CA RICH
ENVIRONMENTAL SPECIALISTS

July 11, 2007

Michael D. MacCabe, P.E.
Senior Environmental Engineer
Division of Environmental Remediation
NYS Department of Environmental Conservation
625 Broadway, 12th Floor
Albany, NY 12233-7016

Re: **Remedial Action Plan for Club East**
BCP Site # C231048; Index # A2-0531-1105
421-433 East 13th St. & 420 East 14th St.
New York, New York

Dear Mr. MacCabe:

On behalf of the 13th and 14th Street Realty, LLC., CA Rich Consultants, Inc. is pleased to provide you with the attached Remedial Action Plan for the above-referenced project. As requested, a complete electronic copy of the RAP has also been included for your convenience. This report is being submitted in accordance with the requirements of the Brownfield Cleanup Agreement executed on November 15, 2005.

The Remedial Investigation Report for this Site was submitted to NYSDEC on February 15, 2007 and the Public comment period ended on April 19, 2007. We are currently awaiting the Significant Threat Determination Letter from NYSDEC and therefore could not include a copy with the enclosed Remedial Action Plan (RAP).

We look forward to the NYSDEC's comments and approval of this Remedial Action Plan. If you have any questions, please do not hesitate to call us, immediately.

Respectfully submitted,

CA RICH CONSULTANTS, INC.

Deborah Shapiro
Project Scientist

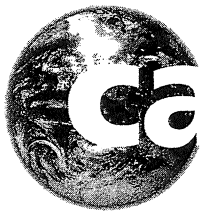
Stephen Malinowski
Project Manager

Reviewed By

Charles A. Rich, CPG
President

AMERICAN INSTITUTE OF PROFESSIONAL GEOLOGISTS CERTIFICATE NUMBER 4433 AIPG CHARLES A. RICH CERTIFIED PROFESSIONAL GEOLOGIST

Attachments
cc: Dawn Hettrick - NYSDOH (Hard copy and PDF Format)
Robert Kaliner, 13th and 14th Street Realty, LLC. (PDF Format only)
Lawrence P. Schnapf, Esq. (PDF Format only)



REMEDIAL ACTION PLAN

"CLUB EAST"
BCP Site # C231048
Index # A2-0531-1105
421-433 E. 13th St. & 420 E. 14th St., New York, NY 10009

July 2007

Prepared for:

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1.0 INTRODUCTION

The following Remedial Action Plan (RAP) was prepared by CA Rich Consultants, Inc. (CA RICH) of Plainview, NY on behalf of the redeveloper 13TH & 14TH STREET REALTY, LLC for the property located at 421-433 East 13th Street and 420 East 14th Street (the "Site" or "Property") in New York, New York (Figure 1).

An Interim Remedial Measures (IRM) was conducted in conjunction with Site redevelopment activities. This RAP summarizes the IRM already completed and addresses the remaining remedial and post-remedial activities to be conducted upon completion of construction. As such, only one on-site remedial alternative is considered as feasible for this project, that is: excavation of contaminated soils as part of the IRM; the installation of a water/vapor barrier; post-remediation soil vapor and indoor air sampling; and, a Deed Restriction for groundwater. Since the Applicant entered into the Brownfield Cleanup Program (BCP) as a "Volunteer", the RAP is limited to on-site remediation.

This RAP is based upon the guidelines set forth in NYSDEC's DER-10 Technical Guidance for Site Investigations and Remediation (Ref. 11), the NYSDEC's Draft Brownfield Cleanup Program Guide (Ref. 12) as well as 6 NYCRR Part 375 (Ref. 13). For the purposes of this document, the contaminants of concern are tetrachloroethene (*also known as perchloroethylene or PCE, a common dry cleaning solvent)* and PCE degradation products (trichloroethene, dichloroethene, and vinyl chloride). This volatile organic compound (VOC) is a residual contaminant allegedly attributable to historical discharges from a former dry cleaning operation that was situated on the 427 East 13th Street portion of the Property. The historical presence of VOCs found in the underlying soil and groundwater led to delayed planned improvements for this property and its qualification into the State Brownfield Cleanup Program.

To summarize, the Property has been impacted with PCE contamination of the soil and uppermost groundwater as reflected by testing data collected by CA RICH and others. Elevated concentrations of PCE occur in the soil and uppermost groundwater within the unconsolidated soil/fill deposits beneath the Property. The depth to groundwater is approximately 13 feet below street grade and the direction of groundwater flow is east-southeast direction toward the East River. The distance from the Site to the East River is about 2,500 feet.

Previous assessments and investigations have already been performed at this Site for environmental due diligence purposes. The following list identifies earlier studies prepared for this Site.

Investigation	Date
Phase I ESA, AIRTEK Corp.	March 2004
Phase II Investigation, SOIL MECHANICS ENVIRONMENTAL SERVICES	January 2005
Phase II Investigation, ENVIRO BUSINESS, INC.	April 2005
Soil Waste Characterization & Groundwater Tests, CA RICH	June & Oct. 2005
Remedial Investigation Work Plan, CA RICH	June 2005
Interim Remedial Measures Work Plan, CA RICH	June 2005
Revised Interim Remedial Measures Work Plan, CA RICH	March 2006
Remedial Investigation Report, CA RICH	August 2006
Interim Remedial Measures Report, CA RICH	September 2006
Revised Remedial Investigation Report, CA RICH	February 2007

All previous groundwater and soil sampling locations and analytical results have been summarized in the February 15, 2007 Revised Remedial Investigation Report (Ref. 10).

2.0 PHYSICAL SITE CHARACTERISTICS

2.1 Site History/Description

The Site is located at 421-433 East 13th Street and 420 East 14th Street and is situated along and between the north side of East 13th Street and the south side of East 14th Street midway between First Avenue to the west and Avenue A to the east (see Figure 1). The neighborhood is referred to as the East Village in lower Manhattan, New York. East 14th Street maintains two-way traffic and East 13th Street maintains one-way traffic westbound. This area is now a rapidly evolving commercial and residential neighborhood with the relatively large residential apartment complex known as Stuyvesant Town situated directly to the north.

On Manhattan tax maps, the Site is designated as Block: 441; Lots: 17 (421-429 E. 13th St. & 420 E. 14th St.), 45 (433 E. 13th St.), and 46 (431 E. 13th St.), and is situated within C1-6A, a Commercial (Local Retail) District. The Property consists of approximately 16,827 square feet of urban land. The Site was formerly occupied by old adjoining one-story, two-story, and three-story buildings that were demolished in October 2005. These former Site buildings were most recently occupied by East Side Lumber, Personal Touch Valet, LaChapelle Photo Studio, White Express Cleaning, and a grocery store.

The former Site buildings were first built between 1903 and 1920. Previous occupants included a church, a wagon builder, and a dry cleaning facility. The 1944 through 1996 Sanborn Maps show that the 431-433 East 13th Street part of the Site (easternmost Lots 45 and 46) were occupied by the New York City Department of Sanitation with wood and oil storage noted. The building located at 427 East 13th Street (in the middle of the property) was utilized as a dry cleaning facility. The dry cleaning equipment was located on the first floor and the full basement was utilized for storage purposes. The cleaner had a self-contained laundry machine, which used PCE and historically stored drums of waste PCE in the "Rear Yard".

In January 2006, when the RI field activities commenced, the Site was completely free of structures. The soil beneath the portions of the former buildings not containing basements had been excavated to a level of approximately 11-feet below the sidewalk elevation. The excavation extended to the sidewalk on East 13th Street and to the adjoining existing off-site building walls on the eastern and western Site boundaries. The northern boundary was extended up to the East 14th Street sidewalk or to the adjacent property boundary. A Site Plan is included as Figure 2.

2.2 Surrounding Land Use

Abutting the Site directly to the east is a one-story U.S. Post Office distribution facility, which was identified on Sanborn Fire Insurance maps since 1950. Abutting the Site directly to the west is the Immaculate Conception School also identified on the Sanborn maps since 1985. Abutting much of the rear of the Site to the north on East 14th Street are existing four-story residential apartment buildings, with retail stores at street level and rear yards. Also to the north, across East 14th Street is a one-story grocery store – "Associated Supermarket" - and there is an active east-west subway line running beneath East 14th Street. The land use in the surrounding area is predominantly mixed residential, commercial and retail. The most common types of nearby buildings are four to six-story residential apartment buildings, some of which have retail space at street level.

2.3 Hydrogeologic Setting

According to the USGS 7.5 Minute Series Topographic Map of Brooklyn, NY Quadrangle, dated 1995, the Site elevation is approximately 15 feet above mean sea level. Based upon site-specific geotechnical data obtained by Langan Engineering and Environmental Services, P.C. (Langan) the subsurface geology beneath the buildings generally consists of a surficial layer of construction fill down to 10-20 feet below the surface. The fill is underlain by a natural sand deposit followed by silt and fine sand, then decomposed and weathered bedrock at 77-85 foot depths. Although competent bedrock was not encountered by Langan, it is anticipated that the Manhattan Schist occurs beneath the property at depths greater than 200 feet.

The uppermost groundwater surface occurs under unconfined conditions (i.e. the water table) at a depth of approximately 13-feet below grade and within the unconsolidated fill materials. Based upon site-specific groundwater information, the direction of horizontal shallow groundwater flow is east-southeast in a direction downgradient toward the East River. Underlying groundwater is not used for potable supply purposes, and groundwater is not a water resource at, or in proximity to, this Site. A Groundwater Elevation Contour Map is included as Figure 3.

2.4 Description of Proposed Redevelopment Project

The proposed new construction consists of a new residential building with retail shops on the first floor. The proposed new building will total 100,000 sq. ft. and will include 2,500 sq. ft. of new retail space fronting on East 14th Street.

2.5 Significant Threat

While the Remedial Investigation Report for this Site was submitted to NYSDEC on February 15, 2007 and the Public comment period ended on April 19, 2007, neither NYSDEC nor NYSDOH have issued the Significant Threat Determination Letter. Therefore, a copy is not included with this RAP.

3.0 SUMMARY OF INTERIM REMEDIAL MEASURES

3.1 General

The detected presence of PCE in the on-site soils caused the need to conduct an Interim Remedial Measures (IRM). The primary objective of the IRM was to effectively excavate and remove all of the PCE-impacted on-site soils to at least 15-feet below grade and 3-feet beneath the shallow groundwater table in conjunction with the Volunteer's planned redevelopment of the Property – specifically, to facilitate the installation of the new building's foundation. The IRM scope consisted of the excavation and off-site disposal of all impacted on-site soils and earth fill materials ("soil") extending out to all Site boundaries, and construction dewatering of the excavation to achieve the desired depth for the new foundation. All of the cleanup work was performed in accordance with the NYSDEC-approved IRM Work Plan dated June 30, 2005, revised on March 23, 2006.

3.2 Waste Classification Testing

In June 2005, a representative from the Stablex facility in Canada, subcontracted to CA RICH, collected one soil sample from the on-site source area – the rear yard of 427 East 13th Street – for waste characterization purposes. Based on the results of this sample, CA RICH secured acceptance at the Stablex facility for the disposal of the hazardous materials from the source area of the Site. The Stablex facility has a patented treatment process that changes the waste into a cement-like matter for its emplacement into a storage cell permanently buried within a secure hazardous waste landfill.

In September and October 2005, before the previous Site buildings were demolished, CA RICH conducted additional waste classification testing on subsurface construction fill materials as required by the potential waste disposal facility. Nine (9) test pits and four (4) hand-cored soil borings were installed in non-source areas. A total of six (6) composite soil samples and six (6) grab soil samples were obtained from the test pits and boring locations and submitted to NYS-Certified American Analytical Laboratories in Farmingdale, New York, under contract to CA RICH, for specified chemical analyses. Each sample was tested for a specified extended list of parameters. The waste classification analyses indicated that the soil and earth fill materials beneath portions of the former buildings contained elevated levels of SVOCs, select heavy metals, and some petroleum constituents. With the benefit of these pre-remedial excavation test results, CA RICH sought and secured soil acceptance at suitable additional waste disposal facilities.

Based upon the waste classification results from the test pits, and CA RICH's original soil boring results from June 2005, the Clean Earth of Philadelphia, Inc. (CEP) facility was selected for the disposal of the non-hazardous fill materials from the non-source areas of the Site. CEP is a permitted thermal-treatment facility that utilizes high temperatures to destroy the contaminants. To efficiently meet CEP's waste acceptance criteria to expedite transport and disposal of the anticipated volume of construction fill materials from the planned remedial excavation required for the new building's foundation, an additional sixteen (16) grab and three (3) composite soil samples were collected from test pits on November 17, 2005. In addition, during the first stage of the remedial excavation on December 5, 2005, an additional five (5) grab and one (1) composite sample were collected from beneath the 421 East 13th Street portion of the Site. A copy of the waste classification test results and sample locations is included in the IRM Report (Ref. 9).

3.3 Remedial Excavation

Under the oversight of the New York State Department of Environmental Conservation (NYSDEC), the area of potential residual source contamination (rear yard area), as well as surrounding Site soils, were excavated site-wide with soil removal advanced to excavation depths that were down to at least 3-feet into and below the water table. Due to the presence of PCE dissolved in the uppermost shallow ground water quality, an activated carbon filtration system was incorporated into the construction-dewatering plan. This treatment system included a 21,000-gallon settling tank and two 2,000-pound activated carbon filters, prior to the temporary discharge of dewatering effluent into the municipal sewer system.

All of the soil and fill excavated from the Site was tested and transported off-Site by permitted waste haulers. The remedial excavation extended to the adjoining lot building walls on both the eastern and western Site boundaries, to the construction shoring along the sidewalk on the southern Site boundary, and up to the construction shoring on the northern Site boundary at the East 14th Street sidewalk - or alternatively, up to the property line abutting the rear yards of the adjoining properties on East 14th Street.

A total of 11,682.39 tons of impacted construction fill and soil containing elevated levels of SVOCs, select heavy metals, and some petroleum constituents was exhumed and transported off-Site to the CEP Facility in Pennsylvania. A total of 202.08 tons of specific PCE-contaminated soil was carefully excavated out from the rear yard area of the former dry cleaner (the area of concern) and transported off-Site as a regulated hazardous waste. This material was shipped out of country and permanently disposed of at the Stablex treatment facility in Canada.

During the installation of the sump ejector pit on February 23, 2006, the excavated material contained obvious signs of petroleum contamination. It was determined that the petroleum contamination was associated with NYSDEC Spill #0507771, previously reported on September 28, 2005. Approximately 13 truckloads of petroleum-impacted soil were unearthed and shipped to the CEP facility on this date.

Upon completion of the excavation down to 16–17 feet below grade behind the former dry cleaner at 427 East 13th Street was completed, two confirmatory endpoint soil samples were obtained from the bottom of this remedial excavation just above the temporarily-lowered (dewatered) water table. The soil endpoint results indicated that PCE and its breakdown products were well below the applicable NYSDEC TAGM #4046 guidance values and NYSDEC 6 NYCRR Part 375 Track 2. Sample results are illustrated on Figure 4.

4.0 SUMMARY OF REMEDIAL INVESTIGATION

A Site Investigation that included soil vapor point installation and sampling, and groundwater monitoring well installation and sampling was completed during the winter of 2006. A Remedial Investigation Report detailing the work performed was prepared and submitted to NYSDEC (Ref. 10). The following is a summary of the results of that investigation.

4.1 Soil Vapor

On January 24, 2006, three soil vapor points were installed beneath the sidewalk of East 13th and East 14th Streets. Vapor point VMP-1 was installed on the southern sidewalk of East 13th Street directly opposite the Site. The second point VMP-2 was installed on the sidewalk of East 13th Street near the southeastern corner of the Site. VMP-3 was installed in the sidewalk frontage of 420 East 14th Street. Each of these points was sampled and the collected vapor was analyzed for VOCs.

PCE was detected in the soil vapor at VMP-1, VMP-2, and VMP-3. Petroleum constituent's Benzene, Toluene, and M&P Xylene were also detected at VMP-1. PCE's breakdown products cis-1,2-Dichlororethene and trichloroethene were also detected at VMP-2. These results are illustrated on Figure 5.

4.2 Groundwater

During the period of January 24 through 26, 2006, one on-site multi-depth well couplet and four water table monitoring wells were installed. MW-1 and MW-2 were installed in the sidewalk frontage along East 13th Street. The multi-depth well couplet identified as MW-3S and MW-3D, was installed directly within the rear suspect source area of 427 East 13th Street. MW-4 and MW-5 were installed in the on-site excavation. One week after well development, CA RICH collected depth-to-water measurements and groundwater samples from the four newly-installed water table wells and the new multi-depth well couplet. Groundwater was encountered at the Site at a depth of approximately 13 feet below grade and the direction of flow was determined to be toward the east-southeast.

Groundwater sampling conducted in February 2006 indicated concluded that the uppermost groundwater below the Property was impacted with PCE and its degradation products, most likely from the Site's historic use as a dry cleaner. The sample results are displayed on Table 1.

A caisson was used to protect the multi-depth cluster well during subsequent on-Site remedial excavation and ongoing site preparation activities. Despite this effort, this cluster well was destroyed by a track-hoe in March 2006. During the March 2006 excavation activities, a track-hoe excavator also crushed and destroyed both MW-4 and MW-5. In addition, MW-1 was removed during the installation of a Consolidated Edison vault and MW-2 was destroyed during the installation of an exterior elevator.

4.3 Summary of Qualitative Exposure Assessment

4.3.1 Identification and Evaluation of Exposure Pathways (Contaminant source, contaminant release and transport mechanism, point of exposure, route of exposure, receptor population)

Since the BCP Applicant entered into a formal agreement with the NYSDEC as a "Volunteer", only on-Site conditions were and could be evaluated as part of the Qualitative Exposure Assessment. According to the June 2005 soil investigation, waste characterization sampling, and the Remedial Investigation, elevated levels of PCE, lead, fuel oil constituents, and PAHs were detected on-Site. Based on the concentrations of PCE detected in the soil and groundwater at the eastern Property boundary and the visual observation of oily soil at the southwest Property boundary, it is possible that these constituents may have migrated onto the adjoining properties. Therefore, it was necessary to examine the exposure pathways for adult and child residents, and commercial and construction workers.

Existing On-Site Pathway - Before completion of the IRM, there was an exposure pathway (Subsurface Soil Concentrations Protective of Ambient Air (Outdoor) Vapor Inhalation and Inhalation of Vapors and Particulates, Dermal Contact, and Ingestion of Chemicals in Surficial Soils) from surface and subsurface soil/fill as a result of on-Site construction activities. On-Site construction workers potentially could have ingested, inhaled, or had dermal contact with exposed impacted fill or soils. Since the IRM has been completed, there is no existing potential exposure pathway from subsurface soil/fill to on-Site receptors.

Before completion of the IRM, there was also an exposure pathway (Groundwater Concentrations Protective of Ambient Air (Outdoor) Vapor Inhalation) from the groundwater as a result of on-Site excavation and/or dewatering activities for construction purposes. On-Site construction workers could have potentially inhaled or had dermal contact with any soil/fill that was saturated with contaminated groundwater and/or the contaminated groundwater itself. Since the IRM has been completed, on-site dewatering activities have ceased, and a water/vapor barrier has been installed underneath and around the new foundation, thus, there is no existing potential exposure pathway from groundwater to on-Site receptors.

Future On-Site Pathway - All of the impacted soil and earth fill materials formerly occurring on-Site were excavated and removed as part of the approved IRM activities conducted between December 2005 and April 2006. Source removal was accomplished by excavation, transport, and off-Site disposal of contaminated soils to a regulated waste disposal facility. Soils were excavated down to 17 feet in the source area (four feet into the water table) and 15-feet below street grade in the rest of the Site (three feet into the water table). The lateral extent of the excavation was to the two sidewalks to the north and south, and the adjoining property lines to the east and west. Two endpoint samples were collected from 16 and 17 feet below sidewalk grade in the former source area to document the removal of the contaminated soil.

Since no impacted soil above the water table remains on-Site, there is no longer a potential presence of soil vapor attributable to impacted soil contaminants occurring within the unsaturated vadose zone. However, there may be some minor off-gassing of residual VOCs dissolved in the underlying uppermost groundwater. Therefore, the BCP Applicant installed a water/vapor barrier beneath the entire Site to eliminate any potential soil vapor from entering the building or Property. Since the IRM was implemented according to the NYSDEC-Approved Work Plan and the vapor barrier was installed according to its specifications, there are no potential exposure pathways for on-Site adult or child residents, or commercial workers.

There is a potential exposure pathway (Subsurface Soil Concentrations Protective of Ambient Air (Outdoor) Vapor Inhalation and Inhalation of Vapors and Particulates, Dermal Contact, and Ingestion of Chemicals in Surficial Soils) for future on-Site construction workers conducting construction-related activities underneath the vapor barrier if future construction activities require on-Site workers to come into direct dermal contact with residual contaminated groundwater and/or soil within the saturated zone.

Existing Off-Site Pathway - Before installation of the vapor barrier Site-wide, there was an exposure pathway (Subsurface Soil Concentrations Protective of Ambient Air (Outdoor) Vapor Inhalation and Inhalation of Vapors and Particulates, Dermal Contact, and Ingestion of Chemicals in Surficial Soils) from contaminated surface and subsurface soil/fill to off-Site adult and child residents, and commercial workers as a result of on-Site construction activities. Off-Site adult and child residents, and commercial workers could have potentially inhaled soil/fill dust particulate or have had dermal contact with any soil/fill that may have emanated from the Site during sidewalk/street (off-Site) construction activities.

There is an exposure pathway (Inhalation of Vapors and Particulates, Dermal Contact, and Ingestion of Chemicals in Surficial Soils) from contaminated surface and subsurface soil/fill to off-Site adult and child residents of the adjoining properties based on the close proximity of the adjoining backyards to the source area of the on-Site PCE-contaminated surface and subsurface soil/fill. If the backyards contain contaminated soil, then the off-Site adult and child residents could have direct dermal contact with that contaminated soil while playing, gardening, or performing other outdoor activities. In addition, off-Site adult and child residents could potentially track contaminated soil into their home from the backyard via their shoes or clothing--creating another exposure pathway.

In addition, there is an exposure pathway (Groundwater Concentrations Protective of Enclosed Space Air (Indoor) Vapor Inhalation) from soil gas emanating from volatile organic compounds (VOCs), including PCE and fuel-related compounds, within the groundwater to enter into the adjoining buildings as a result of any sub-basement floor or lower wall openings/cracks. The indoor air quality at the adjoining properties is susceptible to contamination from subsurface vapor intrusion attributable to VOCs emitted from the shallow contaminated groundwater beneath the Site. The potential receptors from such a migration pathway into the building would be to off-Site commercial workers, and adult and child residents. The primary route of exposure would be inhalation.

Future Off-Site Pathway - There is a potential exposure pathway (Inhalation of Vapors and Particulates, Dermal Contact, and Ingestion of Chemicals in Surficial Soils) from contaminated surface and subsurface soil/fill to off-Site adult and child residents based on the close proximity of the backyards of the adjoining properties to the source area of the on-Site contaminated surface and subsurface soil/fill. Since the Brownfield Applicant entered into an agreement with the NYSDEC as a "Volunteer", only on-Site contamination will be addressed as part of the BCP Program, which means that only on-Site soils were excavated as part of the IRM. Therefore, off-Site adult and child residents could have direct dermal contact with that contaminated soil while playing, gardening, or performing other outdoor activities. In addition, off-Site adult and child residents could potentially track contaminated soil into their home from the backyard via their shoes or clothing creating another exposure pathway.

There is also a potential exposure pathway (Groundwater Concentrations Protective of Enclosed Space Air (Indoor) Vapor Inhalation) from soil gas emanating from any residual contaminated groundwater to enter into the adjoining buildings as a result of any sub-basement floor or lower wall openings/cracks. The indoor air quality at the adjoining properties is susceptible to contamination from subsurface vapor intrusion attributable to any residual VOCs that would be emitted from the shallow groundwater beneath the Site. The potential receptors from such a migration pathway into the building would be to off-site commercial workers, and adult and child residents. The primary route of exposure would be inhalation.

4.3.2 Exposure Assessment Conclusions and Recommendations

Based upon this analysis, the Exposure Assessment concluded that there was an existing exposure pathway from contaminated surface and subsurface soil/fill and groundwater to on-Site construction workers as a result of on-site construction and dewatering activities. However, all of the impacted soil on-Site was excavated and removed as part of the approved IRM activities conducted between December 2005 and April 2006. Therefore, there is no longer an existing exposure pathway from soil/fill and groundwater to on-Site receptors.

Completion of the IRM did not affect the potential exposure pathways to off-Site receptors that currently exist. The following existing potential exposure pathways were identified: off-Site adult and child residents, and commercial workers could potentially inhale soil/fill dust or have dermal contact with soil/fill that may emanate from the Site during sidewalk/street (off-Site) construction activities; off-Site adult and child residents could potentially have direct dermal contact with contaminated soil in their backyard during gardening or other outdoor activities; off-Site child residents could potentially ingest contaminated soil while playing in their backyard; off-Site adult

and child residents could potentially track contaminated soil into their home from the backyard via their shoes and clothing; and, off-Site adult and child residents, and commercial and construction workers could be susceptible to contamination from subsurface vapor intrusion attributable to VOCs that are emitted from the shallow contaminated groundwater beneath the Site.

The installation of the water/vapor barrier eliminated the potential exposure pathway/route from inhalation or dermal contact to on-Site construction workers, off-Site adult and child residents, and off-Site commercial workers regarding soil/fill dust from the Site. However, the following future potential exposure pathways still remain: on-Site construction and/or utility workers conducting construction or utility-related activities underneath the vapor barrier could come into contact with residual contaminated groundwater and/or soil within the saturated zone; off-Site adult and child residents could potentially have direct dermal contact with contaminated soil in their backyard during gardening or other outdoor activities; off-Site child residents could potentially ingest contaminated soil while playing in their backyard; off-Site adult and child residents could potentially track contaminated soil into their home from the backyard via their shoes and clothing; and, off-Site adult and child residents, and commercial and construction workers could be susceptible to contamination from subsurface vapor intrusion attributable to VOCs being emitted from the shallow groundwater beneath the Site.

