complained about, and a brief description of the alleged damages or other circumstances upon which the complaint is predicated. Assign each complaint a number, and number all complaints consecutively in order of receipt.

B. Perform an additional post-well survey at the property associated with a complaint. The post-well survey shall be performed in accordance with the requirements herein for pre-blast well survey and shall be performed within 24 hours of receipt of complaint.

C. Immediately notify the Engineer of any formal claims or demands made by attorneys on behalf of claimants, or of serving of any notice, summons, subpoena, or other legal documents incidental to litigation, and of any out-of-court settlement or court verdict resulting from litigation.

D. Immediately notify the Engineer of any investigations, hearings, or orders received from any Governmental agency, board or body claiming to have authority to regulate blasting operations.

1.10 PROJECT CONDITIONS

A. Perform Work in a manner to minimize safety hazards and exposure of people and equipment in hazardous and potentially hazardous conditions.

B. During the progress and approach of a thunderstorm, all exterior well survey will be stopped until after the thunderstorm has passed.

C. The Contractor shall be responsible for determining any other safety requirements unique to the well survey so as not to endanger life, property, utility services, any existing or new construction, or any property adjacent to the site. The Contractor shall be responsible for and pay for any damage to adjacent structures and injury to all persons resulting from Work executed under this Contract.

D. Performance of all blasting work will occur during the hours permitted by the permit issued by the Fire Marshall of the Town of Colebrook. All water quality surveys can be observed by the Department of Health of the Town of Colebrook.

E. Safety Requirements

1. Perform work in a manner to minimize safety hazards and exposure of men and equipment in hazardous and potentially hazardous conditions.

2. During the progress and approach of a thunderstorm all personnel shall be moved to a place of safety until the danger has passed.

3. All parts of electrical wiring into the well casing will be observed and protected to prevent potential electrical contact to the person conducting the capacity test at the well casing.

4. The Contractor shall be responsible for determining any other safety requirements unique to conducting the capacity testing or water quality sampling.

5. The Contractor shall at all times maintain adequate protection to safeguard the public and all persons engaged in the Work, and shall take such precautions as will accomplish such end, without undue interference with the public. The Contractor shall be responsible for and pay for an damage to adjacent structures and injury to all persons resulting from work executed under this contract.

1.11 FIELD QUALITY CONTROL

A. All sampling will adhere to the Connecticut Department of Environmental Protection guidance document titled Laboratory Quality Assurance Quality Control (QA/QC) Reasonable Confidence Protocols, effective November 2007 and revised December 2010, provides information on laboratory quality control and quality control assurance and the Reasonable Confidence Protocols (RCPs).

B. A duplicate QA/QC sample will be collected at the rate of one sample per 20 wells samples.

C. The presence of the Engineer does not include supervision or direction of the actual work by the Contractor, his employees, or agents. Neither the presence of the Engineer, nor any observations and testing performed by Engineer, shall excuse the Contractor from defects discovered in his Work or damage to third parties.

1.12 INDEMNITY

A. Notwithstanding full compliance with these specifications, approval of blasting plan, and successful limitation to maximum peak particle velocities and air blast overpressures as specified herein, the Contractor shall be solely responsible for any damage, direct, indirect, or consequential arising from blasting and shall defend and hold the Owner and Engineer and their consultants harmless from any costs, liens, charges, claims, or suits, including the costs of defense, arising from such damage, real or alleged.

B. Review of the blast design and or the well survey and associated techniques by the Engineer and representatives shall not relieve the Contractor of total responsibility for the accuracy, adequacy, and safety of the blasting, exercising proper supervision and field judgment, and producing the results within the blasting limits required by these specifications.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Sample containers for the collection of the water sample at the point of entry to the structure.

B. Water level measuring (either direct or indirect reading instrument).

C. Flow meter or other acceptable device to measure the rate of flow from the spigot and the total volume of water during the drawdown test.

PART 3 - EXECUTION

3.01 PREPARATION

A. Complete the pre-blast questionnaire and obtain access to the property.

B. Conduct the pre-blast well survey to evaluate well water quality and capacity.

C. Submission of the analytical results prior to blasting to evaluate any anomalies in the pre-blast water quality in comparison to the Department of Health action limits.

3.02 WATER QUALITY ANALYSES

The following water quality parameters will be used to evaluate private water well quality: Total Coliform Bacteria; pH; Apparent Color; Odor; Chloride; Hardness; Nitrate-Nitrogen; Nitrite/Nitrogen; Sulfate; Turbidity; Iron; Manganese; and Sodium. These parameters are based upon the test identified by the potable water Connecticut Department of Health for private wells.

In addition to those private water well parameters, the Contractor will also analyze the water for the list of volatile organic compounds identified in EPA Method 8260 along with the metals compounds of arsenic, barium, cadmium, chromium, lead, mercury, selenium, and those naturally occurring radioactive compounds (radium 226/228 and gross alpha particles) and perchlorite.

*** * * END OF SECTION * * ***