Therefore, in our professional opinion (based on the results of the Exposure Assessment), certain engineering and/or institutional controls need to be put in place on-Site to ensure that the above-listed on-Site exposure pathways, relating to the vapor barrier and contact with subsurface soils and/or groundwater underneath the vapor barrier, are eliminated.

5.0 ALTERNATIVES ANALYSIS REPORT

5.1 Remedial Action Goal

The remedial goal for this project is the restoration of the Site to pre-release conditions, to the extent feasible and authorized by law, concurrent with the redevelopment of the Property. At a minimum, the remedy will eliminate or mitigate all significant threats to public health and the environment presented by the contaminants at the Site through the proper application of scientific and engineering principles.

5.2 Remedial Action Objective

The Remedial Action Objectives (RAOs) for this Site are media-specific and take into account protection of public health and the environment.

RAO for soil – The RAOs for soil at this Site are to: prevent dermal contact or ingestion of contaminated soils; prevent vapors within the soil from entering the new or existing structures; and remove source areas of contamination in the soil that may contribute to groundwater contamination. The first remedial objective (prevent dermal contact) was accomplished with the completion of the IRM.

RAO for soil vapor – The RAO for soil vapor is to prevent the migration of volatile vapors emanating from the groundwater from entering the new structure where they could be inhaled.

RAO for groundwater – As this section of Manhattan is serviced by public water derived from surface water reservoirs located in upstate New York, ingestion of contaminated water is not a concern and therefore, restoring the groundwater to pre-release conditions – to the extent practicable – is not a consideration. The groundwater RAOs are to prevent dermal contact during construction activities and the inhalation of volatile vapors emanating from the contaminated groundwater below the Property.

5.3 Development and Screening of Alternatives

Three remedial alternatives were developed and screened for this project. They include:

- No Action
- Air Sparging, Soil Vapor Extraction, and Post-Remediation Groundwater Monitoring
- Soil Excavation and Off-Site Disposal of Contaminated Soil as part of the IRM; Installation of a Water/Vapor Barrier, Post-Remediation Soil Vapor and Indoor Air Sampling; and, Deed Restriction for groundwater

5.4 Remedial Action Criteria

In accordance with Part 375, the following three remedial alternatives were selected and are described above: Remedy 1 - No Action; Remedy 2 – Air Sparging, Soil Vapor Extraction, and Post-Remediation Groundwater Monitoring; and, Remedy 3 - Soil Excavation, Off-Site Disposal of Contaminated Soil; Installation of a Water/Vapor Barrier; Post-Remediation Soil Vapor and Indoor Air Sampling; and, implementation of a Deed Restriction for groundwater. All three alternatives were compared to the nine criteria: Overall Protection of Public Health and the Environment; Compliance with Standards, Criteria, and Guidance (SCGs); Long-Term Effectiveness; Reduction of Toxicity, Mobility or Volume with Treatment; Short-Term Effectiveness; Implementability; Cost; Community Acceptance; and, Land Use.

5.4.1 Remedy 1 – No Action

5.4.1.1 Overall Protection of Public Health and the Environment

This remedy will not be protective of Public Health and the Environment since contaminated soil including the source area would remain in the ground.

5.4.1.2 Compliance with Standards, Criteria, and Guidance (SCGs)

This remedy will mean that the soil, groundwater, and soil vapor will not meet their applicable SCGs.

5.4.1.3 Long-Term Effectiveness

This remedy will not be effective in the long term because it will prohibit redevelopment of the Site and allow contamination to remain beneath the Site.

5.4.1.4 Reduction of Toxicity, Mobility or Volume with Treatment

This remedy will not cause a reduction of toxicity, mobility or volume and would rely only on the natural breakdown process to reduce contaminant levels.

5.4.1.5 Short-Term Effectiveness

This remedy will not be effective in the short term because it will prohibit redevelopment of the Site and allow contaminated soil to remain in the ground.

5.4.1.6 Implementability

This remedy is easily implemented because it requires no action.

5.4.1.7 Cost

There are no upfront costs associated with this remedy. However, no action would prevent redevelopment of the Site and the property value would be lowered. In addition, the Site would most likely remain in a vacant and unusable condition.

5.4.1.8 Community Acceptance

This remedy would not be acceptable to the community because the Site would remain vacant and the contamination would remain beneath the Site.

5.4.1.9 Land Use

The no action remedy will affect land use by preventing the redevelopment of the Site and would allow the Site to remain in a vacant unusable condition.

5.4.2 Remedy 2 – Air Sparging, Soil Vapor Extraction, and Post-Remediation Groundwater Monitoring

5.4.2.1 Overall Protection of Public Health and the Environment

This remedy would be protective of Public Health and the Environment as it would achieve the RAOs for soil, soil vapor and groundwater to 6 NYCRR Track 1 standards and TOGS. Since the RAOs for soil, soil vapor, and groundwater to 6 NYCRR Track 1 standards and TOGS would be achieved, long term engineering controls would not be needed.

5.4.2.2 Compliance with Standards, Criteria, and Guidance (SCGs)

This remedy includes the design, construction, operation and maintenance of a mechanical remediation system. The system would include: air sparge points; an on-site air compressor to inject air below the water table to remove contaminants; soil vapor extraction wells; an on-site vacuum blower to extract contaminated soil vapor from the subsurface soils; and carbon units to treat the extracted soil vapor. After a period of operation, this remedy would achieve the RAOs for soil, soil vapor, and groundwater to 6 NYCRR Track 1 standards.

5.4.2.3 Long-Term Effectiveness

This remedy will achieve long-term effectiveness for all three media of concern in accordance with the RAOs.

Soil – The Soil Vapor Extraction (SVE) system will remediate the soil to 6 NYCRR Track 1 standards. The SCGs have been reached at other Sites with similar geology using this remedy.

Soil Gas – The SVE system will extract contaminated soil vapor from the surface soils and off-gassing from contaminated groundwater.

Ground Water – The air sparging system will remediate groundwater to NYSDEC TOGs guidance values or standards. The post-remedial groundwater sampling will confirm that the remedy was effective in achieving the RAOs for groundwater.

5.4.2.4 Reduction of Toxicity, Mobility or Volume with Treatment

The processes are not reversible and are intended to achieve the 6 NYCRR Track 1 standards and TOGS.

Soil – The Soil Vapor Extraction system will remove all soil contamination from the Site.

Soil Gas – The objective of this remedy is the treatment of all soil vapor below the Site via the SVE system. It is noted that the SVE system relies on the mobility of the vapors to remove the contamination.

Ground Water –The air sparging system would treat all of the contaminated uppermost groundwater below the Site to NYSDEC TOGS groundwater standards or guidance values.

5.4.2.5 Short-Term Effectiveness

As it will take a minimum of one year before the RAOs for soil, soil vapor, and groundwater will be achieved, in the short term, there is a risk of short-term impacts as on-Site contamination would remain. In addition, as trenching is required to install the AS/SVE system, there would be a risk of short-term impacts to the site workers who would come into contact with the contaminated soil and the community as the process of trenching through impacted soil could release dust and volatile organic vapors.

5.4.2.6 Implementability

While the equipment, materials, and personnel needed to perform this work are readily available, implementing this remedy would not allow the Property to be redeveloped. Since the new building foundation and most of the structure has already been constructed this remedy has a low implementability.

5.4.2.7 Cost

Based on the information developed in the Site Investigation and current market rates for the materials and labor required to perform this work, the estimated cost for the environmental remediation, monitoring and reporting at this Site is estimated to be approximately $1 million.

5.4.2.8 Community Acceptance

Once the RAOs have been achieved over time, we would expect that the clean up work would achieve community acceptance. However, with this remedy, the Property could not be redeveloped and therefore, the Property would remain as an "eye-sore." We do not believe that the community would be happy with this alternative.

5.4.2.9 Land Use

Since it will be years before the RAOs for soil, soil vapor, and groundwater would be achieved, the Site would remain in a vacant unusable condition

5.4.3 Remedy 3 - Soil Excavation, Off-Site Disposal of Contaminated Soil; Installation of a Water/Vapor Barrier; Post-Remediation Soil Vapor and Indoor Air Sampling; and, implementation of a Deed Restriction for groundwater

5.4.3.1 Overall Protection of Public Health and the Environment

This remedy will be protective of Public Health and the Environment. By employing health and safety procedures during construction, the workers were and will be protected from dermal contact and inhalation of vapors or dust. The incorporation of the water/vapor barrier into the structure will prevent volatile vapors from entering the new structure.

The source of VOC contamination in the underlying uppermost groundwater, prior to completion of the IRM, was from the PCE residue remaining in the soil. Removal of the impacted soils and dewatering the Site during the IRM will significantly reduce the VOC levels in the groundwater.

5.4.3.2 Compliance with Standards, Criteria, and Guidance (SCGs)

Soil/Fill - The fill or subsurface soils below the Site were sampled and analyzed during the Phase II investigations conducted by EBI and Soil Mechanics, and during the waste characterization testing conducted by CA RICH. The Phase II testing conducted at the Site showed elevated levels of PCE and its degradation products. The waste classification analyses indicated that the soil and earth fill materials beneath portions of the former buildings contained elevated levels of PCE, SVOCs, select heavy metals, and some petroleum constituents. During the IRM, all of the on-site soil in the vadose zone and some of the soil in the zone of saturation was excavated totaling 11,884.47 tons.

Two confirming endpoint soil samples were collected upon completion of the IRM. Seven volatile organic compounds were detected in the endpoint soil samples. However, none of these exceeded the NYSDEC 6NYCRR Part 375 Track 2 Standards for restricted residential or commercial use.

VOC	Highest Detection	TAGM	NYSDEC 6NYCRR Part 375 Track 2 Restricted Residential	Commercial
Vinyl Chloride	1.5 ug/kg	100 ug/kg	0.9 ug/kg	13 ug/kg
Carbon Disulfide	0.91 ug/kg	2,700 ug/kg	No Standard	No Standard
Acetone	72 ug/kg	200 ug/kg	100 ug/kg	500 ug/kg
Methylene Chloride	3.7 ug/kg	100 ug/kg	100 ug/kg	500 ug/kg
Cis-1,2-Dichloroethene	22 ug/kg	No Standard	100 ug/kg	500 ug/kg
Trichloroethene	2.5 ug/kg	700 ug/kg	21 ug/kg	200 ug/kg
Tetrachloroethene	98 ug/kg	1,400 ug/kg	19 ug/kg	150 ug/kg

The proposed future use at this Site is for ground level commercial tenants and restricted residential for the basement, second floor and above. When compared to the NYSDEC 6NYCRR Part 375 Track 2 guidance values, the results are below the restricted residential and commercial standards.

Soil Vapor - Three soil vapor points were installed beneath the sidewalk of East 13th and East 14th Streets during the Remedial Investigation. These points were sampled using SUMMA canisters and analyzed for VOCs using method TO-15.

The sample results revealed that PCE was detected in the soil vapor at VMP-1, VMP-2, and VMP-3. Petroleum constituent's Benzene, Toluene, and M&P Xylene were also detected at VMP-1. PCE's breakdown products cis-1,2-Dichlororethene and trichloroethene were also detected at VMP-2. These compounds could not be compared to an applicable standard as none yet exist in New York State.

Organic Compound	Highest Detection	NYSDOH Guidance
Tetrachloroethene	11,000 ug/m^3	No standard
Trichlorofluromethane	1,000 ug/m^3	No standard
Cis-1,2-Dichloroethene	450 ug/m^3	No standard
Trichloroethene	240 ug/m^3	No standard
Benzene	16 ug/m^3	No standard
Toluene	26 ug/m^3	No standard
M&P Xylene	9.7 ug/m^3	No standard

Incorporation of the Site-wide water/vapor barrier beneath the structure will prevent any future residual volatile vapors from entering the new structure.

Ground Water – One multi-depth cluster well and four water table monitoring wells were installed and sampled at the Site during the Remedial Investigation.

The following organics were detected in groundwater above a regulatory guideline.

Organic Compound	Highest Detection	TOGS
Tetrachloroethene	170 ug/l	5 ug/l
Trichloroethene	44 ug/l	5 ug/l
Cis-1,2 Dichloroethene	270 ug/l	5 ug/l
Vinyl Chloride	120 ug/l	2 ug/l

These four halogenated volatile organic compounds exceed NYSDEC groundwater standards; however, groundwater is not used as a potable supply in this area of Manhattan. In addition, the on-site source of contamination was removed as part of the IRM and the vapor barrier will prevent volatile vapors from entering the proposed structure. The residual VOCs remaining in the uppermost groundwater can be expected to naturally degrade over time.

5.4.3.3 Long-Term Effectiveness

This remedy will achieve long-term effectiveness for all three media of concern in accordance with the RAOs.

Soil – During the IRM, all of the on-site soils in the vadose zone and 3-5 feet of the soils in the zone of saturation were excavated. Two confirmatory endpoint soil samples were collected upon completion of the IRM. The results of the endpoint sampling indicate that the soil achieves the SCGs for restricted residential and commercial use under the NYSDECs 6NYCRR Part 375 Track 2 Standards.

Soil Gas – Incorporation of a Site-wide water/vapor barrier beneath and around the structure will prevent any future residual volatile vapors from entering the new structure.

Ground Water – An activated carbon filtration system was incorporated into the construction-dewatering plan. This treatment system included a 21,000-gallon settling tank and two 2,000-pound activated carbon filters, prior to the temporary discharge of dewatering effluent into the municipal sewer system. In addition, by removing the impacted soil in the vadose zone and 3-5 feet into the zone of saturation, the source of VOCs in the groundwater should be significantly reduced if not completely eliminated. In addition, the residual VOCs in the groundwater will naturally degrade over time and the implementation of a Deed Restriction for groundwater (only) will prevent any remote possibility for the future on-site usage of groundwater.

5.4.3.4 Reduction of Toxicity, Mobility or Volume with Treatment

Soil – As the IRM extended into the zone of saturation, all on-site impacted soils were removed. In addition, the confirming endpoint sampling results indicated that the detected compounds were below NYSDECs 6NYCRR Part 375 Track 2 Standards.

Soil Gas – Excavating all soils within the vadose zone and 3-5 feet into the zone of saturation eliminated the source of soil vapor at the Site. However, some soil gas may still be emanating from any residual degraded groundwater. Incorporation of the water/vapor barrier into the structure will reduce its mobility with respect to migrating into the structure.

Ground Water – By removing the impacted soil in the vadose zone and 3-5 feet into the zone of saturation, the source of VOC groundwater contamination was eliminated. The removal of the source combined with the significant dewatering that occurred during the IRM will significantly reduce, and can be expected to eventually eliminate the slightly elevated PCE levels in the groundwater. In addition, these specific residual VOCs in the groundwater will naturally degrade over time and the implementation of a Deed Restriction for groundwater (only) will be an added protective measure to prevent any future Site usage of groundwater.

5.4.3.5 Short-Term Effectiveness

The completed IRM was very effective in reducing soil contaminant levels in the short term as the impacted soil, including the source of groundwater contamination, was removed from the Site. There was, however, a risk of short-term impacts to the site workers and the community as the process of excavating impacted soil could have released dust and volatile organic vapors. This was controlled by employing engineering controls. A trained technician was at the Site during the excavation program to measure VOC readings with a PID meter and airborne dust readings with a particulate meter around the work perimeter. If the measured levels exceeded a predetermined threshold level, engineering controls such as applying potable water misting methods in the work area, would have been implemented to reduce airborne dust particulates. These engineering controls were never employed during the IRM. In addition, the significant dewatering that was employed at the Site eliminated the short term risk of site works coming into contact with fluids such as degraded groundwater.

5.4.3.6 Implementability

The proposed remedy is highly implementable. The equipment and personnel needed to perform this work are readily available. The materials needed to construct the water/vapor barrier in accordance with ASTM standards are available and the manufacturers provide installation procedures for these products. Although the monitoring wells no longer exist, one of the three vapor monitoring points is still accessible and should serve as an appropriate point for post-remediation monitoring.

5.4.3.7 Cost

Based on the information developed in the Site Investigation, the classification of the Site soils as non-hazardous and hazardous waste, and current market rates for the materials and labor required to perform this work, the estimated cost for the environmental remediation, monitoring and reporting at this Site including the IRM is estimated to be approximately $1.3 million. This assumes that the remaining remedial work will be performed once the windows and walls have been sealed.

5.4.3.8 Community Acceptance

We expect that this clean up work will achieve community acceptance. As the redevelopment of the Property is currently underway, the Site is being transformed from a former "eye-sore" to a new residential building. The project will also provide the community with new retail stores. In addition, the project will provide local jobs both during and after construction. A series of public notices and community mailings will continue to be held in accordance with BCP requirements.

5.4.3.9 Land Use

Currently, the Property is being redeveloped. The Site was previously occupied by abandoned old industrial structures that were covered in graffiti. The future land use intended for this Property is a combination of new ground level retail stores and residential units. To the best of our knowledge, the property is not part of a Brownfield Opportunity Area (BOA) or a Comprehensive Community Master Plan. The population of the City of New York is expected to increase in the future. This project will help to provide the necessary housing units to meet that need. The Property is serviced by public transportation in the form of both buses and trains. The area is sewered, municipal water and utilities are available. Cultural resources are available locally. There are no known natural resources, such as fish and wildlife, or floodplains in close proximity to this Site and to the best of our knowledge, there are no current institutional controls related to this Property.

5.5 Alternative Screening

The first Alternative, No Action, consists of allowing the Site to remain in its current condition. This Alternative was reviewed and found to be unacceptable for several reasons. Since contaminated soil would remain in the ground, it would not achieve the RAOs for soil, soil vapor or groundwater or meet 6 NYCRR Part 375 Track 1 or 2 standards. More importantly, it does not allow for the redevelopment of the Property. Therefore, No Action is <u>not</u> considered a feasible alternative.

The second Alternative, Air Sparging, Soil Vapor Extraction, and Post-Remediation Groundwater Monitoring was also reviewed and found to be unacceptable. This Alternative included the design, construction, operation and maintenance of a mechanical remediation system. The system would include: air sparge points; an on-site air compressor to inject air below the water table; soil vapor extraction wells; an on-site vacuum blower to extract contaminated soil vapor from the subsurface soils; and carbon units to treat the extracted soil vapor. After a period of operation, the second Alternative would achieve the RAOs for soil, soil vapor and groundwater to 6 NYCRR Track 1 standards; however, it does not allow for the redevelopment of the Property. Therefore, Air Sparging, Soil Vapor Extraction, and Post-Remediation Groundwater Monitoring is not considered a feasible alternative.

The Applicant already performed some remedial activities at the Property as part of the NYSDEC approved IRM. The Applicant intends to conduct further remedial activities at the Property in conjunction with the completion of Site redevelopment activities. As such, only the third Alternative is considered feasible for this project. Alternative three includes: excavation of contaminated soils as part of the construction and redevelopment of this parcel (already completed as part of the IRM); off-site disposal of contaminated soil (already completed as part of the IRM); installation of a water/vapor barrier; post-remediation soil vapor and indoor air monitoring; and, implementation of a Deed Restriction for groundwater (only). The third Alternative is the only approach that will both achieve the RAOs for soil, soil vapor and groundwater and allow for the redevelopment of the Property. In addition, implementation of the selected remedy will achieve the 6NYCRR Part 375 Track 2 Standards as the Track 1 Standards do not allow for use of a long term institutional or engineering control i.e. water/vapor barrier.

6.0 REMEDIAL ACTION PLAN

6.1 Area of Concern

The area of concern includes the footprint of the proposed structure which encompasses most of the Property. Since the Applicant entered the BCP as a Volunteer, the remedy addresses all on-site environmental issues.

6.2 Excavation Design, Equipment and Procedures

All on-site excavation activities were completed as part of the IRM. All details relating to implementation of the IRM are discussed in the IRM Report (Ref. 9).

6.3 Design of Water/Vapor Barrier and Installation

On February 3, 2006, CA RICH submitted a technical cut sheet for the proposed GRACE waterproofing/vapor barrier specified for this Site to NYSDEC and New York State Department of Health (NYSDOH). On February 8, 2006, CA RICH received acknowledgement from both the NYSDEC and NYSDOH that the selected waterproofing membrane/vapor barrier was deemed acceptable.

Following the removal of all on-site soils, the water/vapor barrier was installed by Restor Technologies, Inc. with its installation periodically inspected by a NYS-Licensed Project Engineer. The water/vapor barrier was installed according to the manufacturer's product specifications over the entire bottom of the Site, including the elevator shaft and sump ejector pits. The barrier was installed directly above a 4-inch thick concrete mat and extended up to grade along the entire surrounding perimeter of the Site. A complete copy of the barrier submittal, the product warranty, and selected photos documenting the installation activity are included in the IRM Report (Ref. 9) and are included as Appendix A.

6.4 UST Removal

During ramp construction, a previously unknown 15,000 gallon underground oil storage tank (UST) was discovered beneath the former building occupying 433 East 13th Street. The soil surrounding the UST was inspected for signs of petroleum contamination utilizing photoionizing detection instrumentation (PID). No suspect contamination was detected. The UST was pumped free of liquids, cleaned, and removed off of the Site by A.L. Eastmund & Sons, Inc. Since the tank was greater than 1,100 gallons in capacity, the requisite NYSDEC Petroleum Bulk Storage (PBS) registration for this UST was completed by CA RICH for submittal to NYSDEC. A copy of the PBS Facility Information Report #2-610111 and the tank removal Affidavit was included in Appendix C of the IRM (Ref. 9).

6.5 Post-Remediation Soil Vapor and Indoor Air Sampling

The exhumation and removal of all on-Site impacted soils and fill above the water table, UST removal, the elimination of the soil vadose zone beneath the new building foundation, and the installation of a Site-wide water/vapor barrier provided a combination of preventative measures to effectively eliminate the potential for any future vapor intrusion pathway into the building basement. Given these precautions, it is judged that these "interim remedial measures" effectively serve as the permanent final remedy for this Site.

To confirm that the IRM is effective as the final remedy for this Site, indoor air and soil vapor sampling will be conducted in accordance with NYSDOH's Guidance for Evaluating Soil Vapor Intrusion (Ref. 14). During on-site construction activities VMP-2 and VMP-3 were destroyed. As part of the sampling program, two new vapor monitoring points will be installed near the original location of VMP-2 and on the western portion of the sidewalk on East 13th Street. The new vapor monitoring points identified as VMP-2a and VMP-4 will be installed with hand-tools through the existing sidewalk or ground surface. The points will be constructed of ¼-inch diameter polyethylene tubing connected to a stainless steel sampling screen. The screen will be set to collect soil vapor from three feet below the surface. The soil vapor point locations are illustrated on Figure 6. A diagram detailing the construction of the soil vapor points is included as Figure 7.

Upon sealing of all the windows and walls of the new Site building, soil vapor samples will be collected from VMP-1, VMP-2a, and VMP-4, indoor air samples will be collected from each of the four individual basement apartments, the retail basement on 14th Street, and in a first floor apartment on 13th Street and 14th Street; and ambient air samples will be collected from the roof, the garden, and in front of the new building on 13th street via 6-liter Summa Canisters. In addition, one duplicate sample will be obtained from VMP-2a. The samples will be analyzed for volatile organic compounds via EPA Method TO-15. The recommended sample locations are illustrated on Figure 6.

6.6 Sampling QA/QC Protocol

A site-specific Quality Assurance Project Plan (QAPP) has been prepared for the sampling component of this RAP. The QAPP is included as Appendix B.

6.7 Health & Safety

A site-specific Health and Safety Plan (HASP) has been prepared for the field portion of this RAP. The HASP will cover all sampling activities as well as emergency procedures and available emergency services in proximity to the Site. The HASP is included as Appendix C.

6.8 Institutional and Engineering Controls

The engineering control included in this RAP is the installation of a water/vapor barrier. As this control has no mechanical components, an annual inspection is not warranted.

An institutional control in the form of a Deed Restriction for groundwater is required for this Site. This restriction will include the prohibition of any drilling through the concrete slab and vapor barrier. No other institutional controls are envisioned at this time.

6.9 Reporting

Upon receipt of the DUSR, a Final Engineering Report will be prepared and signed by a Certified Professional Engineer. The Report will include a description of all work performed, including analytical results, summary tables, maps, and an "as built" drawing of the water/vapor barrier; and Final drawings of the newly-constructed building.

In addition to the Final Engineering Report, a Site Management Plan (SMP) will be prepared. This will include an Operations, Maintenance & Monitoring (OM&M) Plan. It will also include an Institutional and Engineering Control (I&EC) Plan which will describe the institutional and engineering controls required as part of the remedy and a recommended inspection schedule, if required.

7.0 SCHEDULE

Task	Estimated time
Water/vapor barrier installation	Completed
Indoor Air and Soil Vapor Sampling	Upon sealing of walls and windows in new building (Anticipated Aug/Sept 2007)
Deed Restriction (groundwater only)	Upon approval of the RAP
Final Engineering Report and Site Management Plan	One month after receipt of DUSR

8.0 CERTIFICATION

We hereby Certify that the remedial activities at the Property will be performed as specified in this RAP. We also Certify that all remedial work will be witnessed either by the Project's Senior Engineer or by a person working under his direct supervision. The Senior Engineer is a NYS-licensed Engineer as established under the regulations of the State of New York.

Seal:

Stephen J. Osmundsen, P.E.
Senior Engineer

7/11/07
Date

9.0 REFERENCES

1. AIRTEK Corp., March 2004, Phase I ESA.
2. SOIL MECHANICS ENVIRONMENTAL SERVICES, January 2005, Phase II Investigation.
3. ENVIRO BUSINESS, INC., April 2005, Phase II Investigation.
4. CA Rich Consultants, Inc., June & Oct. 2005, Soil Waste Characterization & Groundwater Tests.
5. CA Rich Consultants, Inc., June 2005, Remedial Investigation Work Plan.
6. CA Rich Consultants, Inc., June 2005, Interim Remedial Measures Work Plan.
7. CA Rich Consultants, Inc., March 2006, Revised Interim Remedial Measures Work Plan.
8. CA Rich Consultants, Inc., August 2006, Remedial Investigation Report.
9. CA Rich Consultants, Inc., September 2006, Interim Remedial Measures Report.
10. CA Rich Consultants, Inc., February 2007, Revised Remedial Investigation Report.
11. NYSDEC, December 2002, Technical Guidance for Site Investigations and Remediation.
12. NYSDEC, Draft Brownfield Cleanup Program Guide.
13. NYSDEC, December 2006, 6NYCRR Part 375 Environmental Remediation Programs Subparts 375-1 to 375-4 & 375-6.
14. NYSDOH, October 2006, Guidance for Evaluating Soil Vapor Intrusion in the State of New York.

TABLE

TABLE 1

Volatile Organic Compounds in Groundwater
Club East (BCP Site #C231048)
13th and 14th Street Realty, LLC
421-433 E. 13th St. & 420 E. 14th St., New York, New York

Sample ID	MW-1	MW-2	MW-3S	MW-3D	MW-3X	MW-4	MW-5	Field Blank	Trip Blank	*NYSDEC
Matrix	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Water	Water	TOGS
Date Sampled	2/7/2006	2/7/2006	2/7/2006	2/7/2006	2/7/2006	2/7/2006	2/7/2006	2/7/2006	2/7/2006	Standards and
Screened Interval (ft below land surface)	8 to 23	8 to 23	4 to 14	26 to 36	4 to 14	3.5 to 23.5	4.75 to 24.75			Guidelines
Depth Below Sidewalk Elevation	8 to 23	8 to 23	15 to 25	37 to 47	15 to 25	14.5 to 34.5	15.75 to 35.75			
Volatile Organic Compounds (USEPA Method 8260)										
Parameters	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Vinyl Chloride	ND	ND	**120**	**6.9**	**120**	1.9 J	**4.4 J**	ND	ND	2
Bromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
1,1 Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Carbon Disulfide	ND	ND	ND	ND	ND	ND	ND	ND	ND	NGV
Acetone	ND	ND	17	ND	17	3.4 J	ND	1.5 J	ND	50
Methylene Chloride	ND	ND	1.0 JB	ND	0.98 JB	0.43 JB	0.43 JB	0.41 J	0.75 J	5
trans-1,2-Dichloroethene	ND	ND	1.7 J	ND	1.8 J	ND	ND	ND	ND	5
1,1 Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
cis-1,2 Dichloroethene	ND	4.3	**270**	**21**	**270**	1.8 J	**37**	ND	ND	5
2-Butanone (MEK)	ND	ND	ND	ND	ND	ND	ND	ND	ND	50
Chloroform	ND	ND	5.3 J	ND	5.1	1.6 J	ND	ND	ND	7
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Carbon Tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Benzene	ND	ND	ND	ND	ND	0.79 J	ND	ND	ND	1
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.6
Trichloroethene	ND	1.5	**23**	2.3 J	**24**	ND	**44 H**	ND	ND	5
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	50
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.4
4-Methyl-2-pentanone (MIBK)	ND	ND	ND	ND	ND	ND	ND	ND	ND	NGV
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.4
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
Tetrachloroethene (PCE)	**11**	**27**	**92**	**17**	**92**	ND	**170**	ND	ND	5
2-Hexanone	ND	ND	ND	ND	ND	ND	ND	ND	ND	50
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	50
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Bromoform	ND	ND	ND	ND	ND	ND	ND	ND	ND	50
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Xylenes (total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	5

Notes:

ND - Compound was analyzed for but not detected.

All concentrations are reported in micrograms per liter (ug/L) or parts per billion.

Bold value and box indicates an exceedance of NYSDEC TOGS.

NGV - No Given Value

J - Estimated Value

B - Analyte Detected in Method Blank

H - Alternate Peak Selection Upon Analytical Review

** NYSDEC Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations TOGS 1.1.1 June 1998*

***Sample MW-3X is a duplicate of sample MW-3S.*

Prepared By CA RICH CONSULTANTS, INC.

7/3/2007

FIGURES

APPROX. SCALE (ft.)

0 2,000 4,000

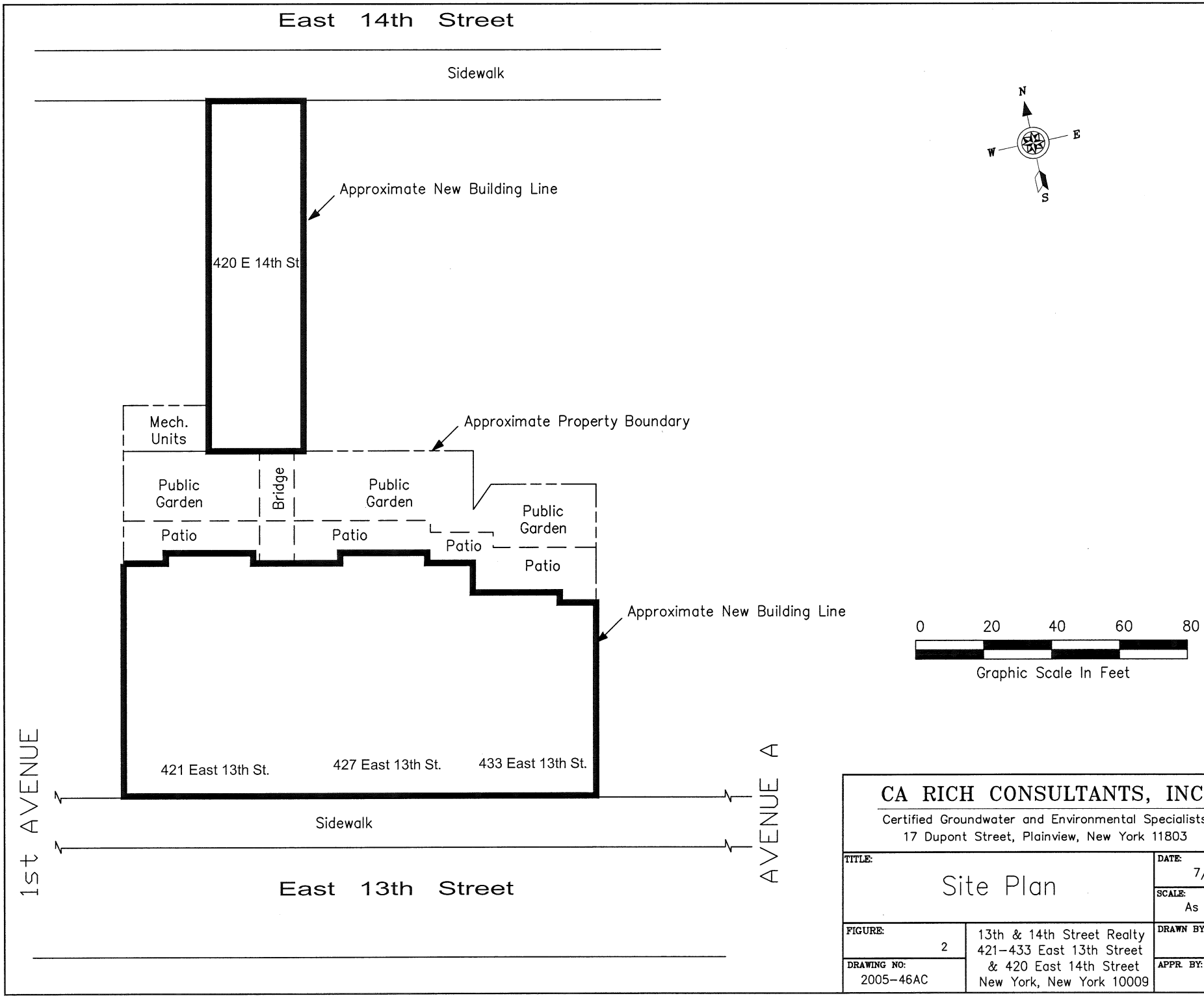
N

Adapted from USGS 1969-1979 (photorevised) Brooklyn Quadrangle Map.

CA RICH CONSULTANTS, INC.

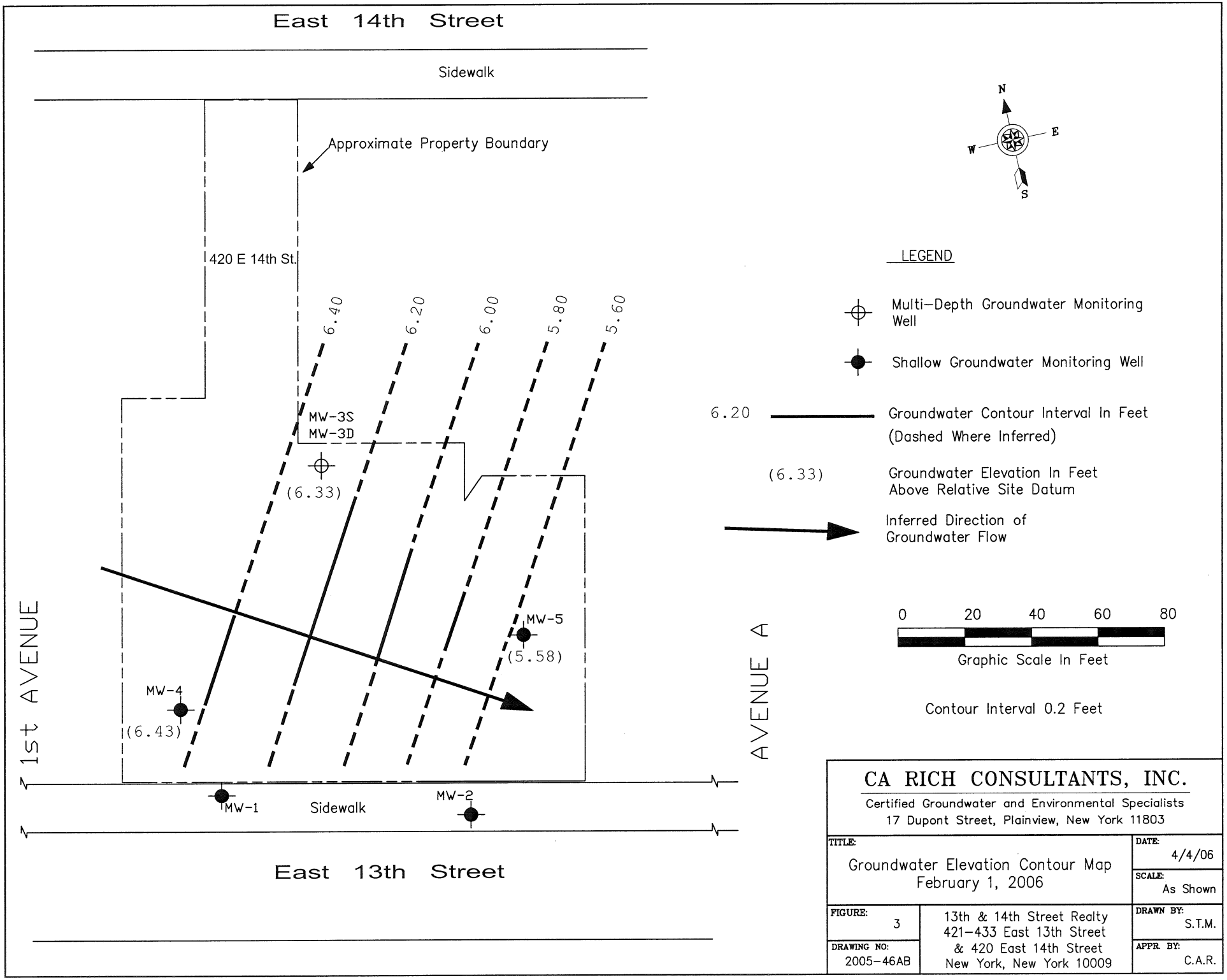
Certified Ground Water and Environmental Specialists
17 Dupont Street, Plainview, NY 11803

TITLE: **PROPERTY LOCATION MAP**	DATE: **4/7/06**
	SCALE: **AS SHOWN**
FIGURE: **1**	**13th and 14th Street Realty** **421-433 East 13th Street** **and 420 East 14th Street** **New York, NY 10009**
DRAWING:	DRAWN BY: **S.T.M.**
	APPR. BY: **C.A.R.**



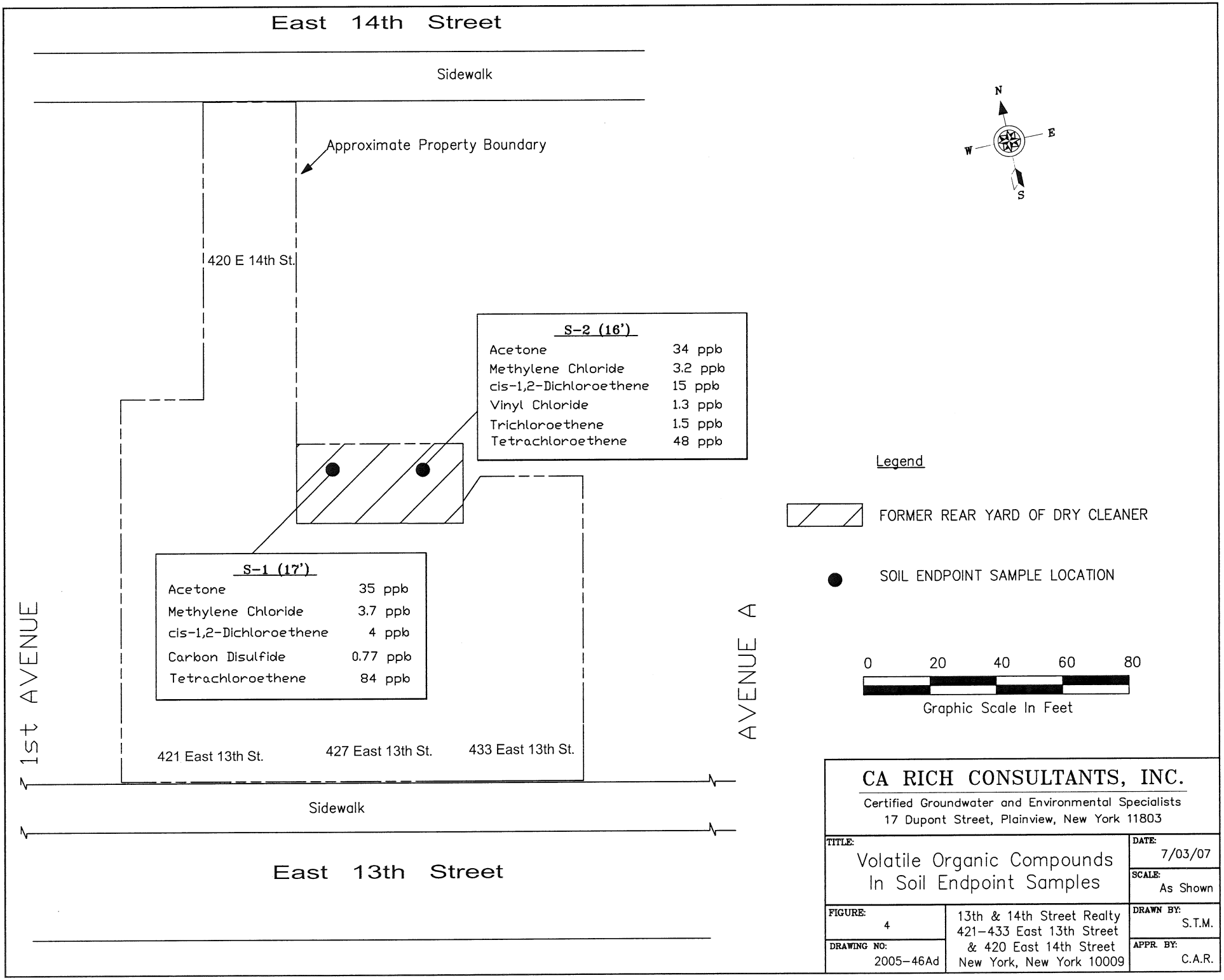
CA RICH CONSULTANTS, INC.
Certified Groundwater and Environmental Specialists
17 Dupont Street, Plainview, New York 11803

TITLE: Site Plan		DATE: 7/3/07
		SCALE: As Shown
FIGURE: 2	13th & 14th Street Realty 421–433 East 13th Street & 420 East 14th Street New York, New York 10009	DRAWN BY: S.T.M.
DRAWING NO: 2005–46AC		APPR. BY: C.A.R.



CA RICH CONSULTANTS, INC.
Certified Groundwater and Environmental Specialists
17 Dupont Street, Plainview, New York 11803

TITLE: Groundwater Elevation Contour Map February 1, 2006		DATE: 4/4/06
		SCALE: As Shown
FIGURE: 3	13th & 14th Street Realty 421-433 East 13th Street & 420 East 14th Street New York, New York 10009	DRAWN BY: S.T.M.
DRAWING NO: 2005-46AB		APPR. BY: C.A.R.

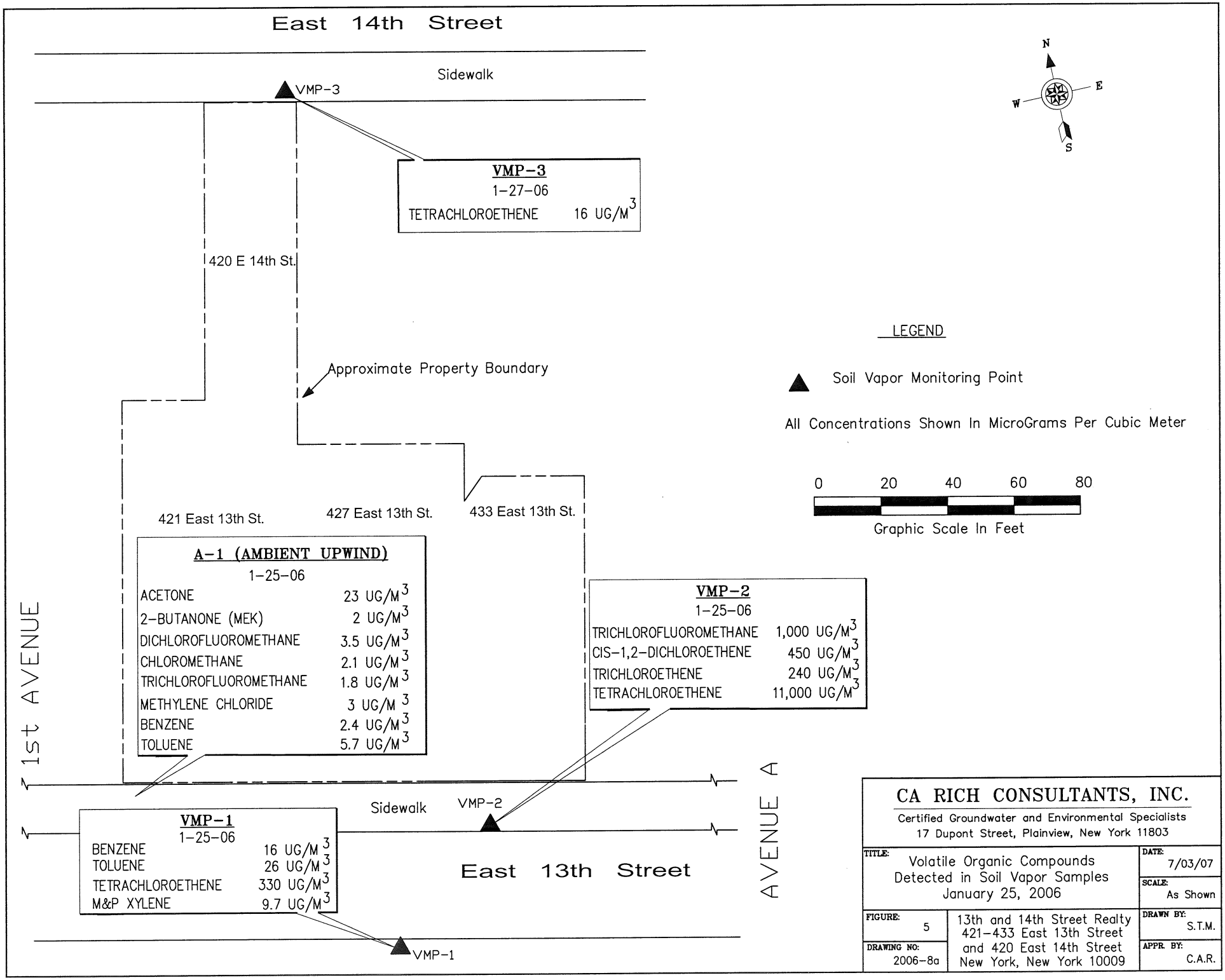


CA RICH CONSULTANTS, INC.

Certified Groundwater and Environmental Specialists
17 Dupont Street, Plainview, New York 11803

TITLE: Volatile Organic Compounds In Soil Endpoint Samples	DATE: 7/03/07
	SCALE: As Shown
FIGURE: 4	DRAWN BY: S.T.M.
DRAWING NO: 2005-46Ad	APPR. BY: C.A.R.

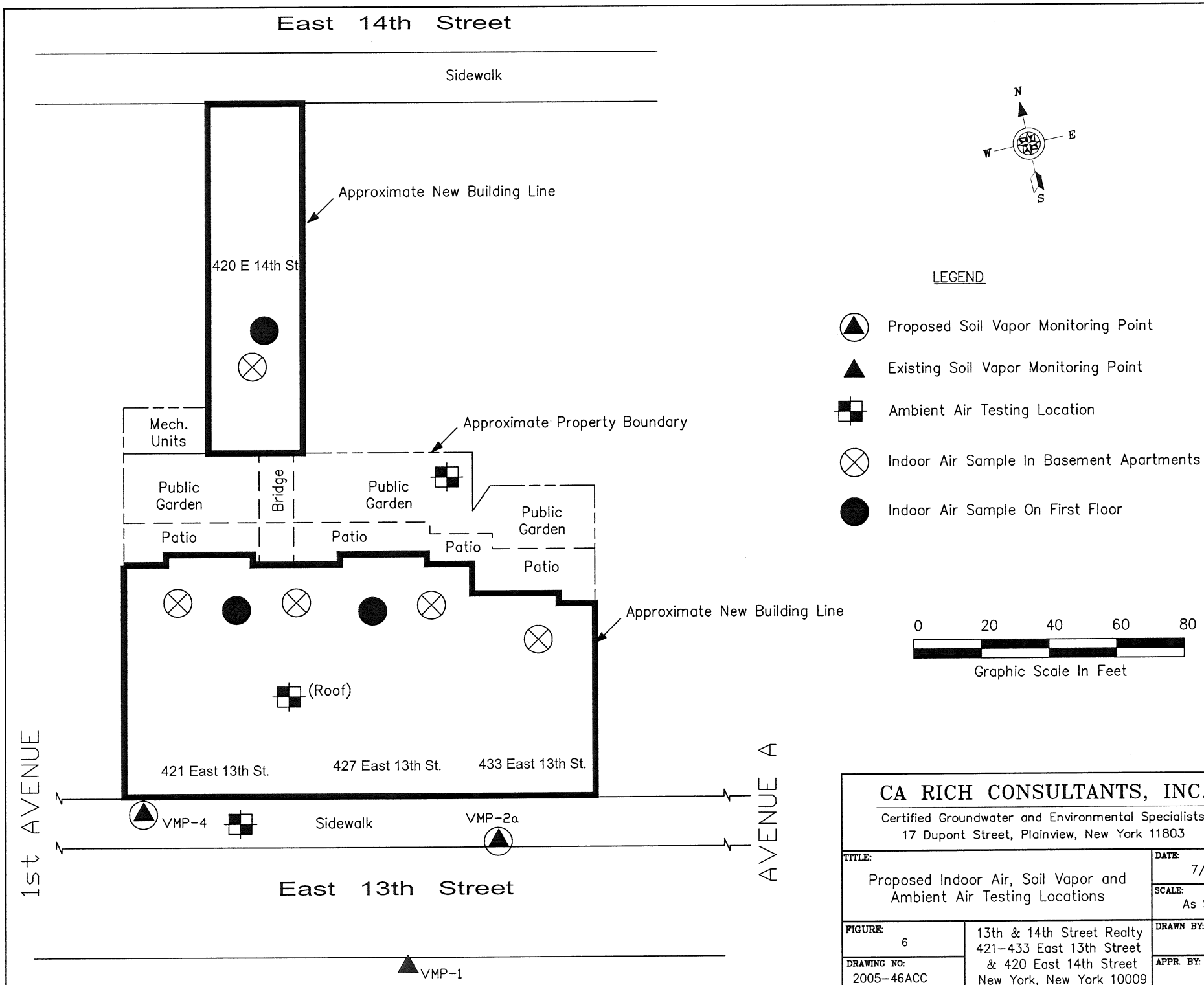
13th & 14th Street Realty
421-433 East 13th Street
& 420 East 14th Street
New York, New York 10009



CA RICH CONSULTANTS, INC.

Certified Groundwater and Environmental Specialists
17 Dupont Street, Plainview, New York 11803

TITLE: Volatile Organic Compounds Detected in Soil Vapor Samples January 25, 2006		DATE: 7/03/07
		SCALE: As Shown
FIGURE: 5	13th and 14th Street Realty 421-433 East 13th Street and 420 East 14th Street New York, New York 10009	DRAWN BY: S.T.M.
DRAWING NO: 2006-8a		APPR. BY: C.A.R.



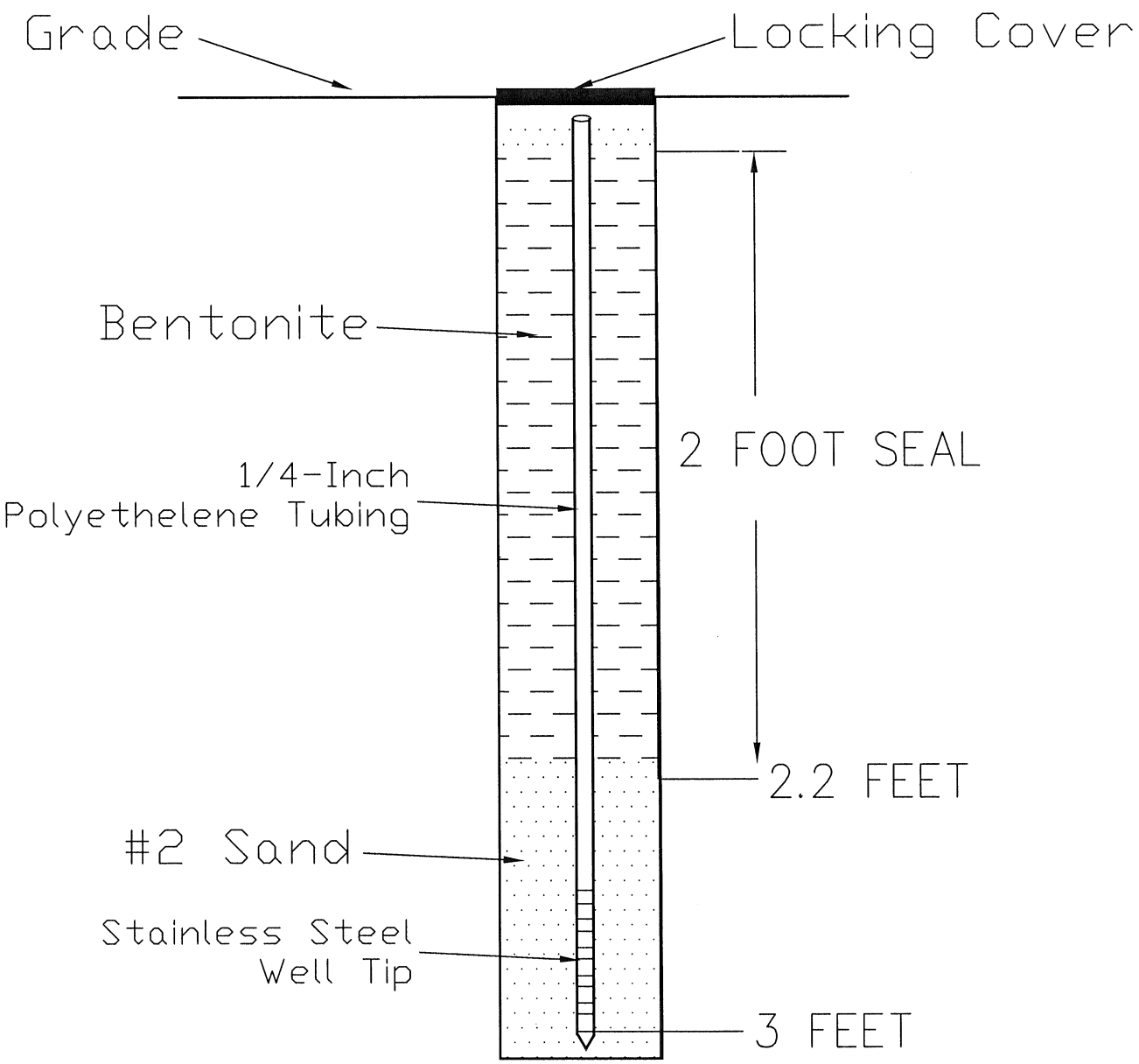
CA RICH CONSULTANTS, INC.

Certified Groundwater and Environmental Specialists
17 Dupont Street, Plainview, New York 11803

TITLE: Proposed Indoor Air, Soil Vapor and Ambient Air Testing Locations	DATE: 7/3/07
	SCALE: As Shown
FIGURE: 6	DRAWN BY: S.T.M.
DRAWING NO: 2005-46ACC	APPR. BY: C.A.R.

13th & 14th Street Realty
421-433 East 13th Street
& 420 East 14th Street
New York, New York 10009

VMP-2a & VMP-4



CA RICH CONSULTANTS, INC. Certified Groundwater and Environmental Specialists 17 Dupont Street, Plainview, NY 11803		
TITLE: CONSTRUCTION DETAILS FOR SOIL VAPOR POINTS VMP-2a, & VMP-4		DATE: 7/03/07 SCALE: Not To Scale
FIGURE: 7 DRAWING NO: 2007-42A	13TH & 14TH STREET REALTY 421-433 EAST 13TH STREET & 420 EAST 14TH STREET NEW YORK, NEW YORK	DRAWN BY: S.T.M. APPR. BY: C.A.R.

Appendix A

Waterproofing Membrane/Vapor Barrier Submittal

RESTOR TECHNOLOGIES INC.
16 Norden Lane
Huntington Station, NY 11746
Tel. (631) 385-8400 Fax (631) 385-8669

SUBMISSION FORM

JOB:	**425 E. 13th St.** **New York, NY**
CONTRACTOR:	Hudson Meridian Construction Group 40 Rector St., 18th Floor New York, NY 10006 Attn: William Cote/Dave Lin
SUBMITTED BY:	**Restor Technologies Inc.**
SPECIFICATION SECTION:	**Waterproofing**
DESCRIPTION OF MATERIAL:	**W.R. Grace Bituthene 4000 Sheet Membrane**
DESCRIPTION OF USE:	**Sheet membrane at exterior vertical foundation 2 sided walls.**
RE-SUBMITTED:	**January 20, 2006**

JAN 2 3 2006

PRODUCT INFORMATION

Bituthene® System 4000

Self-adhesive HDPE waterproofing membrane with super tacky compound for use with patented, water-based System 4000 Surface Conditioner

Advantages

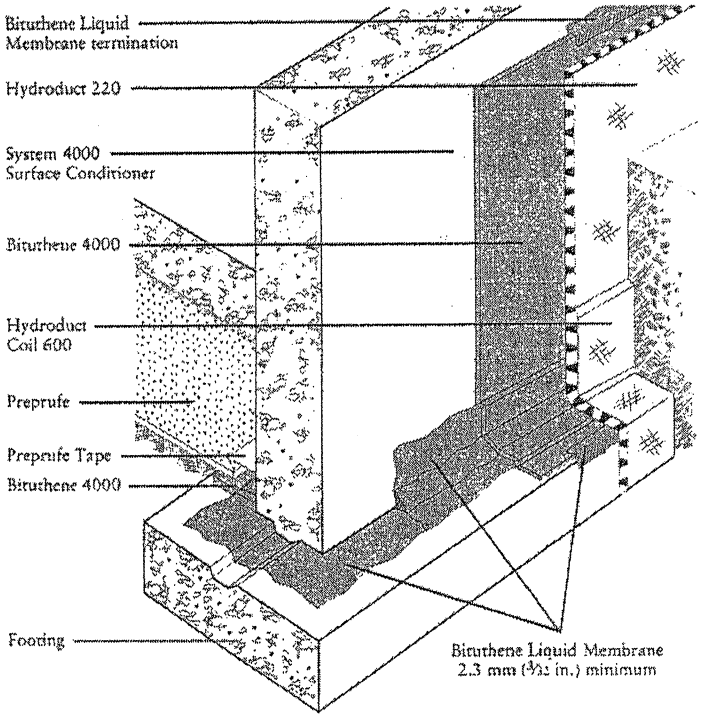
- Excellent adhesion – special adhesive compound engineered to work with high tack System 4000 Surface Conditioner
- Cold applied – simple application to substrates, especially at low temperatures
- Reduced inventory and handling costs – System 4000 Surface Conditioner is included with each roll of membrane
- Wide application temperature range – excellent bond to self and substrate from -4°C (25°F) and above
- Overlap security – minimizes margin for error under site conditions
- Cross laminated, high density polyethylene carrier film – provides high tear strength, puncture and impact resistance
- Flexible – accommodates minor structural movements and will bridge shrinkage cracks
- RIPCORD® – this Split Release on Demand feature allows the splitting of the membrane into two (2) pieces for ease of installation in detailed areas

Description

Bituthene® System 4000 is a 1.5 mm (1/16 in.) flexible, pre-formed waterproof membrane which combines a high performance, cross laminated, HDPE carrier film with a unique, super tacky, self-adhesive rubberized asphalt compound.

System 4000 Surface Conditioner is a unique, water-based, latex surface treatment which imparts an aggressive, high tack finish to the treated substrate. It is specifically formulated to bind site dust and concrete efflorescence, thereby providing a suitable surface for the Bituthene System 4000 Waterproofing Membrane.

Conveniently packaged in each roll of membrane, System 4000 Surface Conditioner promotes good initial adhesion and, more importantly, excellent permanent adhesion of the Bituthene System 4000 Waterproofing Membrane.



RESTOR TECHNOLOGIES INC.
16 NORDEN LANE
HUNTINGTON STATION NY 11746
TEL 631 385-8400
FAX 631 385-8669

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Construction Products

The VOC (Volatile Organic Compound) content of this product is 125 g/L.

Architectural and Industrial Maintenance Regulations limit the VOC content in products classified as Architectural Coatings. Refer to Technical Letters at www.graceconstruction.com for most current list of allowable limits.

Use

Bituthene is ideal for waterproofing concrete, masonry and wood surfaces where in-service temperatures will not exceed 57°C (135°F). It can be applied to foundation walls, tunnels, earth sheltered structures and split slab construction, both above and below grade. (For above grade applications, see "Above Grade Waterproofing Bituthene System 4000.")

Bituthene is 1.5 mm (1/16 in.) thick, 0.9 m (3 ft) wide and 20 m (66.7 ft) long and is supplied in rolls. It is unrolled sticky side down onto concrete slabs or applied onto vertical concrete faces primed with System 4000 Surface Conditioner. Continuity is achieved by overlapping a minimum 50 mm (2 in.) and firmly rolling the joint.

Bituthene is extremely flexible. It is capable of bridging shrinkage cracks in the concrete and will accommodate minor differential movement throughout the service life of the structure.

Application Procedures

Safety, Storage and Handling Information

Bituthene products must be handled properly. Vapors from solvent-based primers and mastic are harmful and flammable. Bituthene Protection Board Adhesive is extremely flammable. For these products, the best available information on safe handling, storage, personal protection, health and environmental considerations has been gathered. Material Safety Data Sheets (MSDS) are available at www.graceconstruction.com and users should acquaint themselves with this information. Carefully read detailed precaution statements on product labels and the MSDS before use.

Surface Preparation

Surfaces should be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Concrete must be properly dried (minimum 7 days for normal structural concrete and 14 days for lightweight structural concrete).

If time is critical, Bituthene Primer B2 may be used to allow priming and installation of membrane on damp surfaces or green concrete. Priming may begin in this case as soon as the concrete will maintain structural integrity. Use form release agents which will not transfer to the concrete. Remove forms as soon as possible from below horizontal slabs to prevent entrapment of excess moisture. Excess moisture may lead to blistering of the membrane. Cure concrete with clear, resin-based curing compounds which do not contain oil, wax or pigment. Except with Primer B2, allow concrete to thoroughly dry following rain. Do not apply any products to frozen concrete.

Repair defects such as spalled or poorly consolidated areas. Remove sharp protrusions and form match lines. On masonry surfaces, apply a parge coat to rough concrete block and brick walls or trowel cut mortar joints flush to the face of the concrete blocks.

Temperature

- Apply Bituthene System 4000 Membrane and Conditioner only in dry weather and when air and surface temperatures are -4°C (25°F) or above.
- Apply Bituthene Primer B2 in dry weather above -4°C (25°F). (See separate product information sheet.)

Conditioning

Bituthene System 4000 Surface Conditioner is ready to use and can be applied by spray or roller. For best results, use a pump-type air sprayer with fan tip nozzle, like the Bituthene System 4000 Surface Conditioner Sprayer, to apply the surface conditioner.

Apply Bituthene System 4000 Surface Conditioner to clean, dry, frost-free surfaces at a coverage rate of 7.4 m^2/L (300 ft^2/gal). Coverage should be uniform. Surface conditioner should not be applied so heavily that it puddles or runs. **Do not apply conditioner to Bituthene membrane.**

Allow Bituthene System 4000 Surface Conditioner to dry one hour or until substrate returns to its original color. At low temperatures or in high humidity conditions, dry time may be longer.

Bituthene System 4000 Surface Conditioner is clear when dry and may be slightly tacky. In general, conditioning should be limited to what can be covered within 24 hours. In situations where long dry times may prevail, substrates may be conditioned in advance. Substrates should be reconditioned if significant dirt or dust accumulates.

Before surface conditioner dries, tools should be cleaned with water. After surface conditioner dries, tools should be cleaned with mineral spirits. Mineral spirits is a combustible liquid which should be used only in accordance with manufacturer's recommendations. Do not use solvents to clean hands or skin.

Corner Details

The treatment of corners varies depending on the location of the corner. For detailed information on Bituthene Liquid Membrane, see separate product information sheet.

- At wall to footing inside corners –
  Option 1: Apply membrane to within 25 mm (1 in.) of base of wall. Treat the inside corner by installing a 20 mm (¾ in.) fillet of Bituthene Liquid Membrane. Extend Bituthene Liquid Membrane at least 65 mm (2½ in.) onto footing, and 65 mm (2½ in.) onto wall membrane.
  Option 2: Treat the inside corner by installing a 20 mm (¾ in.) fillet of Bituthene Liquid Membrane. Apply 300 mm (12 in.) wide strip of sheet membrane centered over fillet. Apply wall membrane over inside corner and extend 150 mm (6 in.) onto footing. Apply 25 mm (1 in.) wide troweling of Bituthene Liquid Membrane over all terminations and seams within 300 mm (12 in.) of corner.
- At footings where the elevation of the floor slab is 150 mm (6 in.) or more above the footing, treat the inside corner either by the above two methods or terminate the membrane at the base of the wall. Seal the termination with Bituthene Liquid Membrane.

Joints

Properly seal all joints with waterstop, joint filler and sealant as required. Bituthene membranes are not intended to function as the primary joint seal. Allow sealants to fully cure. Pre-strip all slab and wall cracks over 1.5 mm (1/16 in.) wide and all construction and control joints with 230 mm (9 in.) wide sheet membrane strip.

Application on Horizontal Surfaces

(Note: Preprufe® pre-applied membranes are strongly recommended for below slab or for any application where the membrane is applied before concreting. See Preprufe product information sheets.)

Apply membrane from the low point to the high point so that laps shed water. Overlap all seams at least 50 mm (2 in.). Stagger all end laps. Roll the entire membrane firmly and completely as soon as possible. Use a linoleum roller or standard water-filled garden roller less than 760 mm (30 in.) wide, weighing a minimum of 34 kg (75 lbs) when filled. Cover the face of the roller with a resilient material such as a 13 mm (½ in.) plastic foam or two wraps of indoor-outdoor carpet to allow the membrane to fully contact the primed substrate. Seal all T-joints and membrane terminations with Bituthene Liquid Membrane at the end of the day.

Protrusions and Drains

Apply membrane to within 25 mm (1 in.) of the base of the protrusion. Apply Bituthene Liquid Membrane 2.5 mm (0.1 in.) thick around protrusion. Bituthene Liquid Membrane should extend over the membrane a minimum of 65 mm (2½ in.) and up the penetration to just below the finished height of the wearing course.

Vertical Surfaces

Apply membrane in lengths up to 2.5 m (8 ft). Overlap all seams at least 50 mm (2 in.). On higher walls apply membrane in two or more sections with the upper overlapping the lower by at least 50 mm (2 in.). Roll all membrane with a hand roller.

Terminate the membrane at grade level. Press the membrane firmly to the wall with the butt end of a hardwood tool such as a hammer handle or secure into a reglet. Failure to use heavy pressure at terminations can result in a poor seal. A termination bar may be used to ensure a tight seal. Terminate the membrane at the base of the wall if the bottom of the interior floor slab is at least 150 mm (6 in.) above the footing. Otherwise, use appropriate inside corner detail where the wall and footing meet.

Membrane Repairs

Patch tears and inadequately lapped seams with membrane. Clean membrane with a damp cloth and dry. Slit fishmouths and repair with a patch extending 150 mm (6 in.) in all directions from the slit and seal edges of the patch with Bituthene Liquid Membrane. Inspect the membrane thoroughly before covering and make any repairs.

Drainage

Hydroduct® drainage composites are recommended for both active drainage and protection of the membrane. See Hydroduct product information sheets.

Protection of Membrane

Protect Bituthene membranes to avoid damage from other trades, construction materials or backfill. Place protection immediately in temperatures above 25°C (77°F) to avoid potential for blisters.

- On vertical applications, use Hydroduct 220 Drainage Composite. Adhere Hydroduct 220 Drainage Composite to membrane with Hydroduct Tape. Alternative methods of protection are to use 25 mm (1 in.) expanded polystyrene or 6 mm (¼ in.) extruded polystyrene that has a minimum compressive strength of 55 kN/m^2 (8 lbs/in.^{2}). Such alternatives do not provide positive drainage to the system.

If 6 mm (¼ in.) extruded polystyrene protection board is used, backfill should not contain sharp rock or aggregate over 50 mm (2 in.) in diameter. Adhere polystyrene protection board with Bituthene Protection Board Adhesive or Hydroduct Tape.

- In mud slab waterproofing, or other applications where positive drainage is not desired and where reinforced concrete slabs are placed over the membrane, the use of 6 mm (¼ in.) hardboard or 2 layers of 3 mm (⅛ in.) hardboard is recommended.

Insulation

Always apply Bituthene membrane directly to primed or conditioned structural substrates. Insulation, if used, must be applied over the membrane. Do not apply Bituthene membranes over lightweight insulating concrete.

Backfill

Place backfill as soon as possible. Use care during backfill operation to avoid damage to the waterproofing system. Follow generally accepted practices for backfilling and compaction. Backfill should be added and compacted in 150 mm (6 in.) to 300 mm (12 in.) lifts.

For areas which cannot be fully compacted, a termination bar is recommended across the top termination of the membrane.

System 4000 Surface Conditioner Sprayer

The Bituthene System 4000 Surface Conditioner Sprayer is a professional grade, polyethylene, pump-type, compressed air sprayer with a brass fan tip nozzle. It has a 7.6 L (2 gal) capacity. The nozzle orifice and spray pattern have been specifically engineered for the optimum application of Bituthene System 4000 Surface Conditioner.

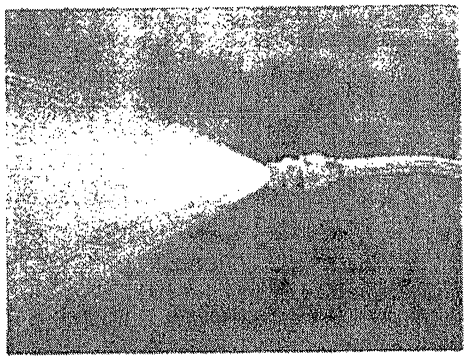
Hold nozzle 450 mm (18 in.) from substrate and squeeze handle to spray. Spray in a sweeping motion until substrate is uniformly covered.

Sprayer should be repressurized by pumping as needed. For best results, sprayer should be maintained at high pressure during spraying.

To release pressure, invert the sprayer and spray until all compressed air is released.

Maintenance

The Bituthene System 4000 Surface Conditioner Sprayer should perform without trouble for an extended period if maintained properly.



Sprayer should not be used to store Bituthene System 4000 Surface Conditioner. The sprayer should be flushed with clean water immediately after spraying. For breaks in the spray operation of one hour or less, invert the sprayer and squeeze the spray handle until only air comes from the nozzle. This will avoid clogging.

Should the sprayer need repairs or parts, call the maintenance telephone number on the sprayer tank (800-323-0620).

Bituthene System 4000	0.9 m x 20 m roll (18.6 m^2) 3 ft x 66.7 ft (200 ft^2)
Roll weight	38 kg (83 lbs) gross
Palletization	25 rolls per pallet
Storage	Store upright in dry conditions below +35°C (95°F).
System 4000 Surface Conditioner	1 x 2.3 L (0.625 gal) bottle in each roll of System 4000 Membrane
Ancillary Products	
Surface Conditioner Sprayer	7.6 L (2 gal) capacity professional grade sprayer with specially engineered nozzle
Bituthene Liquid Membrane	5.7 L (1.5 gal) pail/125 pails per pallet or 15.1 L (4 gal) pail/ 48 pails per pallet
Hydroduct Tape	2.5 cm x 61.0 m (1 in. x 200 ft) roll/6 rolls per carton
Bituthene Mastic	12 - 0.9 L (30 oz) tubes/carton or 18.9 L (5 gal) pail/36 pails per pallet
Complementary Materials	
Hydroduct	See separate data sheets
Protection Board Adhesive	18.9 L (5 gal) pail/36 pails per pallet
Equipment by others:	Soft broom, utility knife, brush or roller for priming

Placing Steel

When placing steel over properly protected membrane, use concrete bar supports (dobies) or chairs with plastic tips or rolled feet to prevent damage from sharp edges. Use special care when using wire mesh, especially if the mesh is curled.

Approvals

- City of Los Angeles Research Report RR 24386
- U.S. Department of Housing and Urban Development (HUD) HUD Materials Release 628E

Warranty

Five year material warranties covering Bituthene and Hydroduct products are available upon request. Contact your Grace sales representative for details.

Technical Services

Support is provided by full time, technically trained Grace representatives and technical service personnel, backed by a central research and development staff.

Physical Properties for Bituthene 4000 Membrane

Property	Typical Value	Test Method
Color	Dark gray-black	
Thickness	1.5 mm (1/16 in.) nominal	ASTM D3767 – method A
Flexibility, 180° bend over 25 mm (1 in.) mandrel at -32°C (-25°F)	Unaffected	ASTM D1970
Tensile strength, membrane, die C	2240 kPa (325 lbs/in.^{2}) minimum	ASTM D412 modified[1]
Tensile strength, film	34.5 MPa (5,000 lbs/in.^{2}) minimum	ASTM D882 modified[1]
Elongation, ultimate failure of rubberized asphalt	300% minimum	ASTM D412 modified[1]
Crack cycling at -32°C (-25°F), 100 cycles	Unaffected	ASTM C836
Lap adhesion at minimum application temperature	880 N/m (5 lbs/in.)	ASTM D1876 modified[2]
Peel strength	1576 N/m (9 lbs/in.)	ASTM D903 modified[3]
Puncture resistance, membrane	222 N (50 lbs) minimum	ASTM E154
Resistance to hydrostatic head	70 m (210 ft) of water	ASTM D5385
Permeance	2.9 ng/m^{2}sPa (0.05 perms) maximum	ASTM E96, section 12 – water method
Water absorption	0.1% maximum	ASTM D570

Footnotes:
1. The test is run at a rate of 50 mm (2 in.) per minute.
2. The test is conducted 15 minutes after the lap is formed and run at a rate of 50 mm (2 in.) per minute at 5°C (40°F).
3. The 180° peel strength is run at a rate of 300 mm (12 in.) per minute.

Physical Properties for System 4000 Surface Conditioner

Property	Typical Value
Solvent type	Water
Flash point	>60°C (>140°F)
VOC* content	125 g/L
Application temperature	-4°C (25°F) and above
Freeze thaw stability	5 cycles (minimum)
Freezing point (as packaged)	-10°C (14°F)
Dry time (hours)	1 hour**

* Volatile Organic Compound
** Dry time will vary with weather conditions

For Technical Assistance call toll free at 866-333-3SBM (3726).

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RESTOR TECHNOLOGIES INC.
16 Norden Lane
Huntington Station, NY 11746
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SUBMISSION FORM

JOB:	**425 E. 13th St.** **New York, NY**
CONTRACTOR:	Hudson Meridian Construction Group 40 Rector St., 18th Floor New York, NY 10006 Attn: William Cote/Dave Lin
SUBMITTED BY:	**Restor Technologies Inc.**
SPECIFICATION SECTION:	**Waterproofing**
DESCRIPTION OF MATERIAL:	**W.R. Grace Preprufe 300 R HDPE**
DESCRIPTION OF USE:	**Waterproofing at horizontal slab**
RE-SUBMITTED:	**January 20, 2006**

web www.graceconstruction.com
■PRODUCT DATA ■UPDATES ■TECH LETTERS ■DETAILS ■MSDS ■CONTACT ■FAQS

Preprufe® 300R & 160R

Pre-applied waterproofing membranes that bond integrally to poured concrete for use below slabs or behind basement walls on confined sites.

Advantages

- Forms a unique integral seal to concrete poured against it – prevents water migration and makes it unaffected by ground settlement beneath slabs
- Fully-adhered watertight laps and detailing
- Provides a barrier to water, moisture and gas – physically isolates the structure from the surrounding ground
- BBA Certified for basement Grades 2, 3, & 4 to BS 8102:1990
- Zero permeance to moisture
- Solar reflective – reduced temperature gain
- Simple and quick to install – requiring no priming or fillets
- Can be applied to permanent formwork – allows maximum use of confined sites
- Self protecting – can be trafficked immediately after application and ready for immediate placing of reinforcement
- Unaffected by wet conditions – cannot activate prematurely
- Inherently waterproof, non-reactive system:
  - not reliant on confining pressures or hydration
  - unaffected by freeze/thaw, wet/dry cycling
- Chemical resistant – effective in all types of soils and waters, protects structure from salt or sulphate attack

Description

Preprufe® 300R & 160R membranes are unique composite sheets comprising a thick HDPE film, an aggressive pressure sensitive adhesive and a weather resistant protective coating.

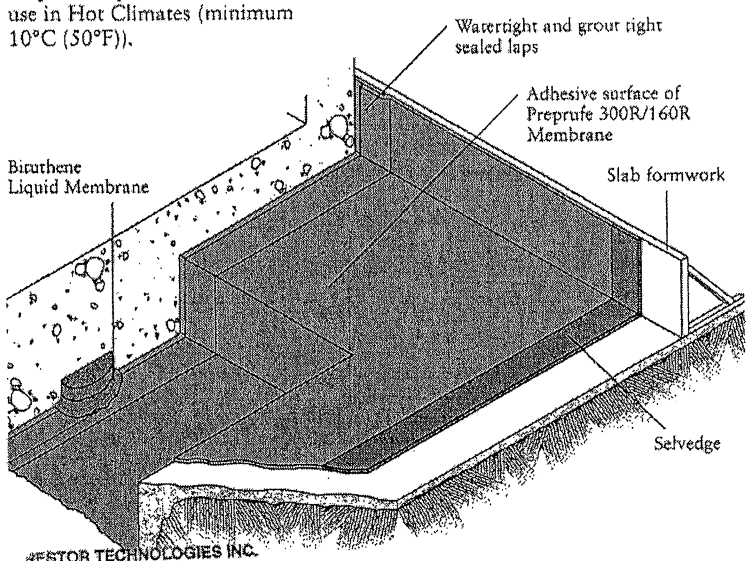
Unlike conventional non-adhering membranes, which are vulnerable to water ingress tracking between the unbonded membrane and structure, the unique Preprufe seal to concrete prevents any ingress or migration of water around the structure.

The Preprufe R System includes:

- Preprufe 300R – heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- Preprufe 160R – thinner grade for lighter applications and blindside, zero property line applications against soil retention systems.
- Preprufe Tape LT – for covering cut edges, roll ends, penetrations and detailing (temperatures between -4°C (25°F) and +30°C (86°F)).
- Preprufe Tape HC – as above for use in Hot Climates (minimum 10°C (50°F)).
- Bituthene® Liquid Membrane – for sealing around penetrations, etc.

Preprufe 300R & 160R membranes are applied either horizontally to smooth prepared concrete or well rolled and compacted sand or crushed stone blinding; or vertically to permanent formwork or adjoining structures. Concrete is then cast directly against the adhesive side of the membranes. The specially developed Preprufe adhesive layers work together to form a continuous and integral seal to the structure.

Preprufe can be returned up the inside face of slab formwork but is not recommended for conventional twin-sided formwork on walls, etc. Use Bituthene self-adhesive membrane or Procor® fluid applied membrane to walls after removal of formwork for a fully bonded system to all structural surfaces.



NESTOR TECHNOLOGIES INC.
16 NORDEN LANE
HUNTINGTON STATION NY 11746
TEL 631 385-8400
FAX 631 385-8669

BBA BRITISH BOARD OF AGREMENT CERTIFICATE No. 97/3002

GRACE Construction Products

Installation

Preprufe 300R & 160R membranes are supplied in rolls 1.2 m (4 ft) wide, with a selvedge on one side to provide self-adhered laps for continuity between rolls. The rolls of Preprufe Membrane and Preprufe Tape are interwound with a disposable plastic release liner which must be removed before placing reinforcement and concrete.

Substrate Preparation

All surfaces – It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 12 mm (0.5 in.). Grout around all penetrations such as utility conduits, etc. for stability.

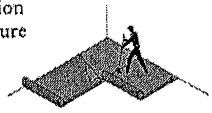
Horizontal – The substrate must be free of loose aggregate and sharp protrusions. An angular profiled blinding is recommended rather than a sloping or rounded substrate. The surface does not need to be dry, but standing water must be removed.

Vertical – Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 12 mm (0.5 in.) out of alignment.

Membrane Installation

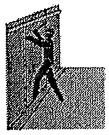
Preprufe can be applied at temperatures of -4°C (25°F) or above. During cold or damp conditions, the selvedge and tape adhesive can be gently warmed using a hot air gun or similar to remove moisture or condensation and improve initial adhesion.

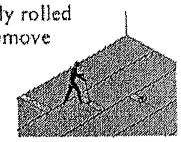
Horizontal substrates – Place the membrane HDPE film side to the substrate with printed coated side up facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave plastic release liner in position until overlap procedure is completed.



Accurately position succeeding sheets to overlap the previous sheet 75 mm (3 in.) along the marked selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

Vertical substrates – Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the printed coated side facing towards the concrete pour. The membrane may be installed in any convenient length. Secure the top of the membrane using a batten such as a termination bar or similar 50 mm (2 in.) below the top edge. Fastening can be made through the selvedge so that the membrane lays flat and allows firmly rolled overlaps. Immediately remove the plastic release liner. Any additional fasteners must be covered with a patch of Preprufe Tape.





Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Roll firmly to ensure a watertight seal.

Roll ends and cut edges – Overlap all roll ends and cut edges by a minimum 75 mm (3 in.) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap and roll firmly. Immediately remove printed plastic release liner from the tape.

Penetrations

Use the following steps to seal around penetrations such as service pipes, piles, lightning conductors, etc.

Grout around the penetration if the penetration is not stable. Scribe membrane tight to the penetration. If the membrane is not within 12 mm (0.5 in.) of the penetration, apply Preprufe Tape to cover the gap.

Wrap the penetration with Preprufe Tape by positioning the tape 12 mm (0.5 in.) above the membrane.

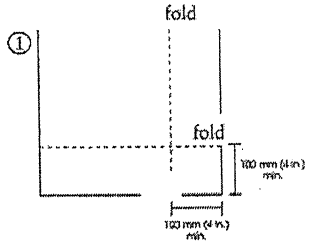
Mix and apply Bituthene Liquid Membrane around the penetrations using a filler to provide a watertight seal between the Preprufe Membrane and Preprufe Tape.

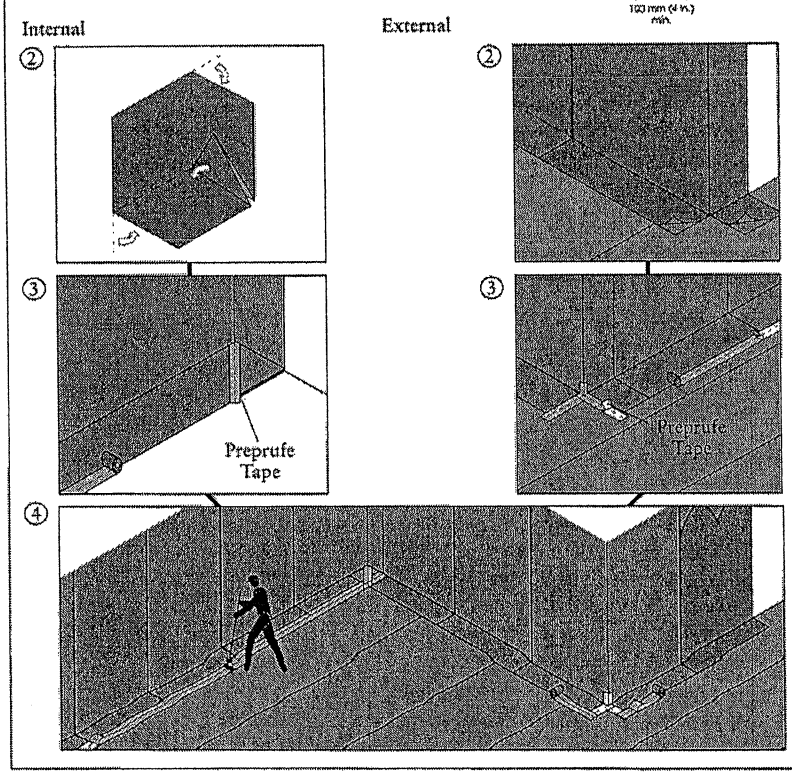
Membrane Repair

Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by jet washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Apply Preprufe Tape centered over the damaged area and roll firmly. Any areas of damaged adhesive should be covered with Preprufe Tape. Remove printed plastic release liner from tape. Where exposed selvedge has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

Corners

Internal and external corners should be formed as shown in the diagrams returning the membrane a minimum of 100 mm (4 in.) and sealing with Preprufe Tape. Ensure that the apex of the corner is covered and sealed with tape and roll firmly. Crease and fold the membrane to ensure a close fit to the substrate profile and avoid hollows.





Supply

Dimensions (Nominal)	Preprufe 300R Membrane	Preprufe 160R Membrane	Preprufe Tape (LT or HC*)
Thickness	1.2 mm (0.046 in.)	0.8 mm (0.032 in.)	
Roll size	1.2 m x 30 m (4 ft x 98 ft)	1.2 m x 35 m (4 ft x 115 ft)	100 mm x 15 m (4 in. x 49 ft)
Roll area	36 m^2 (392 ft^2)	42 m^2 (460 ft^2)	
Roll weight	50 kg (108 lbs)	42 kg (92 lbs)	2 kg (4.3 lbs)
Minimum side/end laps	75 mm (3 in.)	75 mm (3 in.)	75 mm (3 in.)

*LT denotes Low Temperature (between -4°C (25°F) and +30°C (86°F))
*HC denotes Hot Climate (>+10°C (50°F))

Ancillary Products

Bituthene Liquid Membrane (LM), 5.7 liter (1.5 US gal) or 15.1 liter (4 US gal)

Physical Properties

Property	Typical Value 300R	Typical Value 160R	Test Method
Color	white	white	
HDPE Thickness	0.75 mm (0.030 in.)	0.4 mm (0.016 in.)	
Peel Adhesion to Concrete	~~144 N per 50 mm~~ 880 N/m	~~144 N per 50 mm~~ 880 N/m	~~MOAT 27:5.1.3~~ ASTM D 903 Modified[3]
Shear Strength of Joints	476 N per 50 mm	476 N per 50 mm	MOAT 27:5.2.2/3/4
Methane Permeability	9.1 $mls/m^2/day$	N/A	University of London, QMW College[3]
Resistance to Hydrostatic Head	>6 m (>20 ft) >70 m (>230 ft)	>6 m (>20 ft) >70 m (>230 ft)	MOAT 27:5.1.4[5] ASTM D 5385 Modified[2]
Low Temperature Flexibility	<-20°C (<0°F)	<-20°C (<0°F)	MOAT 31:6D
Puncture Resistance	990 N	445N	ASTM E 154
Elongation (strain %)	long 826 trans 756	long 753 trans 825	BS 2782:320A (test speed 100 mm min.)
Elongation	300% minimum	300% minimum	ASTM D 412 Modified[4]
Tensile Strength, Film	27.6 MPa (400 lbs/in.)	27.6 MPa (400 lbs/in.)	ASTM D 412
Crack Cycling at -23°C (-10°F)	pass	pass	ASTM C 836
Moisture Vapor Transmission	0 gm^{-2} per day	0 gm^{-2} per day	BBA Laboratories BS 3177:1959 (1995) (75% RH/25°C)
Permeability[1] (hydraulic conductivity)	$K=<1.4 \times 10^{-11} cm.s^{-1}$	$K=<1.4 \times 10^{-11} cm.s^{-1}$	ASTM D 5084-90

Footnotes:
1. Result is lower limit of apparatus. Membrane therefore considered impermeable.
2. Hydrostatic head tests are performed by casting concrete against the membrane with a lap. The cured block is cracked and then placed in a chamber where water is introduced to the membrane surface including the lap up to a maximum of 70 m (231 ft) head.
3. Concrete is cast against the protective coating surface of the membrane and allowed to properly cure (7 days min.). Peel adhesion of membrane to concrete is measured at a rate of 50 mm (2 in.) per minute at room temperature.
4. Elongation of membrane is run at 50 mm (2 in.) per minute.
5. Tested at laps. Result is limit of test.

Specification Clauses

Preprufe 300R or 160R shall be applied with its adhesive face presented to receive fresh concrete to which it will integrally bond. Only Grace Construction Products approved membranes shall be bonded to Preprufe 300R/160R. All Preprufe 300R/160R system materials shall be supplied by Grace Construction Products, and applied strictly in accordance with their instructions. Specimen performance and formatted clauses are also available.

Health and Safety

Refer to relevant Material Safety data sheet. Complete rolls should be handled by a minimum of two persons.

For Technical Assistance call us toll free at 866-333-3SBM (3726).

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Pouring of Concrete

Ensure the plastic release liner is removed from all areas of Preprufe R Membrane and Tape.

It is recommended that concrete be poured within 56 days (42 days in hot climates) of application of the membrane. Concrete must be placed and compacted carefully to avoid damage to the membrane. Never use a sharp object to consolidate the concrete.

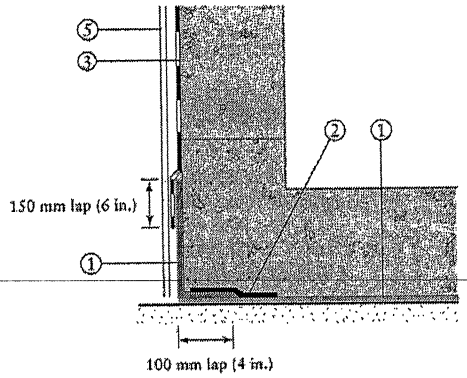
Removal of Formwork

Preprufe membranes can be applied to removable formwork, such as slab perimeters, elevator and lift pits, etc. Once the concrete is poured the formwork must remain in place until the concrete has gained sufficient compressive strength to develop the surface bond. Preprufe membranes are not recommended for conventional twin-sided wall forming systems.

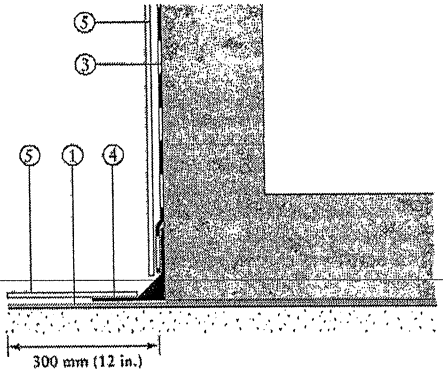
A minimum concrete compressive strength of 10 N/mm^2 (1500 psi) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

As a guide, to reach the minimum compressive strength stated above, a structural concrete mix with an ultimate strength of 40 N/mm^2 (6000 psi) will typically require a cure time of approximately 6 days at an average ambient temperature of -4°C (25°F), or 2 days at 21°C (70°F).

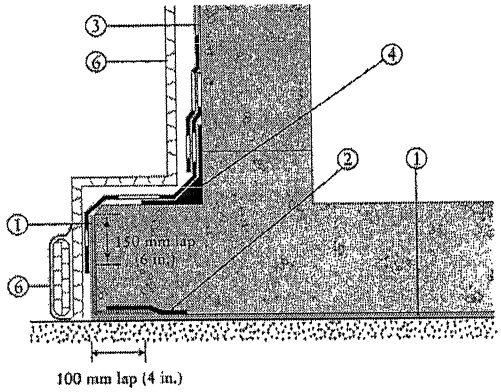
Wall base detail



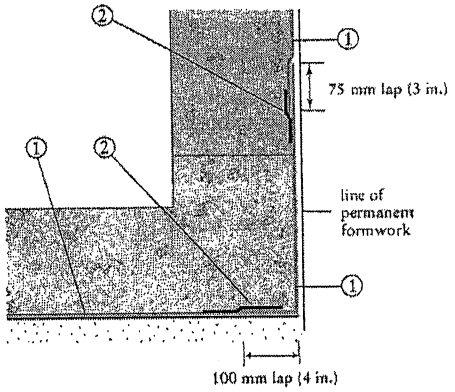
Alternative wall base detail for early shutter removal



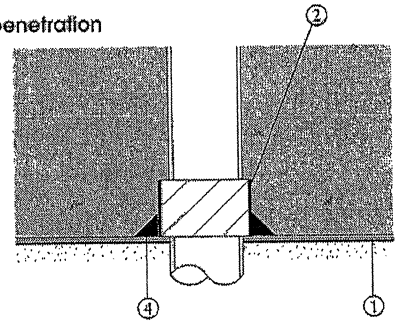
Wall base with toe detail showing drainage option



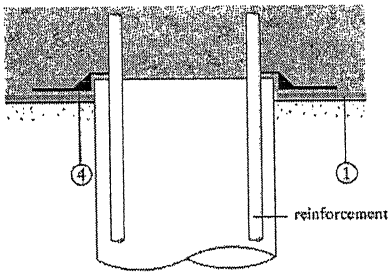
Wall base detail against permanent shutter



Pipe penetration



Pile detail



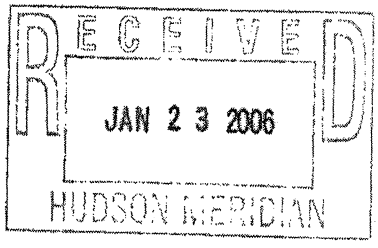
1 Preprufe
2 Preprufe Tape
3 Bituthene® 4000 or Procor®
4 Bituthene Liquid Membrane
5 Protection
6 Hydroduct®

Details shown are typical illustrations and not working details. For assistance with detailing and problem solving please contact Grace Technical Department at 866-333-3SBM (3726).

RESTOR TECHNOLOGIES INC.
16 Norden Lane
Huntington Station, NY 11746
Tel. (631) 385-8400 Fax (631) 385-8669

SUBMISSION FORM

JOB:	**425 E. 13th St.** **New York, NY**
CONTRACTOR:	Hudson Meridian Construction Group 40 Rector St., 18th Floor New York, NY 10006 Attn: William Cote/Dave Lin
SUBMITTED BY:	**Restor Technologies Inc.**
SPECIFICATION SECTION:	**Waterproofing**
DESCRIPTION OF MATERIAL:	**W.R. Grace Hydroduct 220 Drainage Panel**
DESCRIPTION OF USE:	**Louver frames and coping stone joints at 1st and 2nd floors**
RE-SUBMITTED:	**January 20, 2006**



Hydroduct® 220

Pre-fabricated geocomposite drain for use as a combined drainage and protection layer with Grace waterproofing membranes

Advantages

- Enhances waterproofing – eliminates hydrostatic pressure build-up
- Efficient water collector/deflector – can be used as a sandwich drainage layer between lagging and the reinforced concrete structure
- Smooth polymeric sheet – compatible with Preprufe®, Procor®, or Bituthene® membranes
- Simple convenient drainage and protection layer – serves as robust membrane protection and drainage
- Geotextile fabric filter – allows ground water to pass into the drain core while restricting the movement of soil particles
- High flow capacity – drains 186 L/min./m (15 gals/min./ft) width
- Rot proof – unaffected by permanent immersion in water, bacteria, dilute acids and alkalis
- Economical – eliminates imported aggregate drainage layers
- Studded core – allows water to flow to designated drainage collection points

Description

Hydroduct® 220 is a strong, preformed 10 mm (0.375 in.) thick geocomposite drainage sheet system, comprising a hollow studded polystyrene core, covered on one side with a non-woven, needle punched polypropylene filter fabric and on the other side with a smooth polymeric sheet.

Use

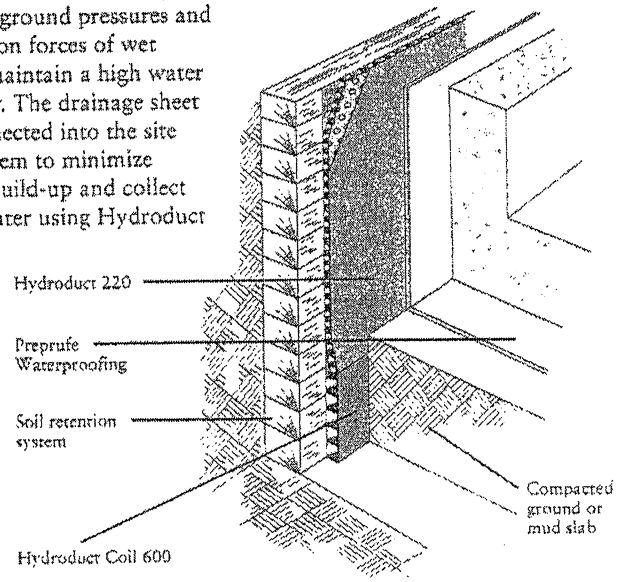
Hydroduct 220 has been specially developed to provide a simple and highly practical collector and deflector of unwanted ground water on foundation walls, retaining walls, tunnels and planters. It can be used with Preprufe, Procor, or Bituthene waterproof membranes. When installed it protects the membrane from damage and minimizes the build-up of percolated surface water against the structure. The construction of the studded sheet also creates an air void to isolate the structure from the effects of the surrounding ground.

Hydroduct 220 has been designed to withstand ground pressures and the compaction forces of wet concrete to maintain a high water flow capacity. The drainage sheet must be connected into the site drainage system to minimize hydrostatic build-up and collect infiltrated water using Hydroduct Coil 600 or traditional perforated pipes wrapped and linked with the geotextile filter fabric to prevent clogging.

Application Procedures

Safety, Storage and Handling Information

All construction products must be handled properly. Grace Protection Board Adhesive is extremely flammable. Material Safety Data Sheets (MSDS) are available at www.graceconstruction.com and users should acquaint themselves with this information. Carefully read detailed precaution statements on product labels and the MSDS before use.



RESTOR TECHNOLOGIES INC.
16 NORDEN LANE
HUNTINGTON STATION NY 11746
TEL 631 385-8400
FAX 631 385-8689

GRACE
Construction Products

Hydroduct 220

Roll Size	1.2 m x 15.2 m (4 ft x 50 ft) 18.6 m^2 (200 ft^2)
Packaging	6 rolls/pallet
Weight	19 kg (42 lbs)/roll

Complementary Materials

Hydroduct Tape	25 mm x 61.0 m (1 in. x 200 ft) rolls [2 x 15.2 m (50 ft) strips per roll of Hydroduct]
Hydroduct Coil 600	15.2 m (50 ft) roll

Physical Properties

Property	Typical Value	Test Method
Drainage Core		
Polymer	High Impact Polystyrene	
Thickness	9.5 mm (0.375 in.) nominal	ASTM C366 Method B
Compressive Strength	718 kPa (15,000 lbs/ft^2)	ASTM D1621
Flow Rate (gradient 1.0, load 172 kPa)	186 L/min./m (15 gal/min./ft)	ASTM D4716
Geotextile		
Type	Nonwoven	
Polymer	Polypropylene	
Weight	136 g/m^2 (4.0 oz/yd^2)	ASTM D3776
Tensile Strength	445 N (100 lbs)	ASTM D4632
Trapezoidal Tear	222 N (50 lbs)	ASTM D4533
Apparent Opening Size	0.150-0.212 mm (70-100 U.S. sieve)	ASTM D4751
Permittivity	6095 L/min./m^2 (150 gal/min./ft^2)	ASTM D4491
Mullen Burst	1480 kPa (215 lbs/$in.^2$)	ASTM D3786
Puncture Strength	30 kg (65 lbs)	ASTM D4833

Installation

Position Hydroduct so that the geotextile fabric filter is facing toward the groundwater, soil or overburden. In vertical applications, Hydroduct 220 Drainage Composites can be applied to the substrate vertically or horizontally but, in either case, should extend from the perimeter discharge pipe to a point approximately 150 mm (6 in.) below the anticipated grade line.

When adhering Hydroduct 220 directly to Bituthene waterproofing membranes, Hydroduct Tape should be used. When using Hydroduct Tape, press firmly to ensure good adhesion. Substrate and job site conditions will determine the attachment pattern. Abut adjacent rolls with excess fabric overlapping in shingle fashion.

For inside and outside corners, abut adjoining drainage composite at the corner. Cover open core with extra geotextile filter fabric.

The exposed core along the top terminations should be covered with a strip of geotextile to prevent intrusion of soil into core. At the bottom termination extend the Hydroduct 220 Drainage Composite out from the structure so that it passes behind and under the perimeter discharge pipe. Additional geotextile should be wrapped over the pipe to prevent soil intrusion.

To secure Hydroduct 220 around protrusions, apply Hydroduct Tape around the protrusion in a picture frame configuration. Cut Hydroduct 220 to fit snugly around the protrusion. Press the cut edge firmly into Hydroduct Tape.

In horizontal applications, adhere Hydroduct 220 with Hydroduct Tape. Substrate and job site conditions will determine attachment pattern. Additional consideration should be given in high wind exposures. Abut all edges tightly with the excess geotextile placed over the adjacent roll in shingle fashion.

Hydroduct 220 should be covered promptly. Do not leave Hydroduct 220 exposed to sunlight for more than two weeks. Motor vehicles, construction equipment or other trades should not be allowed directly on the Hydroduct 220.

For Technical Assistance call toll free at 866-333-3SBM (3726).

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Huntington Station, NY 11746
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SUBMISSION FORM

JOB:	**425 E. 13th St.** **New York, NY**
CONTRACTOR:	Hudson Meridian Construction Group 40 Rector St., 18th Floor New York, NY 10006 Attn: William Cote/Dave Lin
SUBMITTED BY:	**Restor Technologies Inc.**
SPECIFICATION SECTION:	**Waterproofing**
DESCRIPTION OF MATERIAL:	**W.R. Grace Preprufe 160 R HDPE**
DESCRIPTION OF USE:	**Waterproofing to be installed at vertical blindsided wall.**
RE-SUBMITTED:	**January 20, 2006**

web www.graceconstruction.com
■PRODUCT DATA ■UPDATES ■TECH LETTERS ■DETAILS ■MSDS ■CONTACT ■FAQS

Preprufe® 300R & 160R

Pre-applied waterproofing membranes that bond integrally to poured concrete for use below slabs or behind basement walls on confined sites.

Advantages

- Forms a unique integral seal to concrete poured against it – prevents water migration and makes it unaffected by ground settlement beneath slabs
- Fully-adhered watertight laps and detailing
- Provides a barrier to water, moisture and gas – physically isolates the structure from the surrounding ground
- BBA Certified for basement Grades 2, 3, & 4 to BS 8102:1990
- Zero permeance to moisture
- Solar reflective – reduced temperature gain
- Simple and quick to install – requiring no priming or fillets
- Can be applied to permanent formwork – allows maximum use of confined sites
- Self protecting – can be trafficked immediately after application and ready for immediate placing of reinforcement
- Unaffected by wet conditions – cannot activate prematurely
- Inherently waterproof, non-reactive system:
  - not reliant on confining pressures or hydration
  - unaffected by freeze/thaw, wet/dry cycling
- Chemical resistant – effective in all types of soils and waters, protects structure from salt or sulphate attack

Description

Preprufe® 300R & 160R membranes are unique composite sheets comprising a thick HDPE film, an aggressive pressure sensitive adhesive and a weather resistant protective coating.

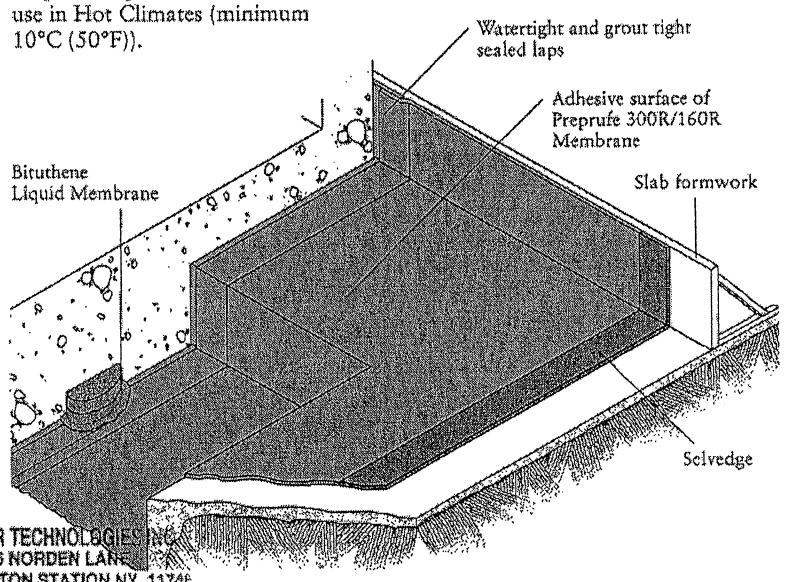
Unlike conventional non-adhering membranes, which are vulnerable to water ingress tracking between the unbonded membrane and structure, the unique Preprufe seal to concrete prevents any ingress or migration of water around the structure.

The Preprufe R System includes:

- Preprufe 300R – heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- Preprufe 160R – thinner grade for lighter applications and blindside, zero property line applications against soil retention systems.
- Preprufe Tape LT – for covering cut edges, roll ends, penetrations and detailing (temperatures between -4°C (25°F) and +30°C (86°F)).
- Preprufe Tape HC – as above for use in Hot Climates (minimum 10°C (50°F)).
- Bituthene® Liquid Membrane – for sealing around penetrations, etc.

Preprufe 300R & 160R membranes are applied either horizontally to smooth prepared concrete or well rolled and compacted sand or crushed stone blinding; or vertically to permanent formwork or adjoining structures. Concrete is then cast directly against the adhesive side of the membranes. The specially developed Preprufe adhesive layers work together to form a continuous and integral seal to the structure.

Preprufe can be returned up the inside face of slab formwork but is not recommended for conventional twin-sided formwork on walls, etc. Use Bituthene self-adhesive membrane or Procor® fluid applied membrane to walls after removal of formwork for a fully bonded system to all structural surfaces.



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HUNTINGTON STATION NY 11746
TEL 631 385-8400
FAX 631 385-8669

BBA BRITISH BOARD OF AGREMENT CERTIFICATE No. 97/3666

GRACE Construction Products

Installation

Preprufe 300R & 160R membranes are supplied in rolls 1.2 m (4 ft) wide, with a selvedge on one side to provide self-adhered laps for continuity between rolls. The rolls of Preprufe Membrane and Preprufe Tape are interwound with a disposable plastic release liner which must be removed before placing reinforcement and concrete.

Substrate Preparation

All surfaces – It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 12 mm (0.5 in.). Grout around all penetrations such as utility conduits, etc. for stability.

Horizontal – The substrate must be free of loose aggregate and sharp protrusions. An angular profiled blinding is recommended rather than a sloping or rounded substrate. The surface does not need to be dry, but standing water must be removed.

Vertical – Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 12 mm (0.5 in.) out of alignment.

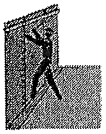
Membrane Installation

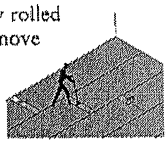
Preprufe can be applied at temperatures of -4°C (25°F) or above. During cold or damp conditions, the selvedge and tape adhesive can be gently warmed using a hot air gun or similar to remove moisture or condensation and improve initial adhesion.

Horizontal substrates – Place the membrane HDPE film side to the substrate with printed coated side up facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave plastic release liner in position until overlap procedure is completed.

Accurately position succeeding sheets to overlap the previous sheet 75 mm (3 in.) along the marked selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

Vertical substrates – Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the printed coated side facing towards the concrete pour. The membrane may be installed in any convenient length. Secure the top of the membrane using a batten such as a termination bar or similar 50 mm (2 in.) below the top edge. Fastening can be made through the selvedge so that the membrane lays flat and allows firmly rolled overlaps. Immediately remove the plastic release liner. Any additional fasteners must be covered with a patch of Preprufe Tape.





Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Roll firmly to ensure a watertight seal.

Roll ends and cut edges – Overlap all roll ends and cut edges by a minimum 75 mm (3 in.) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap and roll firmly. Immediately remove printed plastic release liner from the tape.

Penetrations

Use the following steps to seal around penetrations such as service pipes, piles, lightning conductors, etc.

Grout around the penetration if the penetration is not stable. Scribe membrane tight to the penetration. If the membrane is not within 12 mm (0.5 in.) of the penetration, apply Preprufe Tape to cover the gap.

Wrap the penetration with Preprufe Tape by positioning the tape 12 mm (0.5 in.) above the membrane.

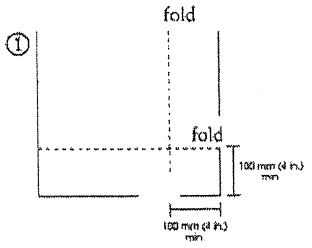
Mix and apply Bituthene Liquid Membrane around the penetrations using a fillet to provide a watertight seal between the Preprufe Membrane and Preprufe Tape.

Membrane Repair

Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by jet washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Apply Preprufe Tape centered over the damaged area and roll firmly. Any areas of damaged adhesive should be covered with Preprufe Tape. Remove printed plastic release liner from tape. Where exposed selvedge has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

Corners

Internal and external corners should be formed as shown in the diagrams returning the membrane a minimum of 100 mm (4 in.) and sealing with Preprufe Tape. Ensure that the apex of the corner is covered and sealed with tape and roll firmly. Crease and fold the membrane to ensure a close fit to the substrate profile and avoid hollows.



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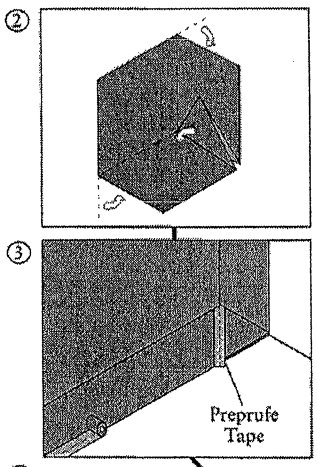

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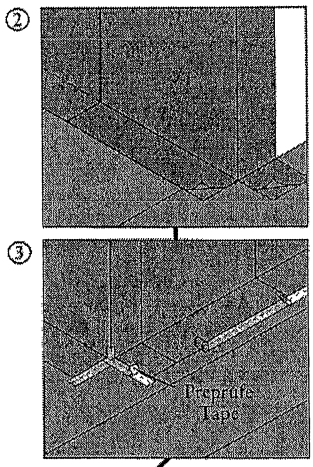

W A R R A N T Y

Preprufe® Waterproofing Membrane

Five Year Material Warranty

WARRANTY NO. 7444
NAME OF BUILDING 425 EAST 13TH ST
LOCATION OF BUILDING 425 EAST 13TH ST, NYC, NY 10009, United States
NAME OF OWNER MAGNUM MANAGEMENT
CONTRACTOR RESTOR TECHNOLOGIES
PRODUCT Preprufe 160R, Preprufe 300R
TOTAL AREA (SF) 22200
DATE OF COMPLETED INSTALLATION 5/11/2006

W.R. Grace & Co.-Conn. (GRACE) hereby warrants that for a period of five (5) years from the date of completion of installation identified above:

1. Water will not leak directly through any individual Preprufe sheet as a result of deterioration of the sheet caused by ordinary wear and tear and the effects thereof.
2. The Preprufe sheet will bridge ruptures caused by cracking of the immediate substrate up to 1/16th of an inch wide.

If at any time during such five (5) year period the Preprufe sheet is found by GRACE not to comply with this warranty, then GRACE will supply to the owner replacement Preprufe sheet in a quantity equal to the material found to be nonconforming, with a value not to exceed the purchase price for the material paid to GRACE for the original installation.

This warranty does not apply to any failure caused by or due to workmanship or improper installation of the Preprufe sheet, abuse of the Preprufe sheet, or chemical incompatibility with other materials, acts of God, inadequate or faulty design of the subject structure or to repairs or installations made by other persons. In addition, this warranty does not cover any costs or expenses associated with 1) the removal, excavation or replacement of any material in connection with the testing, repair, removal or replacement of the Preprufe sheet and, 2) damages or repairs of any kind or nature to the subject building or its' contents from leaking water or otherwise.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ANY AND ALL OTHER GUARANTEES OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE REMEDIES OF THE OWNER FOR ANY BREACH OF THIS WARRANTY SHALL BE LIMITED TO THOSE HEREIN PROVIDED TO THE EXCLUSION OF ANY AND ALL OTHER REMEDIES. GRACE SHALL NOT BE LIABLE IN ANY CASE FOR ANY DAMAGE TO THE BUILDING OR THE CONTENTS THEREOF, NOR WILL IT BE RESPONSIBLE FOR SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR PENAL DAMAGES. NO AGREEMENT VARYING OR EXTENDING THE FOREGOING WARRANTY REMEDIES WILL BE BINDING UPON GRACE UNLESS IN WRITING, SIGNED BY A DULY AUTHORIZED OFFICER OF GRACE.

W.R. GRACE & CO.-Conn.
Grace Construction Products

By
Title Warranty Administrator Date 5/11/06

W. R. Grace & Co.-Conn. 62 Whittemore Avenue Cambridge, MA 02140 www.graceconstruction.com

W A R R A N T Y

Bituthene® Waterproofing Membrane with Hydroduct® Drainage Composite

Five Year System Material Warranty

WARRANTY NO. 7443
NAME OF BUILDING 425 EAST 13TH ST
LOCATION OF BUILDING 425 EAST 13TH ST, NYC, NY 10009, United States
NAME OF OWNER MAGNUM MANAGEMENT
CONTRACTOR RESTOR TECHNOLOGIES
BITUTHENE MEMBRANE TYPE Bituthene 4000
HYDRODUCT DRAINAGE COMPOSITE TYPE Hydroduct 220
TOTAL AREA (SF) 3200
DATE OF COMPLETED INSTALLATION 5/16/2006

W.R. Grace & Co.-Conn. (GRACE) hereby warrants that for a period of five (5) years from the date of completion of installation identified above:

1. Water will not leak directly through any individual Bituthene sheet as a result of deterioration of the sheet caused by ordinary wear and tear and the effects thereof.
2. The Bituthene sheet will bridge ruptures caused by cracking of the immediate substrate up to 1/16th of an inch wide.
3. The Hydroduct drainage composite core will maintain a compressive strength of 10,000 pounds per square foot.
4. The Hydroduct drainage composite will protect the Bituthene sheet from rupture from backfill containing no aggregate larger than 1 inch in diameter.

If at any time during such five (5) year period the Bituthene sheet or Hydroduct drainage composite is found by GRACE not to comply with this warranty, then GRACE will supply to the owner replacement Bituthene sheet or Hydroduct drainage composite in a quantity equal to the material found to be nonconforming, with a value not to exceed the purchase price for the material paid to GRACE for the original installation.

This warranty does not apply to any failure caused by or due to workmanship or improper installation of the Bituthene sheet or Hydroduct drainage composite, abuse of the Bituthene sheet or Hydroduct drainage composite, or chemical incompatibility with other materials, acts of God, inadequate or faulty design of the subject structure or to repairs or installations made by other persons. In addition, this warranty does not cover any costs or expenses associated with 1) the removal, excavation or replacement of any material in connection with the testing, repair, removal or replacement of the Bituthene sheet or Hydroduct drainage composite and, 2) damages or repairs of any kind or nature to the subject building or its' contents from leaking water or otherwise.

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W.R. GRACE & CO.-Conn.
Grace Construction Products

By [signature]
Title Warranty Administrator Date 5/11/06

W. R. Grace & Co.-Conn. 62 Whittemore Avenue Cambridge, MA 02140 www.graceconstruction.com

web www.graceconstruction.com
■PRODUCT DATA ■UPDATES ■TECH LETTERS ■DETAILS ■MSDS ■CONTACT ■FAQS

Preprufe® 300R & 160R

Pre-applied waterproofing membranes that bond integrally to poured concrete for use below slabs or behind basement walls on confined sites.

Advantages

- Forms a unique integral seal to concrete poured against it – prevents water migration and makes it unaffected by ground settlement beneath slabs
- Fully-adhered watertight laps and detailing
- Provides a barrier to water, moisture and gas – physically isolates the structure from the surrounding ground
- BBA Certified for basement Grades 2, 3, & 4 to BS 8102:1990
- Zero permeance to moisture
- Solar reflective – reduced temperature gain
- Simple and quick to install – requiring no priming or fillets
- Can be applied to permanent formwork – allows maximum use of confined sites
- Self protecting – can be trafficked immediately after application and ready for immediate placing of reinforcement
- Unaffected by wet conditions – cannot activate prematurely
- Inherently waterproof, non-reactive system:
  - not reliant on confining pressures or hydration
  - unaffected by freeze/thaw, wet/dry cycling
- Chemical resistant – effective in all types of soils and waters, protects structure from salt or sulphate attack

Description

Preprufe® 300R & 160R membranes are unique composite sheets comprising a thick HDPE film, an aggressive pressure sensitive adhesive and a weather resistant protective coating.

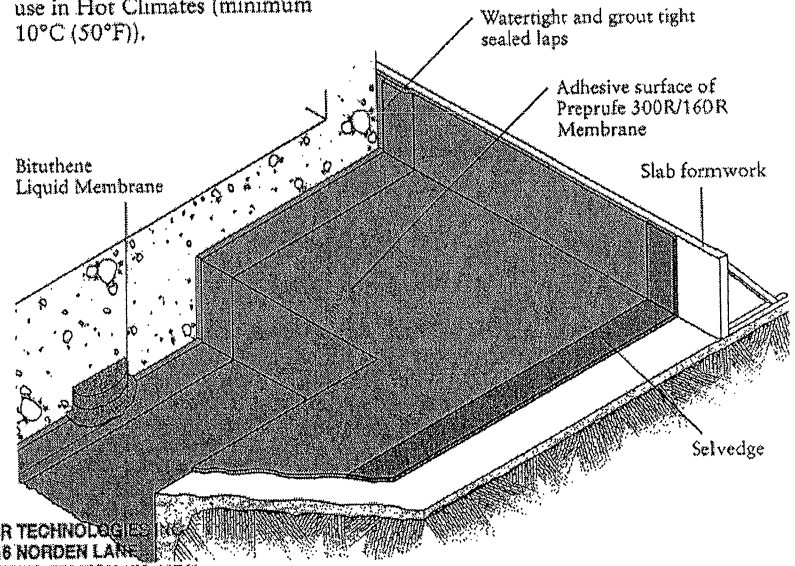
Unlike conventional non-adhering membranes, which are vulnerable to water ingress tracking between the unbonded membrane and structure, the unique Preprufe seal to concrete prevents any ingress or migration of water around the structure.

The Preprufe R System includes:

- Preprufe 300R – heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- Preprufe 160R – thinner grade for lighter applications and blindside, zero property line applications against soil retention systems.
- Preprufe Tape LT – for covering cut edges, roll ends, penetrations and detailing (temperatures between -4°C (25°F) and +30°C (86°F)).
- Preprufe Tape HC – as above for use in Hot Climates (minimum 10°C (50°F)).
- Bituthene® Liquid Membrane – for sealing around penetrations, etc.

Preprufe 300R & 160R membranes are applied either horizontally to smooth prepared concrete or well rolled and compacted sand or crushed stone blinding; or vertically to permanent formwork or adjoining structures. Concrete is then cast directly against the adhesive side of the membranes. The specially developed Preprufe adhesive layers work together to form a continuous and integral seal to the structure.

Preprufe can be returned up the inside face of slab formwork but is not recommended for conventional twin-sided formwork on walls, etc. Use Bituthene self-adhesive membrane or Procor® fluid applied membrane to walls after removal of formwork for a fully bonded system to all structural surfaces.



RESTOR TECHNOLOGIES INC
16 NORDEN LANE
HUNTINGTON STATION NY 11746
TEL 631 385-8400
FAX 631 385-8669

BBA BRITISH BOARD OF AGREMENT CERTIFICATE No. 97/3045

GRACE Construction Products

Installation

Preprufe 300R & 160R membranes are supplied in rolls 1.2 m (4 ft) wide, with a selvedge on one side to provide self-adhered laps for continuity between rolls. The rolls of Preprufe Membrane and Preprufe Tape are interwound with a disposable plastic release liner which must be removed before placing reinforcement and concrete.

Substrate Preparation

All surfaces – It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 12 mm (0.5 in.). Grout around all penetrations such as utility conduits, etc. for stability.

Horizontal – The substrate must be free of loose aggregate and sharp protrusions. An angular profiled blinding is recommended rather than a sloping or rounded substrate. The surface does not need to be dry, but standing water must be removed.

Vertical – Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 12 mm (0.5 in.) out of alignment.

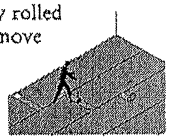
Membrane Installation

Preprufe can be applied at temperatures of -4°C (25°F) or above. During cold or damp conditions, the selvedge and tape adhesive can be gently warmed using a hot air gun or similar to remove moisture or condensation and improve initial adhesion.

Horizontal substrates – Place the membrane HDPE film side to the substrate with printed coated side up facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave plastic release liner in position until overlap procedure is completed.

Accurately position succeeding sheets to overlap the previous sheet 75 mm (3 in.) along the marked selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

Vertical substrates – Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the printed coated side facing towards the concrete pour. The membrane may be installed in any convenient length. Secure the top of the membrane using a batten such as a termination bar or similar 50 mm (2 in.) below the top edge. Fastening can be made through the selvedge so that the membrane lays flat and allows firmly rolled overlaps. Immediately remove the plastic release liner. Any additional fasteners must be covered with a patch of Preprufe Tape.



Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Roll firmly to ensure a watertight seal.

Roll ends and cut edges – Overlap all roll ends and cut edges by a minimum 75 mm (3 in.) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap and roll firmly. Immediately remove printed plastic release liner from the tape.

Penetrations

Use the following steps to seal around penetrations such as service pipes, piles, lightning conductors, etc.

Grout around the penetration if the penetration is not stable. Scribe membrane tight to the penetration. If the membrane is not within 12 mm (0.5 in.) of the penetration, apply Preprufe Tape to cover the gap.

Wrap the penetration with Preprufe Tape by positioning the tape 12 mm (0.5 in.) above the membrane.

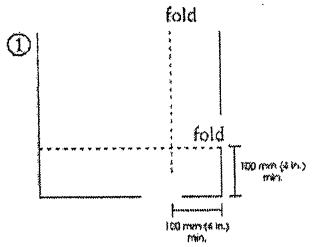
Mix and apply Bituthene Liquid Membrane around the penetrations using a fillet to provide a watertight seal between the Preprufe Membrane and Preprufe Tape.

Membrane Repair

Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by jet washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Apply Preprufe Tape centered over the damaged area and roll firmly. Any areas of damaged adhesive should be covered with Preprufe Tape. Remove printed plastic release liner from tape. Where exposed selvedge has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

Corners

Internal and external corners should be formed as shown in the diagrams returning the membrane a minimum of 100 mm (4 in.) and sealing with Preprufe Tape. Ensure that the apex of the corner is covered and sealed with tape and roll firmly. Crease and fold the membrane to ensure a close fit to the substrate profile and avoid hollows.



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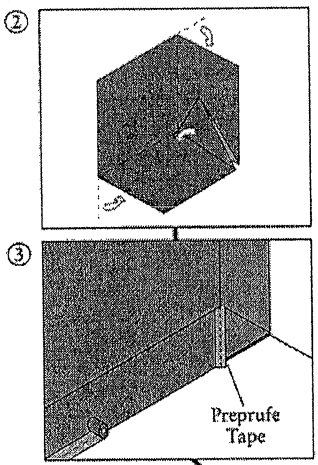

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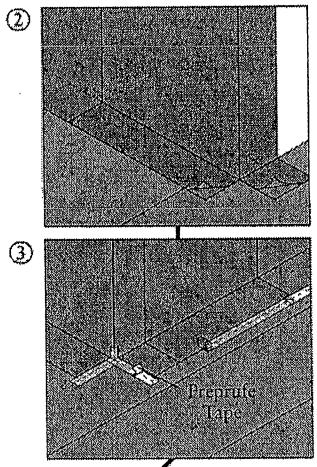

W A R R A N T Y

Preprufe® Waterproofing Membrane

Five Year Material Warranty

WARRANTY NO. 7444
NAME OF BUILDING 425 EAST 13TH ST
LOCATION OF BUILDING 425 EAST 13TH ST, NYC, NY 10009, United States
NAME OF OWNER MAGNUM MANAGEMENT
CONTRACTOR RESTOR TECHNOLOGIES
PRODUCT Preprufe 160R, Preprufe 300R
TOTAL AREA (SF) 22200
DATE OF COMPLETED INSTALLATION 5/11/2006

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W.R. GRACE & CO.-Conn.
Grace Construction Products

By
Title Warranty Administrator Date 5/11/06

W A R R A N T Y

Bituthene® Waterproofing Membrane with Hydroduct® Drainage Composite

Five Year System Material Warranty

WARRANTY NO. 7443
NAME OF BUILDING 425 EAST 13TH ST
LOCATION OF BUILDING 425 EAST 13TH ST, NYC, NY 10009, United States
NAME OF OWNER MAGNUM MANAGEMENT
CONTRACTOR RESTOR TECHNOLOGIES
BITUTHENE MEMBRANE TYPE Bituthene 4000
HYDRODUCT DRAINAGE COMPOSITE TYPE Hydroduct 220
TOTAL AREA (SF) 3200
DATE OF COMPLETED INSTALLATION 5/16/2006

W.R. Grace & Co.-Conn. (GRACE) hereby warrants that for a period of five (5) years from the date of completion of installation identified above:

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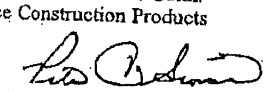
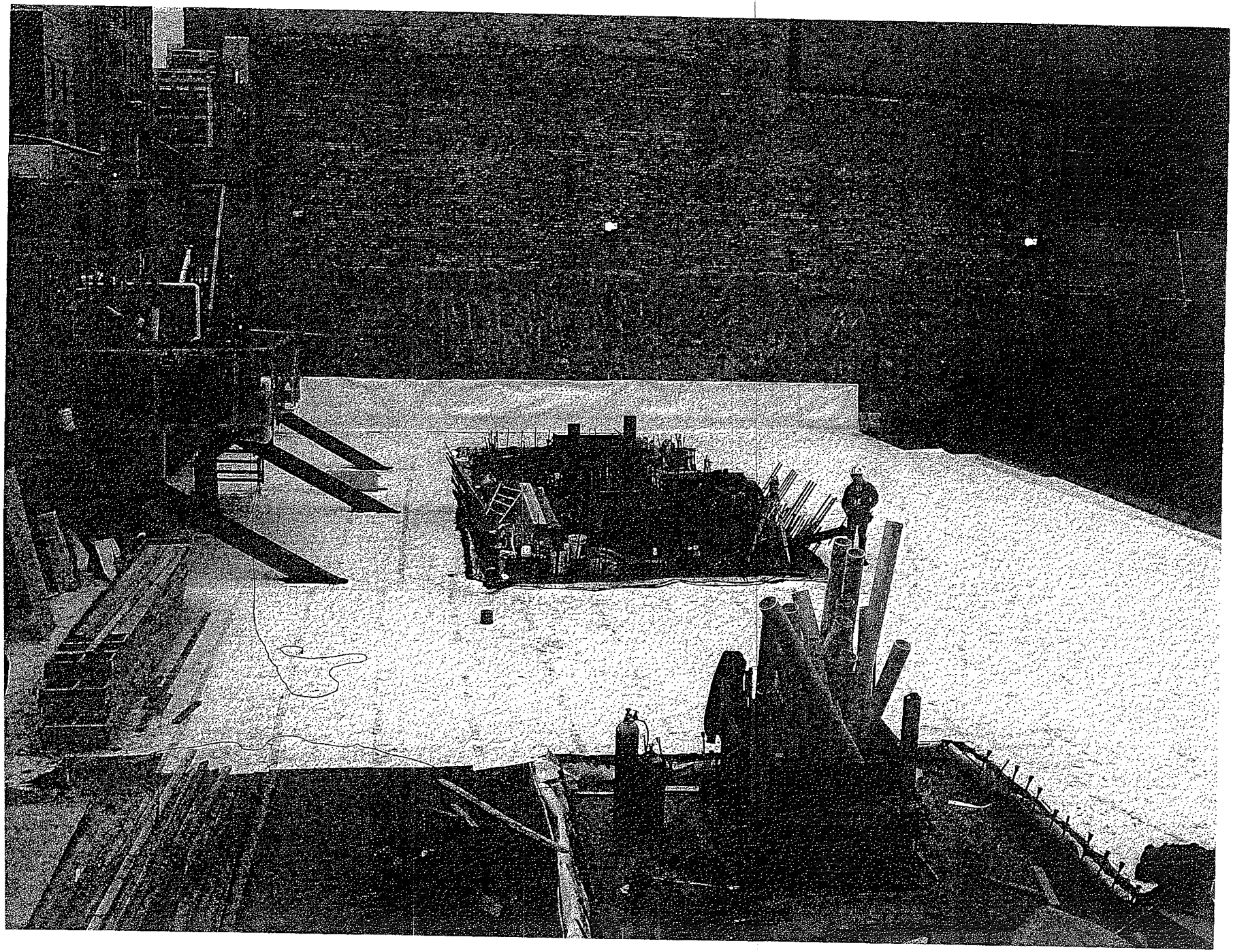
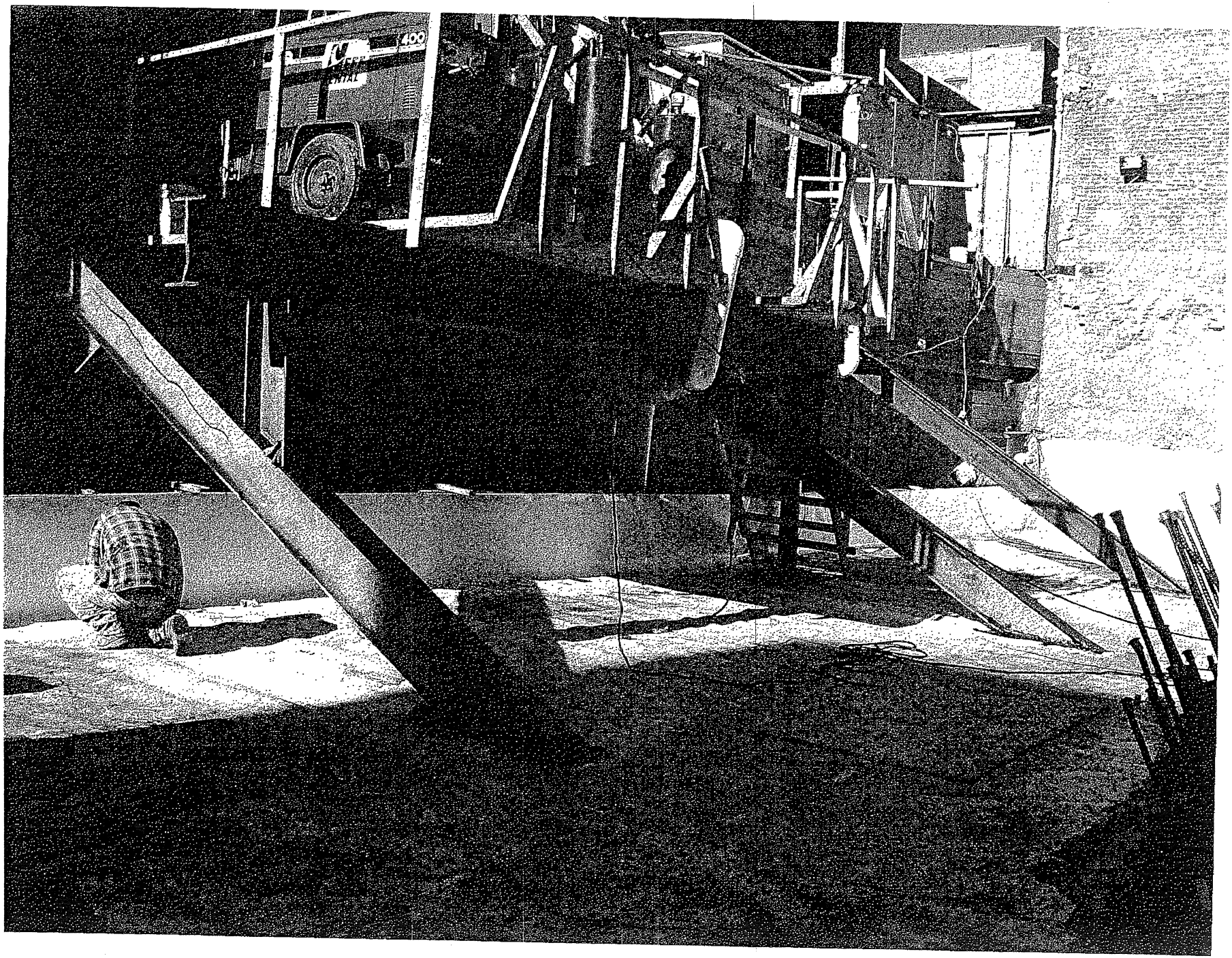
W.R. GRACE & CO.-Conn.
Grace Construction Products

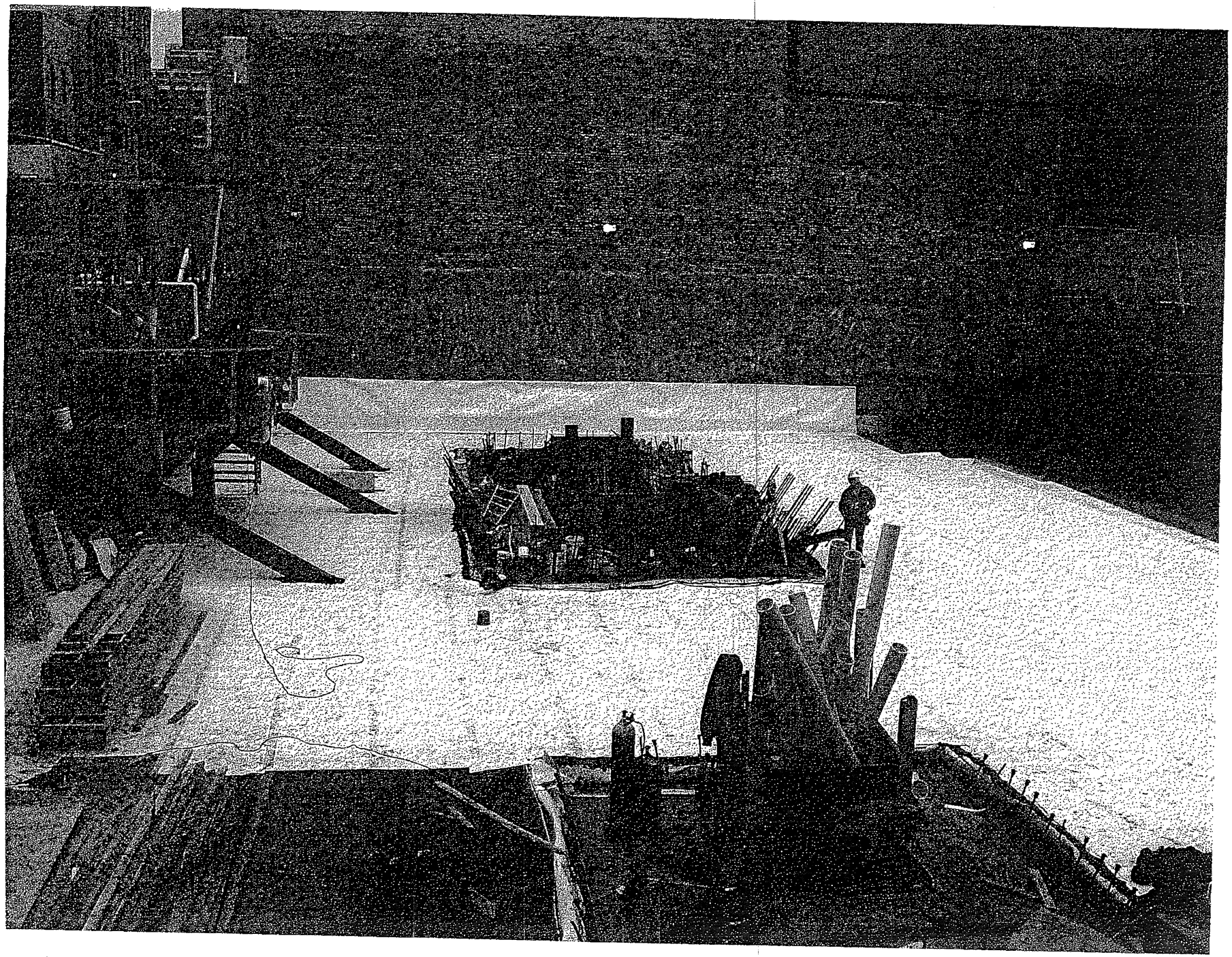
By 
Title Warranty Administrator Date 5/11/06

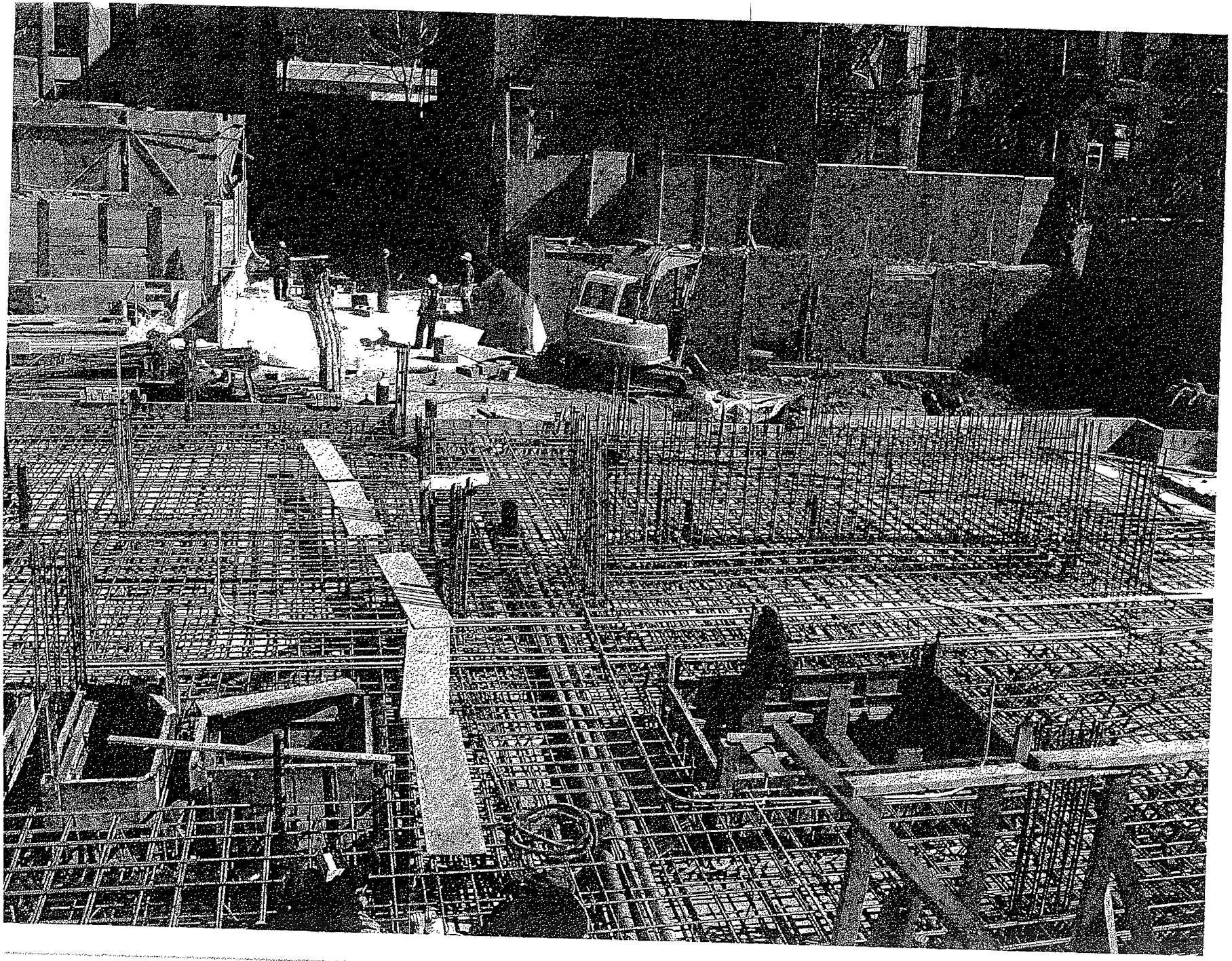
W. R. Grace & Co.-Conn. 62 Whittemore Avenue Cambridge, MA 02140 www.graceconstruction.com

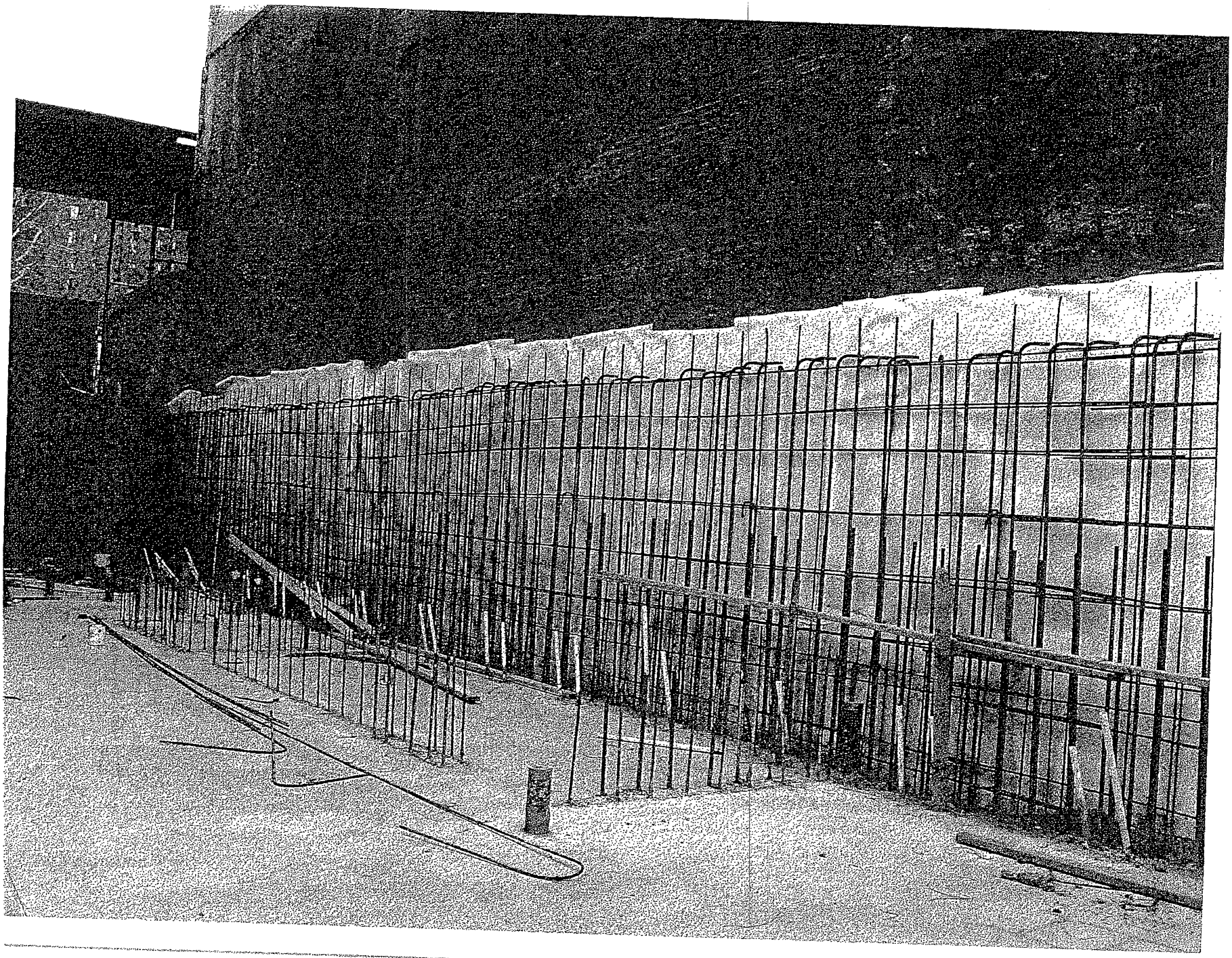
GRACE Construction Products

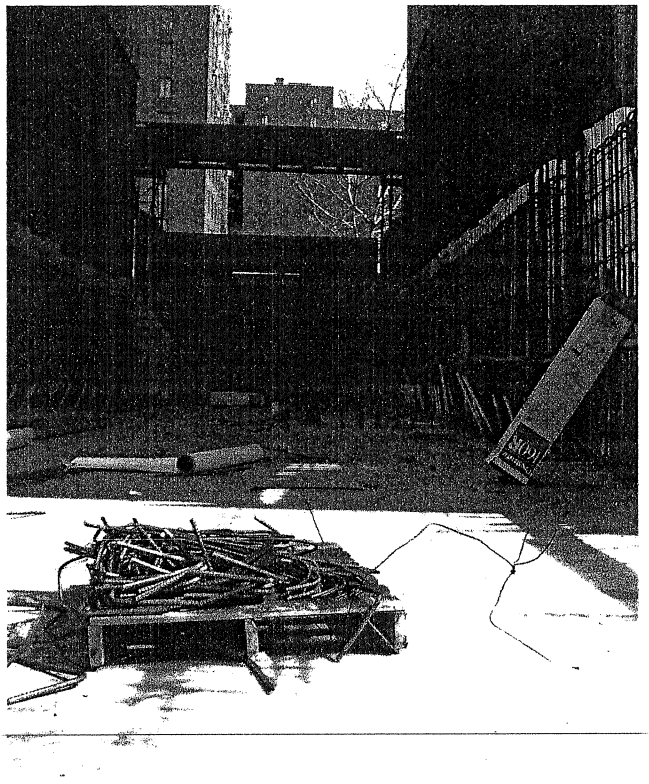




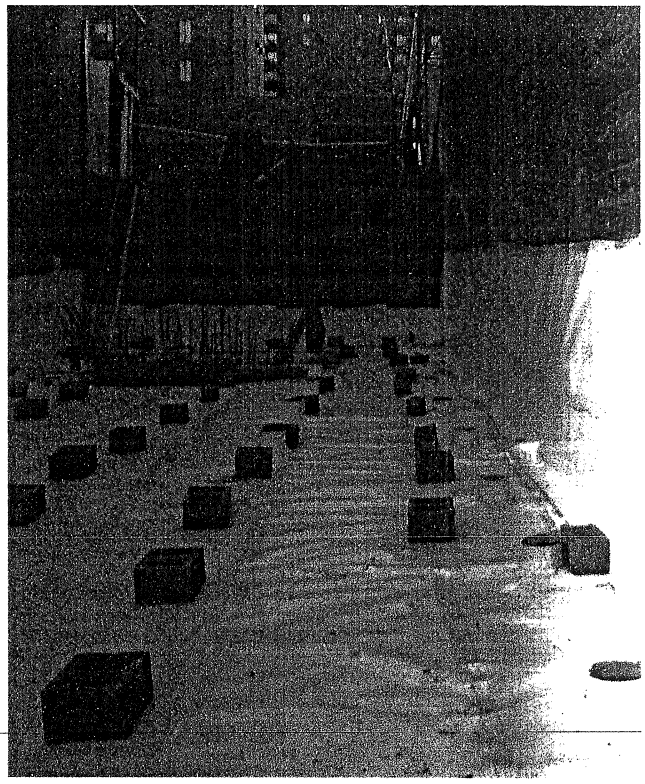




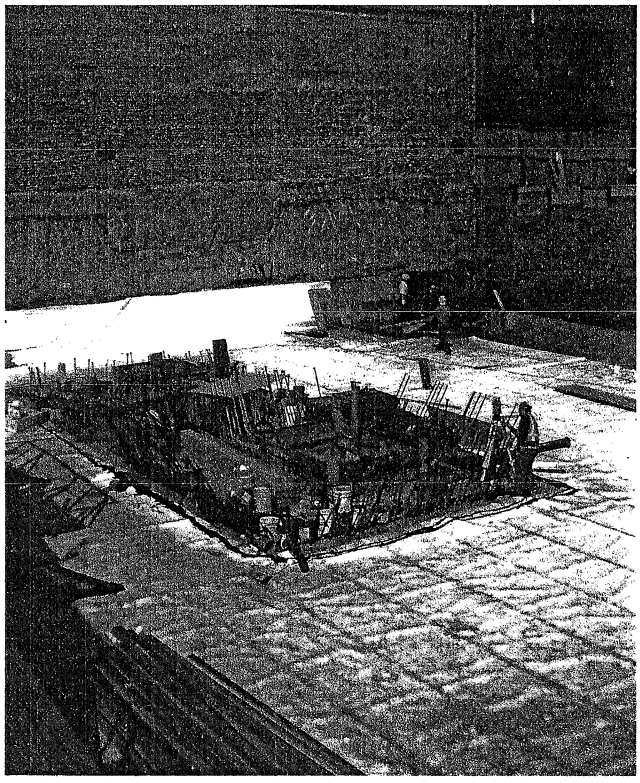




Waterproofing/vapor barrier covering 420 E. 14th Street.



Waterproofing/vapor barrier covering 420 E. 14th Street.



Waterproofing/vapor barrier around elevator shaft.

Waterproofing/vapor barrier covering 421 E. 14th Street.

Appendix B

Quality Assurance Project Plan

Quality Assurance Project Plan

1.1 Introduction - The following Quality Assurance Project Plan ("QAPP") has been prepared specifically for the Remedial Action Plan ("RAP") Plan at 421-433 East 13th Street and 420 East 14th Street located in New York, New York. This Plan was prepared and approved as stated below.

Prepared by: D. Shapiro Date: 7/3/07
Deborah Shapiro, Project Environmental Scientist

Approved by: Stephen Malinowski Date: 7/3/07
Stephen Malinowski, Project Manger

1.2 QAPP - Table of Contents

The following elements are included in this QAPP:

1.3 Project Description - The RAP subject to this QAPP have been prepared to address the following issues:

- Replace one destroyed soil vapor point and install an additional soil vapor point; and,
- Conduct post-remedial indoor air and soil vapor sampling.

The investigative methods that will be used are described in detail in the RAP.

1.4 Project Organization – Mr. Stephen Malinowski will serve as the Project Manager (PM) and will be responsible for the overall scheduling and performance of all the NYSDEC-approved RAP activities.

Mr. Jason Cooper will serve as the Quality Assurance Officer (QAO) for this project. His duties will include:

- Review of laboratory data packages
- Interface with laboratory
- Performance of Field Audits

Experienced CA RICH staff will perform and/or oversee completion of all field activities described in the RAP.

1.5 Quality Assurance Objectives and Data Measurement – There are two sources of data collection methodology that will provide data information during this RAP.

Field Screening - Organic vapor readings will be recorded from the soil vapor and indoor air. This data is intended to be used only as a screening tool. To meet these goals, clean sampling tools will be used and the PID will be calibrated at the beginning of each screening day on-site.

Chemical Analysis – All environmental samples will delivered to a New York State-Certified laboratory contracted to CA RICH for chemical analysis of volatile organic compounds (VOCs). This data is intended to confirm that the installation of the water/vapor barrier Site-wide is effectively eliminating vapor intrusion into the building. The laboratory will follow the NYSDEC – Analytical Services Protocol dated 1995. All samples will be analyzed for VOCs using USEPA Method TO-15 and NYSDEC ASP Category B deliverables. All samples will be delivered to the laboratory by CA RICH within 48 hours of collection.

Quality assurance objectives are generally defined in terms of five parameters:

- **Representativeness -** Representativeness is the degree to which sampling data accurately and precisely represents site conditions, and is dependent on sampling and analytical variability. The RAP has been designed to assess the presence of the constituents in the target media at the time of sampling. The Plan presents the rationale for sample quantities and location. The RAP also presents field sampling methodologies and laboratory analytical methodologies.

  The use of the prescribed field and laboratory analytical methods with associated holding times and preservation requirements are intended to provide representative data. Further discussion of QC checks is presented in Section 1.11.

- **Comparability** - Comparability is the degree of confidence with which one data set can be compared to another data set. Comparability between this RAP, and to the extent possible, with existing data will be maintained through consistent sampling and analytical methodology set forth in the QAPP; the RAP; the NYSDEC ASP analytical methods (1995) with NYSDEC ASP QA/QC requirements (1995); and through use of QA/QC procedures and appropriately trained personnel.

- **Completeness -** Completeness is defined as a measure of the amount of valid data obtained from an event and/or remedial action compared to the amount that was expected to be obtained under normal conditions. This will be determined upon assessment of the analytical results, as discussed in Section 1.12.

- **Precision -** Precision is the measure of reproducibility of sample results. The goal is to maintain a level of analytical precision consistent with the objectives of the Work Plan. To maximize precision, sampling and analytical procedures will be followed. All work for the remedial phase of this project will adhere to established protocols presented in the QAPP and RAP. Checks for analytical precision will include the analysis of field duplicates and intra-laboratory blanks. Checks for field measurement precision will include obtaining duplicate field measurements. Further discussion of precision QC checks is provided in Section 1.11.

- **Accuracy** - Accuracy is the deviation of a measurement from the true value of a known standard. Both field and analytical accuracy will be monitored through initial and continuing calibration of instruments. In addition, internal standards, blank spikes, and surrogates (system monitoring compounds) will be used to assess the accuracy of the laboratory analytical data. Further discussion of these QC samples is provided in Section 1.11.

1.6 Sampling Procedures - The sampling procedures that will be employed are discussed in detail in the RAP.

1.7 Sample and Document Custody Procedures

- **General** - The Chain-of-Custody program allows for the tracing of possession and handling of the sample from its time of collection through its chemical analysis in the laboratory. The chain-of-custody program at this site will include:

  - Sample labels
  - Chain-of-Custody records
  - Field records

- **Sample Labels** - To prevent misidentification of samples, a label will be affixed to the sample container and will contain the following information:

  - Site Name
  - Sample identification number
  - Date and time of collection
  - Name of Sampler
  - Preservation (if any)
  - Type of analysis to be conducted.

- **Chain-of-Custody Records** - To establish the documentation necessary to trace sample possession from the time of collection, a chain-of-custody record (sample attached) will be filled out and will accompany samples at all times. The record will contain the following information:

  - Project name:
  - Printed name and signature of samplers
  - Sample number
  - Date and time of collection
  - Sampling location
  - Number of containers for each sample
  - Signature of individuals involved in sample transfer (when relinquishing and accepting samples)
  - Inclusive dates and times of possession.

- **Field Records** - Field records will be maintained during each sampling effort in a logbook. All aspects of sample collection, handling and visual observations will be recorded. All sample collection equipment, field analytical equipment and equipment utilized to make physical measurements will be identified in the field logbook.

  All calculations, results and calibration data for field sampling, field analytical and field physical measurement equipment will also be recorded in the field logbook. Entries will be dated and initialed. Entries will be made in ink, and will be legible.

1.8 Calibration Procedures and Frequency - The contracted laboratory will follow the NYSDEC Category-B requirements for equipment calibration procedures and frequency.

The QA Officer will be responsible for ensuring that the Field PID is calibrated at the beginning of each day of field sampling using calibration gas supplied by the manufacturer. A log of the meter calibration will be kept in the filed logbook.

1.9 Analytical Procedures - All laboratory analysis will be for VOCs via EPA Method TO-15 will follow NYSDEC ASP (1995) protocols with Category B deliverables. One duplicate sample will be collected for QA/QC purposes. A qualified data validator will review the laboratory data and a Data Usability Summary Report (DUSR) will be prepared.

1.10 Data Reduction, Validation and Reporting

- **Field Data** - All field data recorded in logbooks or on log sheets will be evaluated in the Office and transferred to word processor text by field personnel or clerical staff. PID readings will be included on the logs. The QAO and/or PM will review this data for accuracy and completeness. Typed soil vapor point logs will be prepared for soil vapor points VMP-2a and VMP-4.

- **Laboratory Data** - The laboratory will transfer the instrument readings to laboratory report forms. Ms. Renee Cohen will perform independent data validation of all analytical data using NYSDEC DUSR protocols.

  The data validator will provide CA RICH with a Data Validation Summary Report. The QAO will review the summary report as well as other field data and prepare a Data Usability Report. Both the Data Validation Summary Report and the Data Usability Report will be provided to NYSDEC.

CA RICH will prepare summary tables of the validated analytical data using computer spreadsheet software. The data entries will be reviewed using the red check-green check method. All entries will be reviewed and entry errors will be marked in red ink. Once these entries are corrected, the printouts will be marked with green ink and placed in the project file.

1.11 Internal Quality Control Checks

Both field and laboratory quality control checks are proposed for this project. In the event that there are any deviations from these checks, the Project Manager and Quality Assurance Officer will be notified. The proposed field and laboratory control checks are discussed below.

Field Quality Control Checks

- **Field Measurements** - To verify the quality of data collected using field instrumentation, at least one duplicate measurement will be obtained per day and reported for all field analytical measurements.

- **Sample Containers** - Certified-clean sample containers will be supplied by the contracted laboratory.

- **Field Duplicates** – Field duplicates will be collected to check reproducibility of the sampling methods. Field duplicates will be prepared as discussed in the RAP. In general, field duplicates will be analyzed at a five percent frequency (every 20 samples).

1.12 Performance and Systems Audits

Performance and systems audits will be completed in the field and the laboratory during the remedial action phase of this project as described below.

- **Field Audits** – CA RICH's Project Manager and Quality Assurance Officer will monitor field performance and field meter calibrations to verify that measurements are taken according to established protocols. The Project Manager will review all field logs.

- **Laboratory Audits** – The contracted laboratory will perform internal audits consistent with NYSDEC ASP (1995).

1.13 Preventive Maintenance

Preventive maintenance schedules have been developed for both field and laboratory instruments. A summary of the maintenance activities to be performed is presented below.

- **Field Instruments and Equipment** - Prior to any field sampling, each piece of field equipment will be inspected to assure it is operational. If the equipment is not operational, it must be serviced prior to use. All meters which require charging or batteries will be fully charged or have fresh batteries. If instrument servicing is required, it is the responsibility of the field personnel to follow the maintenance schedule and arrange for prompt service.

- **Laboratory Instruments and Equipment** - The laboratory will document Laboratory instrument and equipment procedures. Documentation includes details of any observed problems, corrective measure(s), routine maintenance, and instrument repair (which will include information regarding the repair and the individual who performed the repair).

Preventive maintenance of laboratory equipment generally will follow the guidelines recommended by the manufacturer. A malfunctioning instrument will be repaired immediately by in-house staff or through a service call from the manufacturer.

1.14 Data Assessment Procedures

The analytical data generated during implementation of the RAP will be evaluated with respect to precision, accuracy, and completeness. The procedures utilized when assessing data precision, accuracy, and completeness are presented below.

- **Data Precision Assessment Procedures -** Field precision is difficult to measure because of temporal variations in field parameters. However, precision will be controlled through the use of experienced field personnel, properly calibrated meters, and duplicate field measurements. Field duplicates will be used to assess precision for the entire measurement system including sampling, handling, shipping, storage, preparation and analysis.

  Laboratory data precision for organic analyses will be monitored through the use of field duplicates and/or laboratory intra-blank.

  The precision of data will be measured by calculation of the standard deviation (SD) and the coefficient of variation (CV) of duplicate sample sets. The SD and CV are calculated for duplicate sample sets by:

  $$SD = (A-B)/1.414$$
  $$CV = SD/((A+B)/2) = 1.414(A-B)/(A+B)$$

  Where:

  A = Analytical result from one of two duplicate measurements
  B = Analytical result from the second measurement.

  Where appropriate, A and B may be either the raw measurement or an appropriate mathematical transformation of the raw measurement (e.g., the logarithm of the concentration of a substance).

  Alternately, the relative percent difference (RPD) can be calculated by the following equation:

  $$RPD = \frac{(A-B)}{(A+B)/2} \times 100$$

  $$RPD = 1.414\ (CV)(100)$$

- **Data Accuracy Assessment Procedures -** The accuracy of field measurements will be controlled by experienced field personnel, properly calibrated field meters, and adherence to established protocols. The accuracy of field meters will be assessed by review of calibration and maintenance logs.

  Laboratory accuracy will be assessed via the use of matrix spikes, surrogate spikes, and internal standards. Where available and appropriate, QA performance standards will be analyzed periodically to assess laboratory accuracy. Accuracy will be calculated as a percent recovery as follows:

  $$\text{Accuracy} = \frac{A-X}{B} \times 100$$

  Where:

  A = Value measured in spiked sample or standard
  X = Value measured in original sample
  B = True value of amount added to sample or true value of standard

  This formula is derived under the assumption of constant accuracy over the original and spiked measurements. If any accuracy calculated by this formula is outside of the acceptable levels, data will be evaluated to determine whether the deviation represents unacceptable accuracy, or variable, but acceptable accuracy. Accuracy objectives for matrix spike recoveries and surrogate recovery objectives are identified in the NYSDEC, ASP (1995).

- **Data Completeness Assessment Procedures -** Completeness of a field or laboratory data set will be calculated by comparing the number of samples collected or analyzed to the proposed number.

  $$\text{Completeness} = \frac{\text{No. Valid Samples Collected or Analyzed}}{\text{No. Proposed Samples Collected or Analyzed}} \times 100$$

  As general guidelines, overall project completeness is expected to be at least 90 percent. The assessment of completeness will require professional judgment to determine data usability for intended purposes.

1.15 Corrective Action

Corrective actions are required when field or analytical data are not within the objectives specified in this QAPP or RAP. Corrective actions include procedures to promptly investigate, document, evaluate, and correct data collection and/or analytical procedures. Field and laboratory corrective action procedures for this project are described below.

- **Field Procedures** - When conducting fieldwork, if a condition is noted that would have an adverse effect on data quality, corrective action will be taken so as not to repeat this condition. Condition identification, cause and corrective action implemented will be documented as a memo to the project file and reported to the Project Manager.

  Examples of situations, which would require corrective actions, are provided below:

  - Protocols as defined by the QAPP or the RAP have not been followed;
  - Equipment is not in proper working order or properly calibrated;
  - QC requirements have not been met; and
  - Issues resulting from performance or systems audits.

  Project field personnel will continuously monitor ongoing work performance in the normal course of daily responsibilities.

- **Laboratory Procedures -** In the laboratory, when a condition is noted to have an adverse effect on data quality, corrective action will be taken so as not to repeat this condition. Condition identification, cause and corrective action to be taken will be documented, and reported to the Quality Assurance Officer.

  Corrective action may be initiated, at a minimum, under the following conditions:

  - Specific laboratory analytical protocols have not been followed;
  - Predetermined data acceptance standards are not obtained;
  - Equipment is not in proper working order or calibrated;
  - Sample and test results are not completely traceable;
  - QC requirements have not been met; and
  - Issues resulting from performance or systems audits.

  Laboratory personnel will continuously monitor ongoing work performance in the normal course of daily responsibilities.

1.16 Quality Assurance Reports and Management

- **Internal Reporting -** The analytical laboratory will submit analytical reports using NYSDEC ASP (1995), Category B requirements. The analytical reports will be submitted to the data validator for review. Supporting data (i.e., historic data, related field or laboratory data) will also be reviewed to evaluate data quality, as appropriate. The Quality Assurance Officer will incorporate results of data validation reports (if any) and assessments of data usability into a summary report. This report will be filed in the project file and will include the following:

  - Assessment of data accuracy, precision, and completeness for field & laboratory data;
  - Results of the performance and systems audits;
  - Significant QA/AC problems, solutions, corrections, and potential consequences;
  - Analytical data validation report; and
  - Data usability report.

- **Reporting** - The Final Engineering Report will contain a separate QA/QC section summarizing the quality of data collected and/or used as appropriate to the project DQOs. The Quality Assurance Officer will prepare the QA/QC summaries using reports and memoranda documenting the data assessment and validation.

Appendix C

Health & Safety Plan

HEALTH AND SAFETY PLAN
&
COMMUNITY AIR MONITORING PLAN

FOR THE
REMEDIAL ACTION PLAN
AT
"Club East"
421-433 East 13th Street and 420 East 14th Street
New York, New York

1.0 INTRODUCTION

This Health and Safety Plan (HASP) is developed for implementation during implementation of the Remedial Action Plan (RAP) at "Club East", 421-433 E. 13th Street 420 E. 14th Street, New York, New York (the Site). The HASP is to be enforced by the Project Health and Safety Manager and on-site Health & Safety Coordinator (HSC). The on-site HSC will interface with the Project Manager and is vested with the authority to make field decisions including the termination of on-site activities if an imminent health and safety hazard, condition or related concern arises. Information and protocol in the HASP is applicable to all on-site personnel who will be entering the work zone.

2.0 POTENTIAL HAZARDS

2.1 Chemical Hazards

On-site testing performed to date indicates the primary class of compounds detected in soils and groundwater underlying the Site to be chlorinated volatile organic compounds (VOCs) and, in particular perchloroethene (PCE).

The organic chemicals listed above are described as "sweet" or "aromatic" smelling and are narcotic in high concentrations. Acute exposure to significant concentrations of these chemicals can cause irritation of the skin, eyes and mucus membrane, headache, dizziness, nausea, and in high enough concentrations, loss of consciousness and death *(Sax, 1984)*. These compounds are suspected to be carcinogenic with chronic exposure.

Physical properties and additional toxicological information is included in Appendix A.

2.2 Other Health and Safety Risks

The **HASP** addresses the environmentally-related chemical hazards identified on the Site. Normal physical hazards associated with using drilling equipment and hand tools as well as hazards associated with adverse climatic conditions (heat & cold) also exist and represent a certain degree of risk to be assumed by on-site personnel.

Certain provisions in this Plan, specifically the use of personnel protective equipment, may tend to increase the risk of physical injury, as well as susceptibility to cold or heat stress. This is primarily due to restrictions in dexterity, hearing, sight, and normal body heat transfer inherent in the use of protective gear.

3.0 RISK MANAGEMENT

3.1 Work / Exclusion Zones

For each activity (e.g. soil vapor point installation, sampling, etc.), a work / exclusion zone will be established. Access to this area will be limited to properly trained, properly protected personnel directly involved with the on-site activities. Enforcement of the work / exclusion zone boundaries is the responsibility of the on-site Health and Safety Coordinator.

3.2 Personnel Protection

Health & Safety regulatory personnel have developed different levels of personnel protection to deal with differing degrees of potential risks of exposure to chemical constituents. The levels are designated as **A, B, C,** and **D** and ranked according to the amount of personnel protection afforded by each level. Level **A** is the highest level of protection and Level **D** is the lowest level of protection as described below.

A – Fully encapsulating suit, SCBA, hard hat, chemcial-resistant steel-toed boots, boot covers, inner and outer gloves.

B – One-piece, hooded chemical-resistant splash suit, SCBA, hard hat, chemcial-resistant steel-toed boots, boot covers, inner and outer gloves.

C – One-piece, hooded chemical-resistant splash suit, hard hat, canister equipped face mask, chemcial-resistant steel-toed boots, boot covers, inner and outer gloves.

D – Work clothes, hard hat (optional), work boots/shoes, gloves (as needed).

The different levels are primarily dependent upon the degree of respiratory protection necessary, in conjunction with appropriate protective clothing. Levels of protection mandate a degree of respiratory protection. However, flexibility exists within the lower levels (B, C, and D) concerning proper protective clothing.

The four levels of protection were developed for utilization in situations which involve suspected or known atmospheric and/or environmental hazards including airborne contamination and skin-affecting substances.

It is anticipated that all of the investigation work will be performed using Level D protection (no respiratory protection with protective clothing requirements limited to long sleeved shirts, long pants or coveralls, work gloves and steel-toe leather work boots).

Level D may be modified by the HSC to include protective clothing or equipment (Saran-coated disposable coveralls or PVC splash suits, safety glasses, hard hat with face shield, and chemically resistant boots) based upon physical hazards, skin contact concerns, and real-time monitoring.

Real-time air monitoring for total airborne organics using either an OVA or an HNU will determine if and when an upgrade from Level D to a higher level of respiratory protection is warranted. Decisions for an upgrade from Level D to higher levels of protection, mitigative actions, and/or suspension of work are the responsibility of the Project Manager and/or the designated on-site Health & Safety Coordinator.

3.3 Air Monitoring

The Health & Safety Coordinator or his properly trained assignee will conduct "Real Time" air monitoring for total organic vapor and total particulates. 'Real-time' monitoring refers to the utilization of instrumentation, which yields immediate measurements. The utilization of real time monitoring helps determine immediate or long-term risks to on-site personnel and the general public, the appropriate level of personnel respiratory protection necessary, and actions to mitigate the recognized hazard. Air monitoring will be conducted in accordance with NYSDOH's Community Air Monitoring Program.

3.3.1. Particulate Monitoring

a. Instrumentation

Dust particulates in air will be monitored using a light scattering technique MINIRAM Model PDM-3 Miniature Real-time Aerosol Monitor (MINIRAM) or equivalent. The MINIRAM is capable of measuring airborne dust particles within the range of 10 to 100,000 micrograms per cubic meter ($\mu g/m^3$).

b. Application

Dust monitoring will occur at regular intervals excavation work activities. Monitoring will be conducted in upgradient and downgradient locations, relative to prevailing wind direction) along the perimeter of the work zone. The HSC or his designee will perform monitoring. As outlined in the NYSDOH Community Air Monitoring Plan, if particluate levels in the downwind location are 150 mg/m^3 greater than those measured in the upwind location, dust suppression techniques shall be employed.

3.3.2 Organic Vapor

a. Instrumentation

Real-time monitoring for total organic vapor (TOV) utilizes either a photo-ionization detector (PID) or flame ionization detector (FID). The appropriate PID is an intrinsically safe HNU Systems Model PI-101 Photoionization detector (HNU) or MiniRae™ Photoionization detector or equivalent, which is factory, calibrated to benzene. The appropriate FID is a Foxboro model 128 Organic vapor Analyzer (OVA) or equivalent, which is factory calibrated to methane.

b. Application

Organic vapor monitoring is performed as outlined in the NYSDOH Community Air Monitoring Plan. Specifically, monitoring shall be conducted at the downwind perimeter of the work zone periodically during work activities. If TOV levels exceed 5 parts per million (ppm) above established pre-work background levels, work activities will be halted and monitoring will be continued under the provision of a Vapor Emission Response Plan (as outlined in the Community Air Monitoring Plan).

3.4 Worker Training

Personnel overseeing the remedial activities will be trained, fit-tested, and medically certified (OSHA 29 CFR 1910. 134). This includes the Health & Safety Coordinator or his/her properly trained assignee.

Prior to any work, all workers involved with the project should be aware of the potential chemical, physical and biological hazards discussed in this document, as well as the general safety practices outlined below. A safety briefing by the on-site HSC and/or assistant designee shall take place at the outset of work activities.

The HSC will be available to address project-related health & safety issues a site worker (such as an equipment operator or laborer) may have regarding the site conditions. Once an issue is brought to the HCS's attention, he or she will evaluate the issue and apply the procedures outlined in this Health & Safety Plan.

3.5 General Safety Practices

All project personnel shall follow the following safety practices:

1. Avoid unnecessary skin exposure to subsurface materials. Long-sleeved shirts tucked into long pants (or coveralls), work gloves, and steel-toe leather work boots are required unless modified gear is approved by the HSC. Remove any excess residual soil from clothes prior to leaving the site.

2. No eating, drinking, gum or tobacco chewing, or smoking allowed in designated work areas. Thoroughly wash hands prior to these activities outside the work area. Avoid sitting on the ground during breaks or while eating and drinking. Thoroughly wash all exposed body areas at the end of the workday.

3. Some symptoms of acute exposure include: nausea, dizziness, light-headedness, impaired coordination, headache, blurred vision, and nose/throat/eye irritation. If these symptoms are experienced or strong odor is detected, leave the work area and immediately report the incident to the on-site HSC.

3.6 Enforcement

Enforcement of the Site Safety Plan will be the responsibility of the HSC. The Coordinator should be on-site on a full-time basis and perform or directly oversee all aspects of Project Health & Safety operations including: air monitoring; environmental mitigation; personnel respiratory and skin protection; general safety practices; documentation; emergency procedures and protocol; and reporting and recordkeeping as described below.

3.7 Reporting and Recordkeeping

Incidents involving injury, symptoms of exposure, discovery of contained (potentially hazardous) materials, or unsafe work practices and/or conditions should be immediately reported to the HSC.

A log book must be maintained on-site to document all aspects of **HASP** enforcement. The log is paginated and dated with entries made on a daily basis in waterproof ink, initialed by the HSC or designee. Log entries should include date and time of instrument monitoring, instrument type, measurement method, test results, calibration and maintenance information, as well as appropriate mitigative actions responding to detections. Miscellaneous information to be logged may include weather conditions, reported complaints or symptoms, regulatory inspections, and reasons to upgrade personnel protection above the normal specification (Level D).

4.0 EMERGENCIES

4.1 EMERGENCY RESPONSE SERVICES

(1)	**HOSPITAL** Beth Israel Medical Center 10 Union Square East, New York, NY (See Figure 1 for Map Route)	**(212) 844-8000**
(2)	**AMBULANCE**	**911**
(3)	**FIRE DEPARTMENT** **HAZARDOUS MATERIAL**	**911**
(4)	**POLICE DEPARTMENT**	**911**
(5)	**POISON CONTROL CENTER**	**(800) 222-1222**

The preceding list and associated attached map (Figure 1) illustrating the fastest route to the nearest hospital must be conspicuously posted in areas of worker congregation and adjacent to all on-site telephones (if any).

4.2 EMERGENCY PROCEDURES

4.2.1 Contact or Exposure to Suspected Hazardous Materials

In the event of a fire, chemical discharge, medical emergency, workers are instructed to immediately notify the HSC and proper emergency services (posted). Should physical contact with unknown or questionable materials occur, immediately wash the affected body areas with clean water and notify the HSC. Anyone experiencing symptoms of exposure should exit the work area, notify the HSC, and seek medical attention.

4.2.2 Personnel Decontamination, First Aid, and Fire Protection

The first step in the treatment of skin exposure to most chemicals is to rinse the affected area with water. For this reason, adequate amounts of potable water and soap are maintained on-site in a clearly designated and readily-accessible location. Portable emergency eyewash stations and a first aid kit must be made available and maintained in the same locations as the potable water. Fire extinguishers are also to be maintained on-site in designated locations. All on-site personnel are to be made aware of the locations of the above-mentioned on-site Health & Safety accommodations during the initial Health and Safety briefing.

4.2.3 Ingress/egress

Clear paths of ingress/egress to work zones and site entrances/exits must be maintained at all times. Unauthorized personnel are restricted from accessing the site.

5.0 COMMUNITY AIR MONITORING PLAN

Real-time air monitoring, for volatile compounds and particulate levels at the perimeter of the work area is necessary. This plan includes the following:

- Volatile organic compounds must be monitored at the downwind perimeter of the work area on a continuous basis. If total organic vapor levels exceed 5 ppm above background, work activities must be halted and monitoring continued under the provisions of a Vapor Emission Response Plan. All readings must be recorded and be available for State (DEC & DOH) personnel to review.

- Particulates should be continuously monitored upwind, downwind and within the work area at temporary particulate monitoring stations during excavation activities. If the downwind particulate level is 150 $\mu g/m^3$ greater than the upwind particulate level, then dust suppression techniques must be employed. All readings must be recorded and be available for State (DEC & DOH) personnel to review.

Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the work area, activities will be halted and monitoring continued. If the organic vapor level decreases below 5 ppm above background, work activities can resume. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

- The organic vapor level 200 ft. downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. When work shutdown occurs, downwind air monitoring as directed by the Safety Officer will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

Major Vapor Emission

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If efforts to abate the emission source are unsuccessful and, if organic vapor levels are approaching 5 ppm above background for more than 30 minutes in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect;

However, the Major Vapor Emission Response Plan shall be immediately placed into effect if organic vapor levels are greater than 10 ppm above background.

Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

1. All Emergency Response Contacts as listed in the Health and Safety Plan of the Work Plan will go into effect.

2. The local police authorities will immediately be contacted by the Safety Officer and advised of the situation.

3. Frequent air monitoring will be conducted at 30 minutes intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Safety Officer.

6.0 HEALTH AND SAFETY PLAN REFERENCES

1. American Conference Governmental Industrial Hygienists, 1989; Threshold Limit Values And Biological Exposure Indices, 111 Pp.

2. Geoenvironmental Consultants, Inc.; 1987; Safety & Operations At Hazardous Materials Sites

3. NIOSH Guide To Chemical Hazards, 1985, US Department Of Health And Human Services, Centers For Disease Control

4. US Department Of Labor Occupational Safety & Health Administration, 1989; Hazardous Waste Operations And Emergency Response Interim Final Rule, 29 CFR Part 1910

5. Sax, N. I. Dangerous Properties Of Industrial Materials; © 1984

Figure 1
Hospital Location & Directions

Google Maps

Start **427 E 13th St**
New York, NY 10009
End **10 Union Square E**
New York, NY 10003
Travel **0.5 mi – about 4 mins**

427 E 13th St
New York, NY 10009
Drive: 0.5 mi – about 4 mins

1.	Head **northwest** on **E 13th St** toward **1st Ave**	0.4 mi 4 mins
2.	Turn **right** at **4th Ave**	331 ft
3.	Continue on **Union Square E**	203 ft

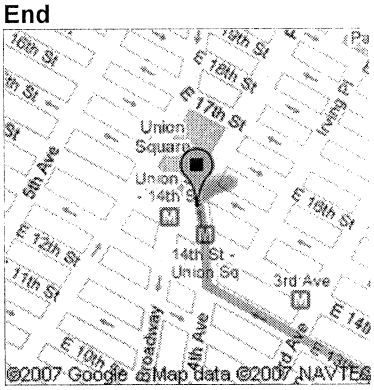
10 Union Square E
New York, NY 10003

These directions are for planning purposes only. You may find that construction projects, traffic, or other events may cause road conditions to differ from the map results.

Overview

Start

End



Appendix A

Chemical Information for
Tetrachloroethylene and Lead

NIOSH Pocket Guide to Chemical Hazards

Tetrachloroethylene	**CAS** 127-18-4
$Cl_2C=CCl_2$	**RTECS** KX3850000
Synonyms & Trade Names Perchlorethylene, Perchloroethylene, Perk, Tetrachlorethylene	**DOT ID & Guide** 1897 160

Exposure Limits	NIOSH REL: Ca Minimize workplace exposure concentrations. See Appendix A
	OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 3-hours)
IDLH Ca [150 ppm] See: 127184	**Conversion** 1 ppm = 6.78 mg/m^3

Physical Description
Colorless liquid with a mild, chloroform-like odor.

MW: 165.8	BP: 250°F	FRZ: -2°F	Sol: 0.02%
VP: 14 mmHg	IP: 9.32 eV		Sp.Gr: 1.62
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid, but decomposes in a fire to hydrogen chloride and phosgene.

Incompatibilities & Reactivities
Strong oxidizers; chemically-active metals such as lithium, beryllium & barium; caustic soda; sodium hydroxide; potash

Measurement Methods
NIOSH 1003; OSHA 1001
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, liver, kidneys, central nervous system

Cancer Site [in animals: liver tumors]

See also: INTRODUCTION See ICSC CARD: 0076 See MEDICAL TESTS: 0179

(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece

Up to 50 mg/m^3:
(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Up to 100 mg/m^3:
(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive

Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation. pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hyp

Target Organs Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue

See also: INTRODUCTION See ICSC CARD: 0052 See MEDICAL TESTS: 0127

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NIOSH Publication No. 2005-151:

NIOSH Pocket Guide to Chemical Hazards

Lead

CAS 7439-92-1

Pb

RTECS OF752

Synonyms & Trade Names
Lead metal, Plumbum

DOT ID & Gu

Exposure Limits

NIOSH REL*: TWA 0.050 mg/m^3 See Appendix C [*Note: The REL also applies to oth compounds (as Pb) -- see Appendix C.]

OSHA PEL*: [1910.1025] TWA 0.050 mg/m^3 See Appendix C [*Note: The PEL also ap lead compounds (as Pb) -- see Appendix C.]

IDLH 100 mg/m^3 (as Pb) See: 7439921

Conversion

Physical Description
A heavy, ductile, soft, gray solid.

MW: 207.2	BP: 3164°F	MLT: 621°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 11.34
Fl.P: NA	UEL: NA	LEL: NA	

~~Noncombustible Solid in bulk form.~~

Incompatibilities & Reactivities
Strong oxidizers, hydrogen peroxide, acids

Measurement Methods
NIOSH 7082, 7105, 7300, 7301, 7303, 7700, 7701, 7702, 9100, 9102, 9105; OSHA ID121, ID125G, ID206
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: Daily
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap flush promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations (See Appendix E) NIOSH/OSHA

Up to 0.5 mg/m^3:
(APF = 10) Any air-purifying respirator with an N100, R100, or P100 filter (including N100, R100, and P100 filtering facep quarter-mask respirators. Click here for information on selection of N, R, or P filters.
(APF = 10) Any supplied-air respirator

Up to 1.25 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode
(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter

Up to 2.5 mg/m^3:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters.
(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode