19 Patchen Avenue
Interim Remedial Measures Work Plan

19 Patchen Avenue – Brooklyn, NY
Block 1618, Lot 8
BCP Site # C224232

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B
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CERTIFICATIONS

I, Matthew M. Carroll, certify that I am a NYS registered professional engineer as defined in 6 NYCRR Part 375 and that this Interim Remedial Measures Work Plan was prepared in accordance with all applicable statues and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

I certify that all information and statements in this certification are true. I understand that a false statement made herein is punishable as Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

091629	3/26/2017	
NYS Professional Engineer #	Date	Matthew M. Carroll, P.E. Signature

It is a violation of Article 130 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 130, New York State Education Law.

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AGV	NYSDOH Air Guidance Value
AOC	area of concern
AS	air sparging
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
ECL	Environmental Conservation Law
BTEX	benzene, toluene, ethylbenzene and xylenes
CAMP	Community Air Monitoring Program
C&D	construction and demolition
CDS	construction dewatering system
Class GA Standards	NYSDEC TOGS 1.1.1 Class GA Ambient Water Quality Standards and Guidance Values
CEQR	City Environmental Quality Review
CFR	Code of Federal Regulations
CPP	Citizen Participation Plan
COC	Certificate of Completion
DCE	dichloroethylene
DER-10	NYSDEC Division of Environmental Remediation (DER), DER-10 / Technical Guidance for Site Investigation and Remediation
DRO	diesel range organics
DOC	dissolved organic carbon
DUSR	Data Usability Summary Report
EC	engineering control
ESA	Environmental Site Assessment
EZ	exclusion zone
FB	field blanks
FER	Final Engineering Report
ft-bs	feet below building slab
ft-bg	feet below sidewalk grade
ft-msl	feet above mean sea level
HASP	Health and Safety Plan
HSA	Hollow Stem Auger
HSO	Health and Safety Officer
IC	institutional control
ISCO	in-situ chemical oxidation
IRM	Interim Remedial Measure
MW	monitoring well
NGVD	National Geodetic Vertical Datum
NIOSH	National Institute for Occupational Safety and Health
NYCDEP	New York City Department of Environmental Protection
NYCDOB	New York City Department of Buildings
NYCDOT	New York City Department of Transportation
NYCRR	New York Codes, Rules and Regulations

NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOH-ELAP	NYSDOH Environmental Laboratory Approval Program
OSHA	Occupational Safety and Health Association
PCB	polychlorinated biphenyl
PCE	perchloroethylene, aka tetrachloroethylene
PID	photoionization detector
PP Metals	Priority Pollutant Metals
PPE	personal protective equipment
QA/QC	quality assurance / quality control
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RAWP	Remedial Action Plan
RCNY	Rules of the City of New York
RMO	Remedial Measure Objective
RE	Remedial Engineer
RI	remedial investigation
RSCOs	Recommended Soil Cleanup Objectives
RCUSCOs	6 NYCRR 375-6.8(b) – Restricted-Commercial Use Soil Cleanup Objectives
RRUSCOs	6 NYCRR 375-6.8(b) – Restricted-Residential Use Soil Cleanup Objectives
SB	soil boring
SV	soil vapor
SMP	Site Management Plan
SMMP	Soil/Material Management Plan
SSDS	sub-slab depressurization system
SVE	soil vapor extraction
SVOC	semi-volatile organic compound
TAL	Target Analyte List
TAGM 4046	NYSDEC Technical and Administrative Guidance Memorandum #4046
TB	trip blanks
TCE	trichloroethylene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TCLP Limits	USEPA Maximum Concentrations of Contaminants for the Toxicity Characteristic
TOC	total organic carbon
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	underground storage tank
UUSCOs	6 NYCRR 375-6.8(a) Track 1 Unrestricted Use Soil Cleanup Objectives
VOC	volatile organic compound

EXECUTIVE SUMMARY

SITE DESCRIPTION/PHYSICAL SETTING/SITE HISTORY

This Interim Remedial Measures (IRM) Work Plan was prepared by Matthew M. Carroll, P.E. and Tenen Environmental (Tenen) on behalf of 19 Patchen, LLC (the "Participant"). On September 7, 2016, the Participant entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) to investigate and remediate the property located at 19 Patchen Avenue (Block 1618, Lot 8) in the Brooklyn Borough of New York (the "Site"). The New York State Brownfield Cleanup Agreement Index Number is C224232-05-16 and the Site Number is C224232. The Site location is shown on Figure 1.

The Participant is proposing to install an active SSDS system as an interim remedial measure (IRM) and to reroute the exhaust location of the active dry cleaner, as required by various State and City regulations. A Remedial Investigation Work Plan (RIWP) has been reviewed by NYSDEC. The remedial investigation (RI), which addresses the Site and adjoining properties, was completed in November and December 2016, prior to implementation of the IRM Work Plan.

The objective of the IRM Work Plan is to provide the means and methods to remediate areas of concern identified during the previously completed investigations and the RI, to be protective of human health and the environment, mitigate the potential further migration of contaminants in soil vapor and to facilitate continued residential use of the property.

The goals of the IRM Work Plan are to 1) mitigate the potential for indoor air impacts by installing a sub-slab depressurization system (SSDS); and, 2) transmit the requirements to reroute the exhaust location of the active dry cleaner.

SUMMARY OF THE REMEDIAL INVESTIGATIONS

The findings of past environmental investigations indicate the presence of chlorinated solvents in indoor air, soil vapor and groundwater above regulatory levels at or near the Site. The concentrations of tetrachloroethene (PCE) detected in soil vapor and indoor air should be mitigated or reduced at the Site based on Matrix 2 of the New York State Department of Health (NYSDOH) October 2006 guidance document.

PRELIMINARY QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

The results of the sampling completed to-date provided sufficient data to complete a preliminary Qualitative Human Health Exposure Assessment (QHHEA), which identified a complete exposure pathway associated with implementation of the IRM:

- direct contact with surface and subsurface soils (and incidental ingestion);
- inhalation of vapors.

Additional remedial investigation activities will be proposed and the QHHEA will be updated.

The potential exposure pathways associated with the IRM are temporary and of limited duration. Worker exposure to impacted soil vapor and potentially-impacted soil will be addressed by adherence to health and safety protocols. Potential exposure of neighborhood residents and other off-site populations to impacted soil vapor and potentially-impacted soil will be addressed through compliance with the Community Air Monitoring Plan (CAMP). A summary of the CAMP is included in Section 4.0 of the Health and Safety Plan (HASP) presented in Appendix A of this Interim Remedial Measures Work Plan (IRMWP).

SUMMARY OF THE INTERIM REMEDIAL MEASURES

The proposed interim remedial measures consist of the following:

1. An active sub-slab depressurization system (SSDS) will be installed to depressurize beneath the entire footprint of the Site to address elevated concentrations in sub-slab soil vapor. A pre-design pilot test was completed to inform the locations of the SSDS elements. The SSDS is designed in general accordance with the New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor intrusion in the State of New York dated October 2006. The performance goal of the sub-slab vapor mitigation system will be to depressurize below the slab to at least -0.02 inches of water gauge (in-wc); however, differential pressure readings above -0.004 in-wc will be considered acceptable.
2. Any soil removed from beneath the current slab during the SSDS installation will be placed in 55-gallon drums, labeled accordingly and staged at the Site for proper disposal.
3. A Community Air Monitoring Program (CAMP) for particulates and volatile organic carbon compounds will be implemented during soil removal and system installation. A HASP will also be implemented to protect workers from exposure to volatile organic compounds (VOCs). Air monitoring will be conducted during pit excavation activities/SSDS installation and the contractor will suppress dust during any soil removal at the Site as described in the HASP.
4. The exhaust location of the active dry cleaner will be routed to above the roof line of the building.
5. After the installation of the SSDS and rerouting of the exhaust location is complete, an indoor air sampling event will be conducted to determine post-remedial conditions.

Remedial activities will be performed at the Site in accordance with this NYSDEC-approved IRM Work Plan. Any deviations from the IRM Work Plan will be promptly reported to NYSDEC.

INTERIM REMEDIAL MEASURES WORK PLAN

1.0 INTRODUCTION

19 Patchen LLC (the "Participant") entered into the Brownfield Cleanup Program (BCP No. C224232) with the New York State Department of Environmental Conservation (NYSDEC) as a "Participant", to investigate and, where necessary, remediate contaminated soil, groundwater and soil vapor associated with the Site, which is an 1,838-square foot four-story mixed-use commercial and residential building with a basement. The commercial space of the building is currently occupied by an active dry cleaning facility.

The Participant entered into a Brownfield Cleanup Agreement (BCA) with NYSDEC on September 7, 2016. A Remedial Investigation Work Plan (RIWP) was reviewed by NYSDEC and the remedial investigation (RI) at the Site and the surrounding property was completed. The RI data analyzed to-date is summarized in Section 2.0.

The objective of the IRM Work Plan is to: provide the means and methods to remediate areas of concern identified during the previously completed investigations and the RI, to be protective of human health and the environment; mitigate the potential further migration of contaminants in soil vapor and to facilitate continued residential use of the property.

The IRM Work Plan will include the installation of an active sub-slab depressurization system (SSDS) and rerouting the exhaust location of the active dry cleaner.

The procedures and reporting requirements contained in the IRM Work Plan are in accordance with NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (May 2010). Consistent with Sections 1.11 and 5.3 of the DER-10 document, this IRM Work Plan includes the following items:

- A summary of environmental investigation findings and a description of the Remedial Areas of Concern identified by these investigations;
- A description of the proposed interim remedial measures, remedial technologies and associated sampling and monitoring;
- A listing of applicable guidance and standards relating to the work;
- Health and Safety and Community Air Monitoring Plans that describe monitoring procedures and vapor, odor and dust control to be implemented during the remedial activities;
- A schedule for implementation and reporting; and,
- A Professional Engineer's certification.

1.1 Site Location and Description

The Site, located at 19 Patchen Avenue, is a rectangular parcel of land located at the corner of Patchen Avenue and Van Buren Street in the Bedford Stuyvesant area of Brooklyn.

The Site area is 1,838 square feet (0.0422 acre) with 25 feet of frontage along Patchen Avenue. The Site is occupied by a four-story mixed-use commercial and residential building with a basement. The Site is located in Brooklyn Community Board 3 and is generally identified on New York City tax maps as Kings County Block 1618, Lot 8.

An active dry cleaner occupies the ground floor commercial space. The current operator is Rodriguez Dry Cleaners (NYSDEC Dry Cleaning Facility #2-6104-01058). The dry cleaner exhaust location is on the first floor level on Van Buren Street, as shown on Figure 2. The New York City Department of Buildings (NYCDOB) Mechanical Code (MC) Section 401.5.2 (Ventilation), which reads in part, "(t)o minimize the hazard from fires and from noxious, toxic or obnoxious discharges to structures, any exhaust air discharge to the outside atmosphere shall terminate at or above the roof or setback from of the buildings or in an exterior wall adjoining a street, yard or court. Exhaust air discharges shall be… at least 10 feet (3048 mm) from any window or in another building or from any window in a residential portion of the same building, or from any fire escape, exterior stair, or balcony. Exhaust system opening shall be provided with dances or louvers construction so as to direct the air away from windows, other openings, and pedestrians." In addition, the New York Codes, Rules and Regulations (NYCRR) Part 232 indicates that discharge above the roof and a minimum 25 feet from air intakes/windows would be acceptable.

The proposed IRM includes the installation of an active SSDS at the Site and rerouting the exhaust location of the active dry cleaner.

The Site location is shown on Figure 1.

1.2 Description of Surrounding Property

The surrounding properties include mixed-use commercial and residential properties. The adjacent properties include residential buildings to the south and east, a vacant lot to the north and a mixed-use residential building with a deli/grocery occupying the ground level to the west. The surrounding area to the north and east is mixed-use commercial (restaurants, grocery stores, nail salons, and stores) and residential. The elevated subway station for the J train is located one block north of the Site. The surrounding properties to the south and west are predominately residential.

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The RIWP was implemented in November and December 2016. The sampling that has been completed is sufficient to complete a preliminary QHHEA for the proposed interim remedial measures. The following sections summarize the sampling that has been completed to-date.

2.1 Summary of Remedial Investigations Performed

In 2015, several environmental investigations were conducted at the Site, and are summarized in the following reports:

- *Phase I Environmental Site Assessment Report, 19 and 25 Patchen Avenue, Brooklyn, New York,* Tenen Environmental (Tenen), June 2015.
- *Phase II Environmental Site Investigation, 19 and 25 Patchen Avenue, Brooklyn, New York,* Tenen Environmental (Tenen), August 21, 2015.

The 25 Patchen Avenue property is not subject to the BCA and PCE impacts are being addressed by implementation of a Remedial Action Plan approved by the New York City Department of Environmental Protection (NYCDEP).

The findings of the above investigations are summarized below. Previous sample locations are shown on Figure 3.

Phase I Environmental Site Assessment, 19 and 25 Patchen Avenue, Brooklyn, NY 11221. June 2015.

The June 2015 Phase I ESA identified the historic and current use of the Site as a dry cleaner as an REC based upon information provided during the Site reconnaissance and records included in the database report and city directories. The Phase I ESA addresses the Site and the adjoining property, 25 Patchen Avenue. Based on the information included in the Phase I ESA, the duration of the dry cleaning activities has been approximately 55 years.

Phase II Investigation Letter Report, 19 and 25 Patchen Avenue, Brooklyn, NY 11221, August 21, 2015.

The objective of the 2015 Phase II Investigation was to further investigate the potential presence of petroleum or hazardous materials at the Site. The investigation included the following:

- Advancement of four interior borings (19P-SB-1 through 19P-SB-4) and two exterior borings (19P-MW-1 and 19P-MW-2).
- Collection of grab samples from varying intervals from the six soil borings for a total of 12 soil samples and analysis for VOCs.
- Installation and sampling of 1) three soil vapor points along with a co-located indoor air sample in the basement of 19 Patchen Avenue; all soil vapor and ambient air samples were analyzed for VOCs using EPA Method TO-15.

- Installation and sampling of two permanent well points (19P-MW-1 and 19P-MW-2) in the sidewalk north and west of the Site. All groundwater samples were analyzed for VOCs.

PCE was detected in seven of 12 soil samples at concentrations ranging from 0.0058 (estimated) milligrams per kilogram (mg/kg) to 0.0083 mg/kg, below the Unrestricted Use SCO of 1.3 mg/kg. With the exception of chloroform, a common laboratory artifact, in one sample, all VOCs were below the Unrestricted Use SCOs.

Groundwater results were compared to the Class GA Standards. PCE was detected at a concentration of 23 micrograms per liter (ug/L) in well 19P-MW-1 and at a concentration of 10 ug/L in well 19P-MW-2. Both concentrations are above the Class GA Standard of 5 ug/L. Trichloroethene (TCE), a PCE degradation compound, was detected at estimated concentrations below the Class GA Standard. Cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride were not detected.

All soil vapor and indoor air results were compared with the New York State Department of Health (NYSDOH) Air Guidance Values (AGVs), Soil Vapor/Intrusion Decision Matrices and three databases based on background studies and referenced in the NYSDOH Soil Vapor Guidance. PCE was detected in the sub-slab at concentrations ranging from 366 micrograms per cubic meter (ug/m3) in sample 19P-SV1 to 5,380 ug/m3 in sample 19P-SV2. PCE was detected in the indoor air at a concentration of 535 ug/m3. TCE was detected in the sub-slab at concentrations of 2.65 ug/m3 in sample 19P-SV-2R to 48.6 ug/m3 in sample 19P-SV2. TCE was detected in the indoor air at a concentration of 1.95 ug/m3. Cis-1,2-DCE was detected in the sub-slab at a concentration of 44 ug/m3 in sample 19P-SV1. Cis-1,2-DCE was detected in the indoor air at a concentration of 0.845 ug/m3.

The concentrations of PCE are above the NYSDOH AGV of 30 ug/m3. The Matrix 2 recommended action based on the sub-slab and indoor air concentrations is “Mitigate”.

Indoor Air Sampling, 19 Patchen Avenue, Brooklyn, NY 11221, completed October 28, 2016.

On October 28, 2016, three indoor air samples and one ambient air sample were collected at the Site. Sample locations are shown on Figure 4. Samples were collected over an eight hour duration using Summa canisters. The results will be included in the Remedial Investigation Report.

PCE was detected in indoor air at concentrations ranging from 113 to 500 ug/m3, above the outdoor concentration of 82.7 ug/m3 and the NYSDOH AGV of 30 ug/m3.

Remedial Investigation, 19 Patchen Avenue, Brooklyn, NY 11221, completed November/December 2016

The objective of the 2016 RI was to further investigate the subsurface conditions at the Site, consistent with the requirements of the BCP, and delineate the chlorinated solvent impacts. The investigation included soil, soil vapor, indoor/ambient air and groundwater sampling. The following sampling was completed:

- Install four groundwater monitoring wells, three shallow and one deep;
- Sample four newly installed groundwater wells and two existing groundwater wells;
- Install and sample two indoor sub-slab soil vapor points and five exterior sub-slab soil vapor points;
- Install and sample seven soil borings;
- Collect one indoor ambient air sample in the basement of 19 Patchen Avenue;
- Collect one exterior ambient air sample outside of 19 Patchen Avenue.

As shown on Figure 5, PCE was detected in both indoor sub-slab soil vapor samples ranging from 1,420 ug/m3 in SV-5 to 1,880 ug/m3 in SV-6; off-site soil vapor sample concentrations ranged from 133 to 557 ug/m3. As shown on Figure 6, PCE was detected in the indoor air sample, at a concentration of 882 ug/m3, and in the exterior ambient air sample at a concentration of 1,550 ug/m3. TCE was detected in both indoor sub-slab soil vapor samples ranging from 44.2 ug/m3 in SV-6 to 45.3 ug/m3 in SV-5; off-site soil vapor sample concentrations ranged up to 14.6 ug/m3. TCE was detected in the indoor ambient air sample at a concentration of 3.61 ug/m3.

The concentrations of PCE were above the NYSDOH AGV of 30 ug/m3. The Matrix 2 recommended action based on the sub-slab and indoor ambient air concentrations is to "Mitigate". The concentrations of TCE were above the NYSDOH AGV of 2 ug/m3. The Matrix 1 recommended action based on the sub-slab and indoor air concentrations is to "Monitor".

As shown on Figure 7, PCE was detected in all groundwater wells, with the exception of MW-1D, at concentrations ranging from 12 ug/l in MW-6 to 26 ug/l in MW-4.

Except for one shallow sample that contained historic fill-related compounds, all concentrations in soil were below the NY Part 375 Unrestricted Use soil cleanup objectives (SCOs).

2.2 Summary of Remedial Investigation Findings

The findings of past environmental investigations indicate the presence of chlorinated solvents in indoor air, soil vapor and groundwater above regulatory levels. Based on the concentrations of PCE in soil vapor and indoor air, these impacts should be mitigated at the Site.

The June 2015 Phase I ESA identified that dry cleaning operations were completed at the Site for a period of approximately 55 years. The Phase II investigations conducted in August 2015 confirmed the presence of PCE and its degradation products at elevated concentrations in groundwater, soil vapor and indoor air. The October 2016 indoor air sampling identified that elevated concentrations of PCE were present in indoor air. Based on a comparison with the NYSDOH matrices, the levels of PCE in the sub slab soil vapor and indoor air at the Site require mitigation. The November/December 2016 investigation also identified elevated concentrations of PCE and its degradation products in soil vapor, indoor air ambient air and groundwater.

The Phase II investigation and Remedial Investigation conducted in 2015 and 2016 documented:

- the presence of PCE and/or its degradation products in soil vapor, indoor air, ambient air and groundwater.

2.3 Geological Conditions

2.3.1 Topography

The surface topography slopes down to the northeast. Based on the U.S. Geological Survey (Brooklyn-NY 2010 Quadrangle) topographic map, the property lies at an elevation of approximately 55 feet above the National Geodetic Vertical Datum of 1929 (an approximation of mean sea level).

2.3.2 Site Geology and Hydrogeology

Boring logs from prior investigations identified the shallow soils, including historic fill material (sands mixed with cobbles and brick), to depths of up to 5.5 feet below the basement level, underlain by native silts and sands to depths of at least 50 feet below sidewalk grade (ft-bg). The native silts and sands extend to approximately 200 ft-bg and are underlain by Gardiners Clay and an unnamed Raritan Formation clay layer. The approximate depth to bedrock is 350 ft-bg.

Groundwater was encountered at a depth of approximately 42 ft-bg. The assumed groundwater flow direction is toward the northwest.

Previous investigations at the Site have documented groundwater concentrations of contaminants above the NYSDEC Class GA Standards. There are no known wellhead protection areas or specifically designated groundwater recharge areas in the vicinity of the Site. Groundwater in this area is not used as a source of potable water.

2.4 Contamination Conditions

The identified contaminant sources include the historic and current use of the commercial space at the Site as a dry cleaner. Given the presence of chlorinated compounds in soil vapor and groundwater, long-term discharge of chlorinated solvents used in dry cleaning operations is the assumed source of contamination in the subsurface and potentially the indoor air. Another potential source of indoor air contamination is the exhaust of the active dry cleaner at the first floor level along Van Buren Street.

2.5 Environmental and Public Health Assessments

2.5.1 Preliminary Qualitative Human Health Exposure Assessment

Based upon the information collected to date, a preliminary qualitative exposure assessment (EA) has been completed in accordance with Section 3.3(c)4 of DER-10 and the NYSDOH guidance for performing a qualitative EA (NYSDEC DER-10; Technical Guidance for Site Investigation and Remediation; Appendix 3B). The qualitative exposure assessment evaluates the potential for populations to be exposed to Site contaminants during the implementation of the IRM. Additional remedial investigation activities will be completed and the QHHEA will be updated in the Remedial Investigation Report (RIR).

An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: (1) a contaminant source; (2) contaminant release and transport mechanisms to an exposed population; (3) a receptor population; (4) a route of exposure; and (5) a point of exposure to a receptor population. Potential contaminant receptors include the following populations:

- Site workers (primarily environmental professionals and contractors)
- Construction workers, visitors or trespassers
- On- and Off-Site residents/building occupants
- Off-Site maintenance workers

The following assessments evaluate how humans might be exposed to Site-related contaminants and whether there are any complete or potentially complete exposure pathways now and under the reasonably anticipated future land use of the Site.

Contaminant Sources

The contaminants of concern at the Site include chlorinated solvents in soil vapor, indoor air, ambient air and groundwater at concentrations above regulatory levels. Chlorinated compounds, in particular PCE and TCE, are the main contaminants of concern, with detected concentrations requiring mitigation .

The presence of chlorinated solvent compounds can be attributed to historic and current use of the Site as a dry cleaner.

Contaminant Release and Transport Mechanisms

Chlorinated compounds, in particular PCE and TCE, are the main contaminants of concern, with detected concentrations requiring mitigation. Dissolved concentrations of PCE are present in shallow groundwater above Class GA Standards; no deep impacts were detected.

The long-term discharge of chlorinated solvents used in dry cleaning operations is the assumed source of contamination in the subsurface and potentially the indoor air. Another potential source

of indoor air contamination is the exhaust of the active dry cleaner at the first floor level along Van Buren Street.

Potential Receptor Populations
The potential on-site receptors include residents of the Site, Site workers (primarily environmental professionals and contractors), construction workers, visitors or trespassers. The potential off-site receptors include off-site workers, residents and visitors.

Potential Routes and Points of Exposure
The potential exists for exposure via dermal absorption or inhalation if proper protective measures are not implemented. During the implementation of the IRM, the potential for exposure of Site construction workers and nearby residents to contaminated soil, via on-site soil disturbance, would be avoided by implementation of a health and safety plan (HASP) and a Community Air Monitoring Program (CAMP).

The following potential exposure routes are considered incomplete or not applicable to the IRM:

Groundwater Ingestion
New York City code and the environmental easement for the Site prohibit the use of groundwater for potable purposes. Groundwater will not be encountered during implementation of the IRM; this exposure route is considered below. The groundwater ingestion pathway is incomplete.

Inhalation of Vapors by Building Occupants and Maintenance Workers
This pathway will be evaluated following completion of the IRM. It is assumed that the potential for vapor exposure will remain and an active SSDS and composite cover system will address this pathway.

The following potential exposure routes are considered complete:

Inhalation of Vapors and Particulates by On-Site Environmental and Construction Workers
During excavation and soil handling, on-Site personnel and construction workers may be exposed to dust and vapors via inhalation.

Dermal Contact with Soil by On-Site Environmental and Construction Workers
During excavation and soil handling, on-Site personnel and construction workers may be exposed to contaminants in soil via dermal contact.

Dermal Contact with Groundwater by On-Site Environmental and Construction Workers
Additional groundwater sampling will be completed by environmental professionals. Exposure to contaminants in groundwater will be mitigated by implementation of a HASP. Groundwater will not be encountered by construction workers during the implementation of the IRM.

Inhalation of Vapors and Particulates by Residents/Building Occupants
Soil excavation and removal may generate dust and vapors that could be inhaled by off-Site residents/building occupants and maintenance personnel. Exposure via this route will be mitigated by implementation of the CAMP.

The above potential exposures are limited to the IRM phase and are temporary and of limited duration. Adherence to health and safety protocols will address worker exposure to contaminated soil vapors and particulates. Potential exposure of off-Site residents and building occupants will be addressed by implementation of the Community Air Monitoring Plan (CAMP) summarized in Section 4.0 of the HASP provided in Appendix A.

2.6 Interim Remedial Measure Objectives

The goals of the IRM Work Plan are to 1) mitigate the potential for indoor air impacts by installing a sub-slab depressurization system (SSDS); and, 2) transmit the requirements reroute the exhaust location of the active dry cleaner. Based on the results of previous investigations conducted at the Site, the following Remedial Action Objectives (RAOs) have been identified and will be achieved by the IRM described in Section 3.0 of this IRMWP.

The successful implementation of the IRM would result in the installation of an active SSDS and documenting the re-routing the existing dry cleaner exhaust location. Excavation of some shallow soil will be completed to a depth of approximately one foot below grade to allow for proper installation of the SSDS components in two locations in the basement.

2.6.1 Soil Vapor and Indoor Air

Chlorinated compounds were detected in the soil vapor and indoor air.

RAOs for Public Health Protection

- Reduce the risk of impacts to public health resulting from existing, or the potential, for, soil vapor intrusion into buildings at the Site.
- Reduce the risk of impacts to public health resulting from dry cleaner exhaust discharging below habitable areas.

3.0 DESCRIPTION OF INTERIM REMEDIAL MEASURE

The IRM will include the installation of an active SSDS and documenting the rerouting of the exhaust location of the active dry cleaner. The IRM will be implemented in accordance with the Standards, Criteria and Guidance (SCGs) described in Section 3.1.

3.1 Standards, Criteria and Guidance (SCGs)

The IRM SCGs are listed below.

SCG	Scope / Application
NYSDEC Brownfield Cleanup Program Guide (draft 2004)	General program guidance
NYSDOH Guidance for Evaluating Soil Vapor Intrusions in the State of New York (2006)	Soil vapor guidance
NYSDOH Generic Community Air Monitoring Plan	Plan for monitoring dust and volatile organics resulting from construction activities
New York State Codes, Rules and Regulations (NYCRR) Title 6 Part 360 – Solid Waste Management Facilities	Off-site disposal of waste
New York State Codes, Rules and Regulations (NYCRR) Title 6 Part 364 – Waste Transporter Permits	Transporter requirements for off-site disposal of waste
6 NYCRR Part 370 – Hazardous Waste Management System	Disposal of hazardous waste, if encountered
6 NYCRR Part 375 – Environmental Remediation Programs (December 2006)	General administrative guidance
6 NYCRR Part 376 – Land Disposal Restrictions	Disposal of hazardous waste, if encountered
Code of Federal Regulations (CFR) Title 29 Part 1910.120 - Hazardous Waste Operations and Emergency Response Standard	Worker safety
29 CFR Title 29 Part 1926 - Safety and Health Regulations for Construction	Worker safety
6 NYCRR Part 232 - Perchloroethylene Dry Cleaning Facilities	Worker and building occupant safety
6 NYCRR Part 232.6 – Equipment Standards and Specifications	Worker and building occupant safety

4.0 INTERIM REMEDIAL PROGRAM

4.1 Governing Documents

4.1.1 Site Specific Health and Safety Plan

A Site Specific HASP has been created for the Site and is included in Appendix A. All remedial work performed under this plan will be in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA. An emergency contact sheet with names and phone numbers is included in Table 1 of the HASP and defines the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency. The HASP and requirements defined in this IRM pertain to all remedial and invasive work performed at the Site until the issuance of a Certificate of Completion.

4.1.2 Soil/Materials Management Plan

The Soil/Materials Management Plan (SMMP) includes plans for managing the minor amount of soils/materials that will be disturbed at the Site.

The SMMP, which describes procedures for excavation, handling, storage, and transport and disposal is included in Appendix B.

4.1.3 Community Air Monitoring Plan

The purpose of the Community Air Monitoring Plan (CAMP) is to protect downwind and building receptors (e.g., residences, businesses, schools, nearby workers, and the public) from potential airborne contaminants released as a direct result of the Remedial Action being performed at the Site. A summary of the CAMP plan is included in Section 4.0 of the HASP, which is presented in Appendix A.

4.1.4 Citizen Participation Plan

The Citizen Participation Plan (CPP) enables citizens to participate more fully in decisions that affect their health, environment and social well-being. The CPP will be updated throughout the Remedial Action in response to any community feedback. The CPP is included in Appendix C.

4.2 General Remedial Construction Information

4.2.1 Project Organization

An organization chart with emergency contacts is included in Table 1. Resumes of key personnel involved in the IRM are presented in Appendix D.

4.2.2 Remedial Engineer

The Remedial Engineer (RE) for this project will be Matthew M. Carroll, P.E. The RE is a registered professional engineer (PE) licensed by the State of New York. The RE will have primary direct responsibility for implementation of the remedial program for the 19 Patchen Avenue Site (NYSDEC BCA Index No. C224232-05-16; Site No. C224232). The RE will certify in the Interim Remedial Measure Construction Completion Report (IRMCCR) and Final

Engineering Report (FER) that the IRM was performed by qualified environmental professionals under his supervision and that the remediation requirements set forth in the IRMWP and any other relevant provisions of ECL 27-1419 have been achieved in conformance with the IRMWP.

The RE will coordinate the work of other contractors and subcontractors involved in all aspects of remedial construction, including soil removal, air monitoring, emergency spill response, import of back fill material (if any), and management of waste transport and disposal. The RE will be responsible for all appropriate communication with NYSDEC and NYSDOH.

The RE will review all pre-remedial plans submitted by contractors for compliance with this IRMWP and will certify compliance in the FER.

4.2.3 Remedial Action Construction Schedule

A general IRM schedule is included in Table 2.

4.2.4 Utility Markout and Easement Layout

The Participant and its contractors are solely responsible for the identification of utilities that might be affected by work under the IRM and implementation of all required, appropriate, or necessary health and safety measures during performance of work under this IRM. The Participant and its contractors are solely responsible for safe execution of all invasive and other work performed under this IRM. The Participant and its contractors must obtain any local, State or Federal permits or approvals pertinent to such work that may be required to perform work under this IRM. Approval of this IRM by NYSDEC does not constitute satisfaction of these requirements.

4.2.5 Required Permits

Permits are not required to implement the IRM. A plumbing permit will be required from the NYCDOB to reroute the exhaust. The project will be self-certified by a mechanical engineer and a full review by NYCDOB will not be required.

4.2.6 Site Security and Signage

The existing walls and gate at the Site will be maintained as required throughout the IRM. Sidewalks adjacent to the Site will be maintained with barriers, as necessary, to protect the public.

4.2.7 Deviations from the Interim Remedial Measures Work Plan

During the implementation of the IRMWP, any material deviation will be noted and immediately brought to the attention of the RE. The RE or his/her representative will contact the NYSDEC Project Manager and determine if the deviation necessitates a formal IRM modification and NYSDEC approval. If no formal IRM modification is required, the deviation will be noted in the Site reports and explained in the FER.

4.2.8 Work Hours

The hours for operation of remedial construction will conform to the requirements of the City of New York, New York or according to specific variances issued by the governing agency. NYSDEC reserves the right to deny alternate remedial construction hours.

4.2.9 Traffic Control

A truck route to and from the Site from the nearest major highway has been selected considering:

- Limited transport through residential areas
- Use of defined truck routes
- Limiting the total distance to the major thoroughfares, and
- Safety in access to highways

Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during site remediation and development; trucks exiting the Site will be securely covered. Drivers of trucks leaving the Site with soil/fill will be instructed to proceed without stopping in the vicinity of the Site to prevent neighborhood impacts.

4.2.10 Contingency Plan

While discovery of previously unknown areas of concern is not anticipated during implementation of this on-site remedy, contingency remediation may be required if previously unknown areas of concern are encountered during implementation of the IRM. These areas may include USTs and hot spots of an unknown nature. The need for additional remediation will be determined at the discretion of the RE in conjunction with NYSDEC and NYSDOH, and will be completed by a qualified remedial contractor. Exploratory test pits may be excavated first to verify the presence, nature, and size of the potential source area. If conditions are uncovered that could be addressed, remediation will then be completed. Remediation will include excavation of the contamination, collection of end-point soil samples for regulatory close out, and off-site disposal of the materials.

Contingency for Underground Storage Tanks

While discovery of unknown USTs is not anticipated, USTs encountered during IRM implementation will be decommissioned in accordance with applicable NYSDEC UST closure requirements. The tanks will be decommissioned and removed following the applicable NYSDEC petroleum storage tank closure regulations.

4.2.11 Worker Training and Monitoring

Site workers involved with hazardous waste, as determined by 40 CFR 262.11 and ECL 27-0903 or a “source area” as determined by DER-10 1.3(b)70 at the Site will be required, at a minimum, to have completed 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response (HAZWOPER), site safety training and medical monitoring for site workers. HAZWOPER training completion certificates will be submitted to the RE before commencement of site work.

4.2.12 Pre-Construction Meeting with NYSDEC

The NYSDEC project manager will be invited to attend a pre-IRM meeting at the Site with all parties involved in the remedial process prior to implementation of the IRM.

4.2.13 Emergency Contact Information

An emergency contact sheet with names and phone numbers is included in Table 1. That document defines the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

4.3 Site Preparation

4.3.1 Mobilization

The contractor will mobilize all necessary materials and equipment on Site directly prior to the initiation of any remedial activities. Material stockpile and equipment decontamination areas will be designated.

4.3.2 Equipment and Material Staging

Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations. There will be no specific material or equipment staging area; any staging will be in areas where space permits. In the event that soil stockpiling is necessary, stockpiles will be placed in clear areas in accordance with Section 1.2 of the Soil/Materials Management Plan included as Appendix B.

4.3.3 Construction Loading Zone

Steps will be taken to ensure that trucks departing the Site will not track soil, fill or debris off-site. Measures will be taken to ensure that adjacent roadways will be kept clean of project-related soils, fill and debris. Additional information is included in Section 5.6.

5.0 INTERIM REMEDIAL MEASURE IMPLEMENTATION: INSTALL SSDS

An active SSDS will installed to depressurize beneath the entire basement slab.

5.1 Sub-slab Depressurization System

An active SSDS will be installed to minimize the potential for vapor intrusion. The system will be operated on a continuous basis.

Active Depressurization/Venting System
The layouts and details are included on drawings X-100 through X-103, included in Appendix E. The active SSDS is a permanent Engineering Control (EC) for the Site.

The SSDS will depressurize below the current basement slab as compared to the basement environment. The SSDS has been designed to create a pressure differential of approximately -0.02 in-wc beneath the basement slab, as compared to the basement air pressure.

Pre-Design Pressure Field Extension Test
A pre-design pressure field extension test was completed on February 7, 2017. The test consisted of applying pressure to the subsurface through drilled holes in the slab and then measuring the resulting pressure at various distances and directions from the point of applied pressure.

The findings of the pre-design pilot test are included on drawing X-104 in Appendix E.

Suction Pits
The SSDS will consist of two suction pits installed beneath the basement slab that will be connected to a fan on the roof via cast iron (interior) and PVC (exterior) piping. To create the suction pits, the existing slab will be saw cut and the underlying soil will be removed to a depth of at least 18 inches. The void space will be lined with geotextile fabric and a layer of ¾" clean stone aggregate (or similar material).

The suction pits will be installed while the basement is actively vented. For each location, a portable blower fan with a minimum flow of 2,000 cubic feet per minute (CFM) will be mobilized. Disposable plastic ventilation ducting will be used to vent the exhaust. The exhaust location will be above the roof of the building.

The layout of the proposed suction pits is included on drawing X-100 and the details are shown on drawing X-103, both in Appendix E.

Crack Sealing
The existing basement slab will be inspected for cracks. If any are identified, they will be filled with non-VOC sealant (e.g., Retro-Coat™ caulk by Land Science Technologies).

Piping and Exhaust Location
A cast iron pipe (4" nominal size) will be inserted into each suction pit. The slab penetration points will be sealed with a chemically-resistant sealant (e.g., bituthene liquid membrane). The riser pipes will connect to exterior common PVC header pipes that will run outside the building to the roof. All horizontal piping runs will be slightly pitched back towards the pressure relief point to allow for drainage of any moisture. The final location of all vertical riser piping, header piping, and roof mounts will be determined by a Professional Engineer in consultation with the building owner.

A blower capable of creating the required flow will be mounted on the roof. In order to size the fan, a blower test will be performed after the sub-grade components are installed under the basement slab.

To avoid entry of extracted subsurface vapors into the building, the vent pipe's exhaust will be:

1. at least twelve inches above the surface of the highest roof level;
2. at least ten feet above ground level;
3. at least ten feet away from any opening that is less than two feet below the exhaust point; and
4. at least ten feet from any adjoining or adjacent buildings, or HVAC intakes or supply registers.

The exhaust location, labeling, alarms and system components have been designed in general accordance with the NYSDOH *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (2006).

The proposed piping network layout is shown on drawing X-101 and the exhaust location is shown on drawing X-102, both in Appendix E.

Pressure Monitoring Points
Several pressure monitoring points will be installed through the slab to confirm the resulting pressure field.

The proposed pressure monitoring point locations are shown on drawing X-101 and the details are shown on drawing X-103, both in Appendix E.

Suction Test
Following the installation of the suction pits, a blower test will be completed in order to size the blower. A regenerative blower will be mobilized to the Site and a step-test will be completed to determine the flows from each suction pit to depressurize below the slab at least -0.02 in-wc. The above-grade head losses will be modeled using the Darcy-Weisbach equation.

Pressure Testing and Alarm System
An alarm system will be installed that will notify the building management if a drop in pressure indicates that the system is not operating as designed. In general, a pressure switch will be placed on the main riser with a field-set switch point. The alarm will be a horn-strobe mounted in the

basement. Currently, building staff is in the basement on a regular basis from Monday to Friday. In the event that the staffing schedule changes, an auto-dialer will be added to the system.

The locations of the pressure switches and alarms are shown on drawing X-101 in Appendix E.

Initial Start-Up
After the depressurization and venting systems have been installed, the following will be completed:

1. visual inspection of basement slabs for any cracks or holes. If any are identified, they will be sealed using caulk;
2. measurement of the sub-slab pressure at the monitoring point to ensure that the remedial goal of -0.02 in-wc has been achieved. If the start-up is not conducted during heating season, the pressure differential will also be measured during heating season to ensure that the remedial goal of -0.02 in-wc has been achieved. While -0.02 is the design goal, differential pressure readings above -0.004 in-wc will be considered acceptable.
3. if appliances that rely on natural draft for exhaust of carbon monoxide and other combustion gases are identified, the potential for back draft will be tested. The potential for back draft will be determined using a carbon monoxide meter. If any back draft is identified, it will be corrected.

Operations, Maintenance and Monitoring (OM&M) Plan
A draft Operations, Maintenance and Monitoring (OM&M) Plan is included in Appendix F. The OM&M Plan includes the currently specified items and will be updated following the completion of the SSDS.

Post-Remedial Indoor Air Sampling
Following installation and start-up of the SSDS and the rerouting of the exhaust piping (described in Section 7.0, below) additional indoor air samples will be collected. Samples will be collected from all residential units. An ambient air sample will be collected during each sampling event.

All samples will be collected in accordance with the Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH, October 2006). Some sample locations may be adjusted based on field observations or conditions.

The indoor air and ambient air samples will be collected from breathing height, between three and four feet above the floor. The sampling flow rate will not exceed 0.2 liters per minute (L/min). Sampling will occur for a duration of eight hours. A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, sampling depth, identity of samplers, sampling methods and devices, soil vapor purge volumes, volume of the soil vapor extracted, vacuum of canisters before and after the samples are collected, apparent moisture content of the sampling zone, and chain of custody protocols.

Samples will be collected in laboratory-supplied canisters and will be sealed, labeled, and placed in a secure container for delivery to a NYSDOH ELAP-certified analytical laboratory. All samples will be analyzed for EPA Method TO-15 VOCs.

5.2 Materials Transport Off-Site

Soil/fill will be excavated during the installation of suction pits. The material will be drummed and staged for disposal. All transport of materials will be performed by licensed haulers in accordance with appropriate local, state, and federal regulations, including 6NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Trucks removing drums from the Site will be loaded on Van Buren Street. Trucks will make a right on Patchen Avenue, followed by a right on Lafayette Avenue, followed by a left hand turn onto Broadway. Trucks will head northwest on Broadway to the Brooklyn Queens Expressway.

5.3 Community Air Monitoring Plan (CAMP)

A Community Air Monitoring Program (CAMP) will be implemented during soil disturbance activities as described in Section 4.0 of the HASP. A Site-specific CAMP for volatiles and particulates (included as Appendix 1A of DER-10), and VOC monitoring will be implemented during all ground-intrusive activities. The Site-specific CAMP is based on the action levels in the NYSDOH Generic CAMP.

All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review

6.0 REROUTE DRY CLEANER EXHAUST

The dry cleaner exhaust will be rerouted from the current location at the first floor level on Van Buren Street to reduce the concentration of PCE in the indoor and ambient air.

6.1 Part 232 and NYCDOB Mechanical Code Compliance

NYCRR Part 232 indicates that discharge of the exhaust above the roof and a minimum 25 feet from air intakes/windows would be acceptable. While the installation date of the machine is unknown, the most conservative exhaust guidance is in Part 232.6(a)4, which reads in part that the exhaust "must be vented to the outer air above the roof and more than 25 feet from all openings in nearby occupancies."

The NYCDOB MC Section 401.5.2 (Ventilation), which reads in part, "(t)o minimize the hazard from fires and from noxious, toxic or obnoxious discharges to structures, any exhaust air discharge to the outside atmosphere shall terminate at or above the roof or setback from of the buildings or in an exterior wall adjoining a street, yard or court. Exhaust air discharges shall be… at least 10 feet (3048 mm) from any window or in another building or from any window in a residential portion of the same building, or from any fire escape, exterior stair, or balcony. Exhaust system opening shall be provided with dances or louvers construction so as to direct the air away from windows, other openings, and pedestrians."

6.2 Exhaust Re-routing

As shown on drawings M-100 through M-102, in Appendix G, prepared by WW Engineering PLLC of Brooklyn, NY, a new exhaust duct will be routed to above the parapet. The exhaust duct will have a new exhaust booster fan and make up air vent.

The final exhaust location will be above the roof and more than 25 feet from any window or air intake.

These drawings will be self-certified by Wing F. Wong, a professional engineer licensed in the State of New York.

7.0 REPORTING

This section outlines the reporting requirements for the Site. All daily and monthly reports will be included in the FER. Job-site record keeping for all remedial work will be appropriately documented. These records will be maintained on-Site at all times during the project and be available for inspection by NYSDEC and NYSDOH staff.

7.1 Daily Reports

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers by the end of each day following the reporting period and will include:

- An update of progress made during each day;
- Locations of work and quantities of material imported and exported from the Site;
- A summary of any and all complaints with relevant details (names, phone numbers);
- A summary of CAMP findings, including excursions; and,
- An explanation of notable Site conditions.

Daily reporting will be conducted during active Site remediation periods including suction pit installation, air monitoring, off-Site disposal of material, crack sealing and exhaust re-routing.

Daily reports are not intended to be the mode of communication for notification to the NYSDEC of emergencies (accident, spill, etc.), requests for changes to the Remedial Action Plan or other sensitive or time critical information. However, such conditions must also be included in the daily reports. Emergency conditions and changes to the Remedial Action Plan will be addressed directly to NYSDEC Project Manager via personal communication.

Daily reports will include a description of daily activities keyed to a map for the Site that identifies work areas. These reports will include a summary of air sampling results, odor and dust problems and corrective actions, and any complaints received from the public. All complaints received will immediately be reported to NYSDEC and NYSDOH.

The NYSDEC assigned project number will appear on all reports.

7.2 Monthly Reports

Monthly reports will be submitted to NYSDEC and NYSDOH Project Managers by the 10th day of the following month and will include:

- Activities relative to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e., material exported and imported, etc.);
- Description of approved activity modifications, including changes of work scope and/or schedule;
- Sampling results received following internal data review and validation, as applicable; and,

- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

7.3 Interim Remedial Measures Construction Completion Report

An Interim Remedial Measures Construction Completion Report (IRMCCR) will be submitted to NYSDEC after completion of the IRM, and will include the following documentation of the IRM:

1. Certification by the RE that the data generated is useable and meets the remedial requirements;
2. Certification by the RE that the interim remedial measures conformed to the IRMWP;
3. Certification by the RE that dust, odor, and vapor control measures were implemented during invasive work and conformed with the IRMWP;
4. Certification by the RE that any remedial waste was transported and disposed in accordance with the IRMWP;
5. Certification by the RE that the source approval and sampling of imported acceptable fill was completed in a manner consistent with the methodology of the IRMWP;
6. Summary of the remedy and all remedial actions completed;
7. Description of any problems encountered and their resolutions;
8. Description of the deviations from the approved IRMWP;
9. Listing of waste streams, quantity of materials disposed, and where they were disposed;
10. Analytical QA/QC completed for the environmental media sampling during the remedial activities, including DUSR or other data validation;
11. List of the remediation standards applied to the remedial actions;
12. List of all applicable local, regional, and national governmental permits, certificates, or other approvals required for the remedial and development work;
13. Tables and figures containing all pre- and post-remedial data, including volumes of soil removed (as applicable);
14. Description of source and quality of fill (as applicable);
15. Air quality and dust monitoring data, including any supporting documentation on the decisions made based on the data;
16. Copies of all the submitted periodic reports; and
17. Copies of all manifests of off-site transport of waste material.

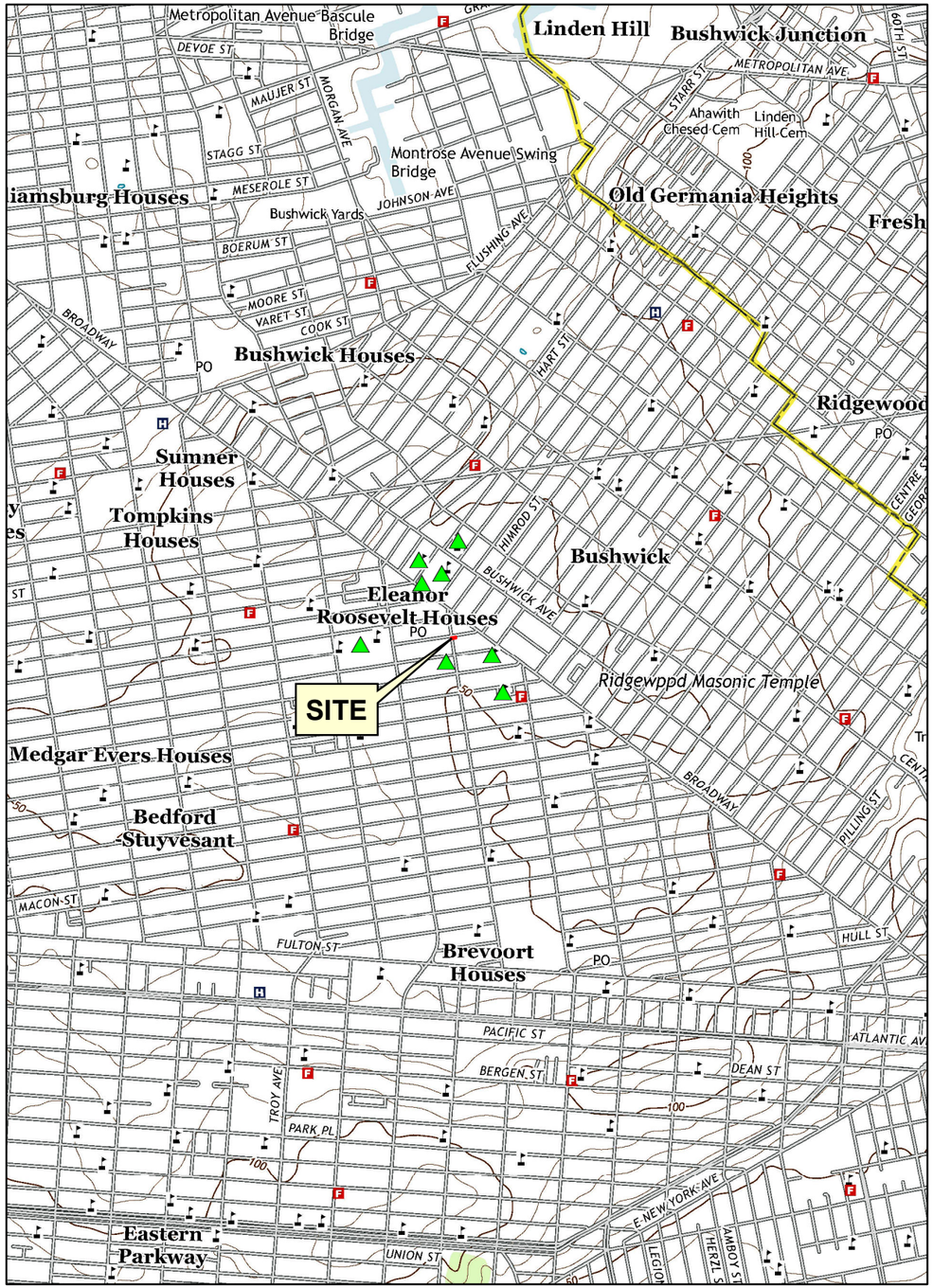
All documents and reports submitted to the NYSDEC will be in both hard copy and in digital format on CD. These digital documents shall be in PDF form and, where appropriate, supplemented by photos and Microsoft Excel files. Laboratory analytical data will be submitted in an electronic data deliverable (EDD) format that complies with the NYSDEC's electronic data warehouse standards.

In the event that the successful implementation results in a Track 1 remedy, the IRMCCR may be submitted with a Final Engineering Report (FER) assuming approval by NYSDEC.

7.4 Remedial Investigation Report and Remedial Action Work Plan

A Remedial Investigation Report (RIR) and a Remedial Action Work Plan (RAWP) will be submitted. The RAWP will include a summary of the IRM, an alternatives analysis and description of a final remedy for the Site. Documentation of the IRM activities will be also be included in the FER that will be completed after the implementation of the RAWP.

Figures



Basemap: USGS Brooklyn - NY Quandrangle, 2013
http://www.usgs.gov

Site Location

▲ Sensitive Receptor

0 1,000 2,000 4,000 Feet

http://gis.nyc.gov/taxmap/map.htm

Department of Finance Digital Tax Map

0 50 100 200 Feet

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
NYC Department of City Planning, Information Technology Division

Department of City Planning MapPLUTO - 2015

0 50 100 200 Feet

19 Patchen Avenue
Brooklyn, New York
Block 1618, Lot 8

Client

TENEN ENVIRONMENTAL
Tenen Environmental, LLC
121 West 27th Street
Suite 702
New York, NY 10001
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Drawn By	Checked By	Date	Scale
LM	MC	July 2016	As Noted

Drawing Title: **Site Location Map**

Drawing No: **Figure 1**

NYCDOB MC 401.5.2. Exhaust air discharges shall be at least 10 feet above the sidewalk or ground and shall terminate at least 10 feet from any window.

0 8
SCALE: 1" = 8'

Re: Google Street View, 2015.

CLIENT
19 PATCHEN AVENUE
BROOKLYN, NY

CONSULTANT
TENEN ENVIRONMENTAL

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DRAWN BY	CHECKED BY	DATE	SCALE:
MC	KM	11/23/15	AS NOTED

DRAWING TITLE.
DRY CLEANER
EXHAUST LOCATION

DRAWING NO.
FIGURE 2

Basemap Features Source: New York City Dept. of Finance & NYC Open Data.

CLIENT

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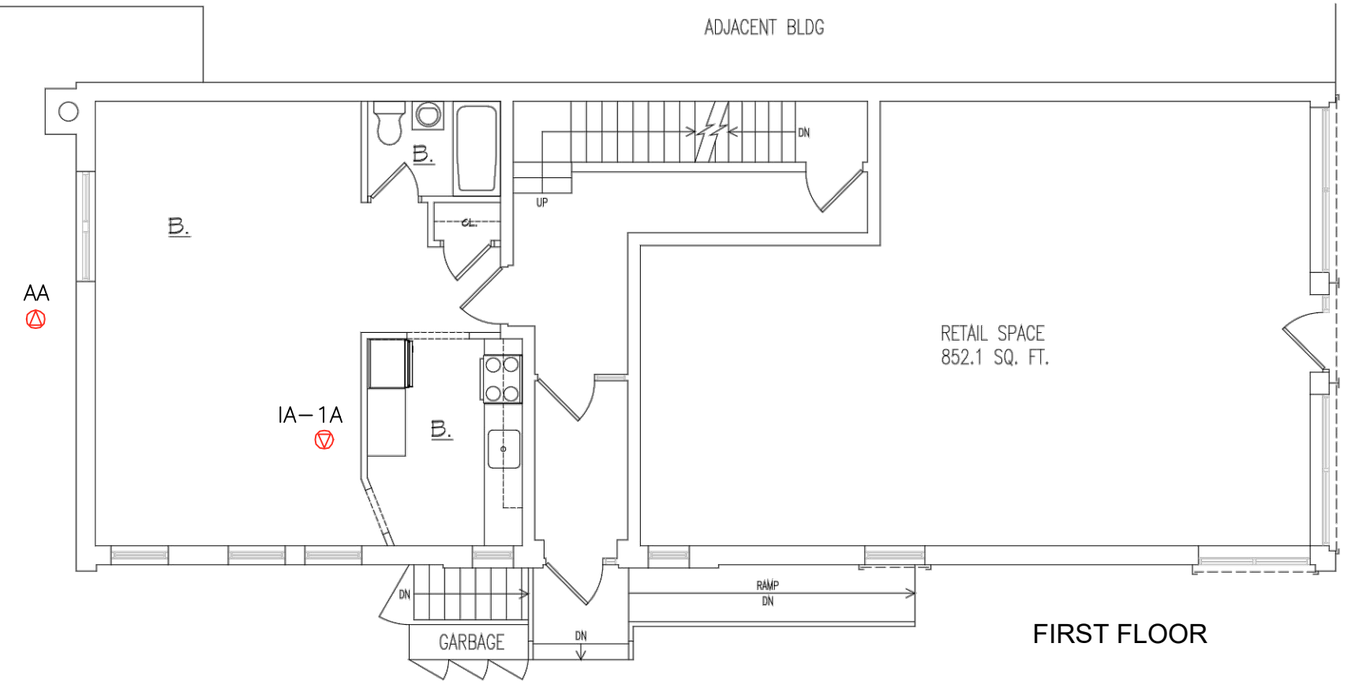
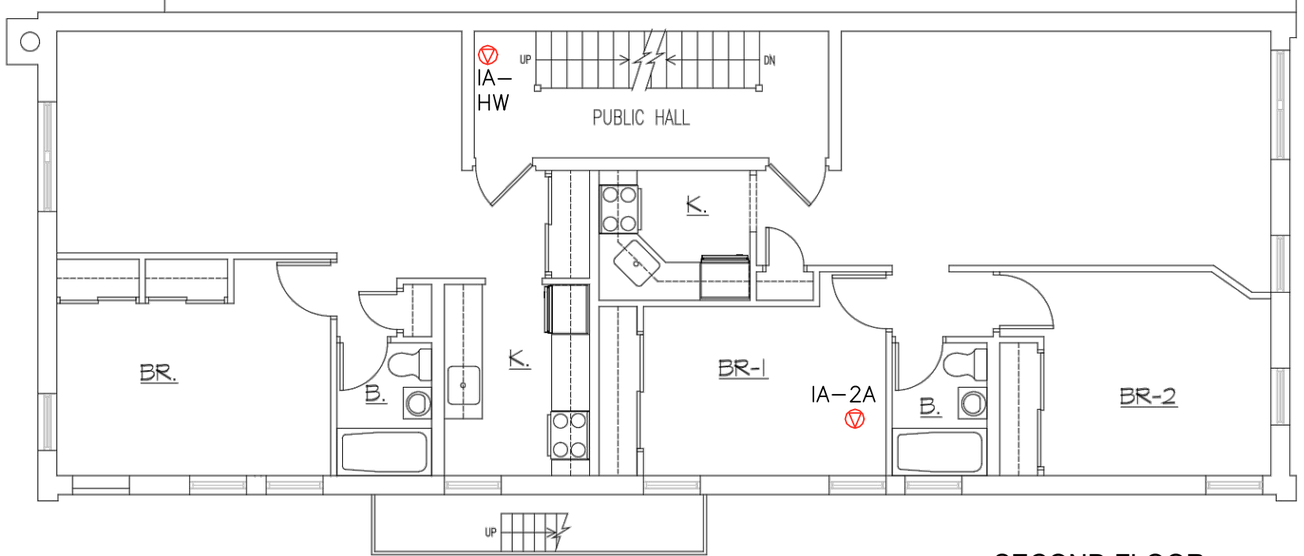
DRAWN BY	CHECKED BY	DATE	SCALE:
LM	MC	JULY 2016	AS NOTED

DRAWING TITLE: FIGURE 3

DRAWING NO.: PREVIOUS SAMPLE LOCATIONS



FIRST FLOOR



SECOND FLOOR

LEGEND

- Indoor Air Sample Location
- Ambient Air Sample Location

0 4' 8' 16'

Drawing Scale

Basemap Source:
Aufgang Architects, LLC, Suffern, NY,
Proposed Repair and Renno□ation for BEC New Communities HDFC, Inc.,
Pro□□151□, Dwg. □A-102.00, 6□2□□15

CLIENT

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BROOKLYN, NEW YORK

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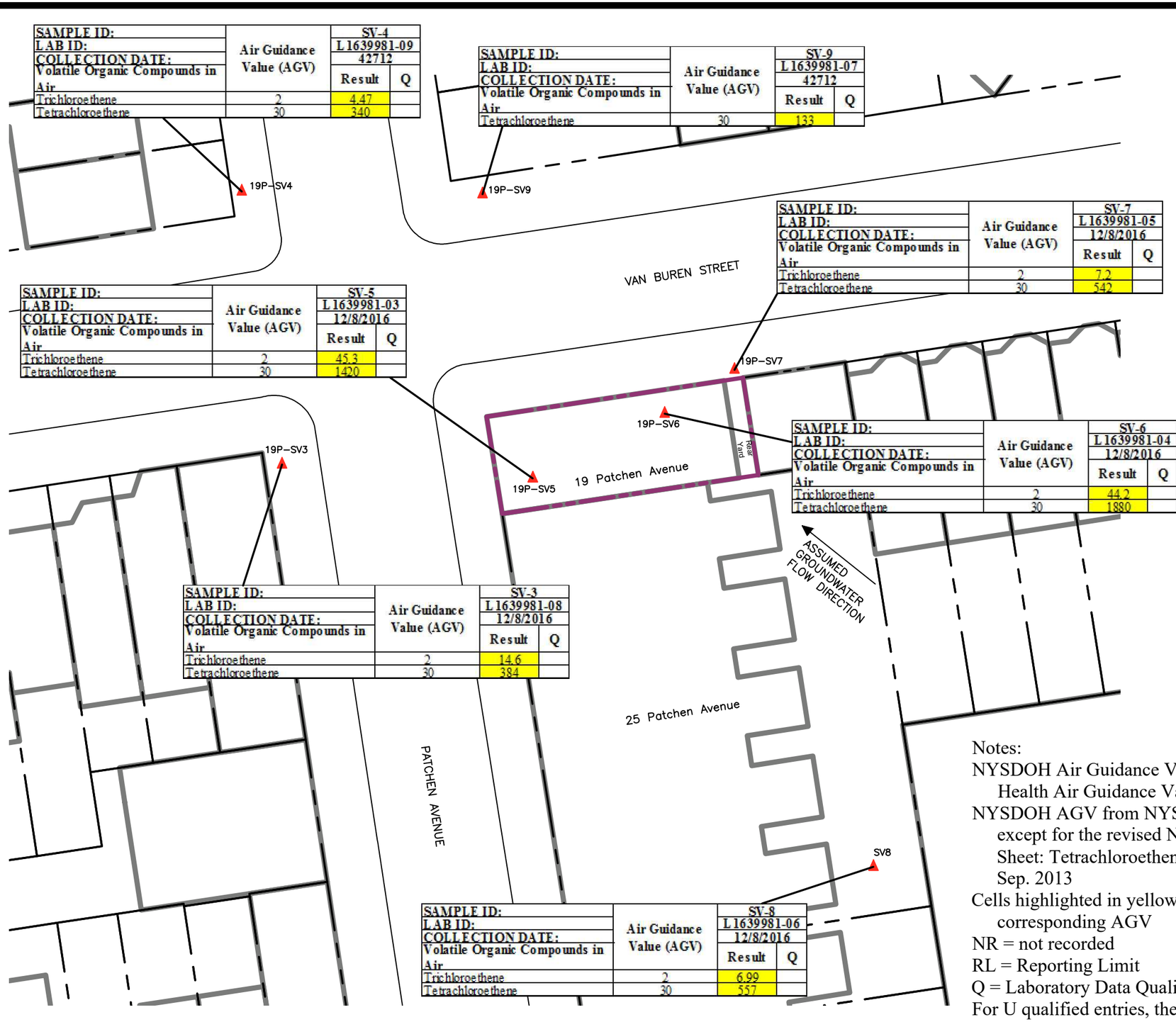
DRAWN BY	CHECKED BY	DATE	SCALE:
LM	MC	DECEMBER 2016	AS NOTED

DRAWING TITLE: FIGURE 4

DRAWING NO.: PREVIOUS AMBIENT AIR AND INDOOR AIR SAMPLES



LEGEND

▲ Soil Vapor Sample Location

Notes:

NYSDOH Air Guidance Value = New York State Department of Health Air Guidance Values (AGV)

NYSDOH AGV from NYSDOH Soil Vapor Guidance, Oct. 2006, except for the revised NYSDOH AGV for PCE from Fact Sheet: Tetrachloroethene (PERC) in Indoor & Outdoor Air, Sep. 2013

Cells highlighted in yellow indicate concentrations above the corresponding AGV

NR = not recorded

RL = Reporting Limit

Q = Laboratory Data Qualifier

For U qualified entries, the RL is shown

U = not detected at or above the RL

-- = No Standard

Results and RL values are in micrograms per cubic meter (ug/m³)

Basemap Features Source: New York City Dept. of Finance & NYC Open Data.

CLIENT: 19 PATCHEN AVENUE
BROOKLYN, NEW YORK

CONSULTANT: TENEN ENVIRONMENTAL

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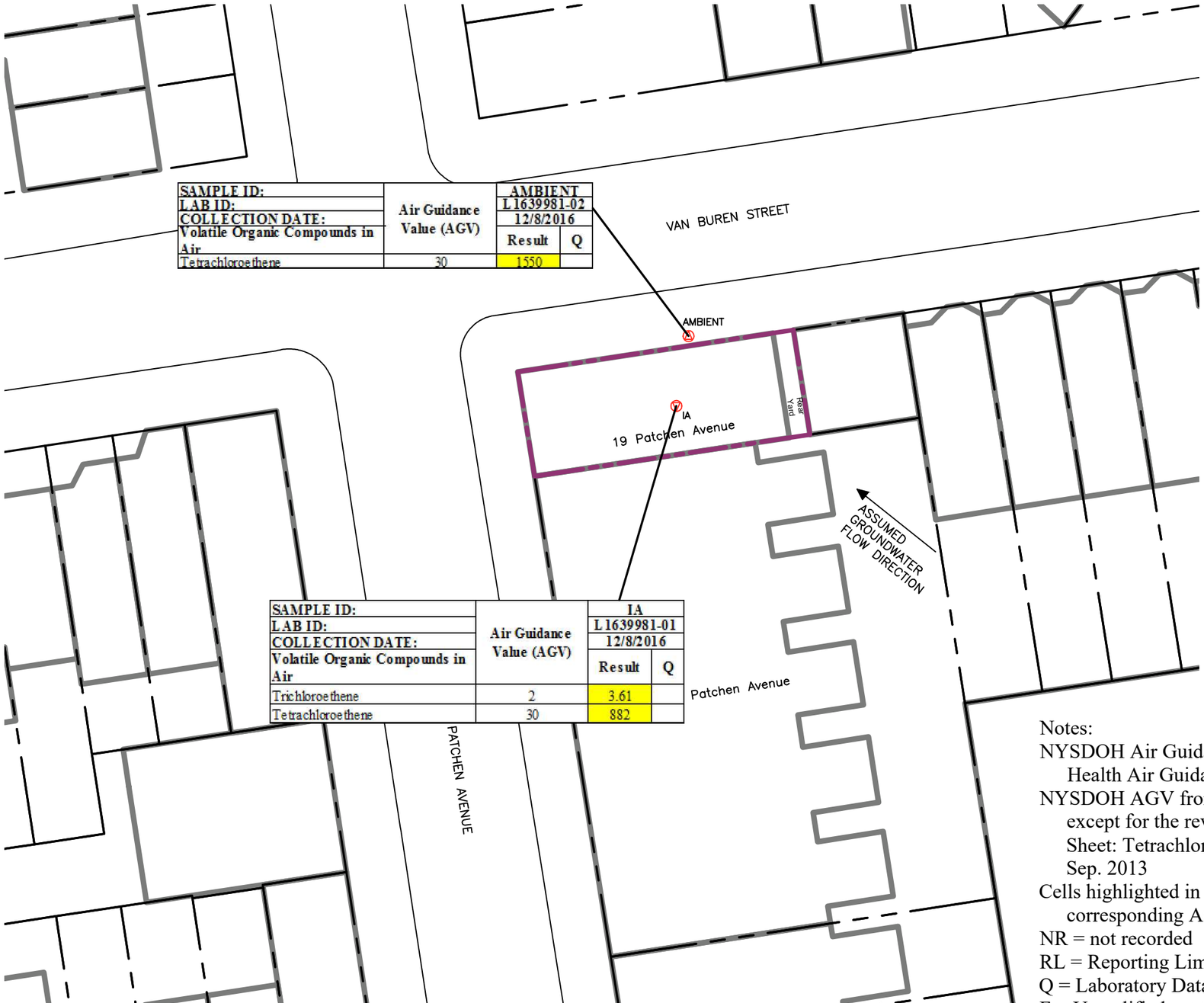
DRAWN BY	CHECKED BY	DATE	SCALE:
LM	CZ	JANUARY 2017	AS NOTED

DRAWING TITLE: FIGURE 5

DRAWING NO.: SOIL VAPOR SAMPLE RESULTS



SAMPLE ID:	Air Guidance Value (AGV)	AMBIENT	
LAB ID:		L1639981-02	
COLLECTION DATE:		12/8/2016	
Volatile Organic Compounds in Air		Result	Q
Tetrachloroethene	30	1550	

SAMPLE ID:	Air Guidance Value (AGV)	IA	
LAB ID:		L1639981-01	
COLLECTION DATE:		12/8/2016	
Volatile Organic Compounds in Air		Result	Q
Trichloroethene	2	3.61	
Tetrachloroethene	30	882	

LEGEND

- Indoor Air Sample Location
- Ambient Sample Location

Notes:

NYSDOH Air Guidance Value = New York State Department of Health Air Guidance Values (AGV)

NYSDOH AGV from NYSDOH Soil Vapor Guidance, Oct. 2006, except for the revised NYSDOH AGV for PCE from Fact Sheet: Tetrachloroethene (PERC) in Indoor & Outdoor Air, Sep. 2013

Cells highlighted in yellow indicate concentrations above the corresponding AGV

NR = not recorded

RL = Reporting Limit

Q = Laboratory Data Qualifier

For U qualified entries, the RL is shown

U = not detected at or above the RL

-- = No Standard

Results and RL values are in micrograms per cubic meter (ug/m³)

Basemap Features Source: New York City Dept. of Finance & NYC Open Data.

0 15' 30' 60'

Drawing Scale

CLIENT: 19 PATCHEN AVENUE BROOKLYN, NEW YORK

CONSULTANT: TENEN ENVIRONMENTAL

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DRAWN BY	CHECKED BY	DATE	SCALE:
LM	MC	JANUARY 2017	AS NOTED

DRAWING TITLE: FIGURE 6

DRAWING NO.: CELLAR INDOOR AIR SAMPLE RESULTS

SAMPLE ID:	NY-AWQS	MW-4	
LAB ID:		L1639548-03	
COLLECTION DATE:		12/6/2016	
Volatile Organic Compounds Units: ug/l		Conc	Q
Tetrachloroethene	5	26	

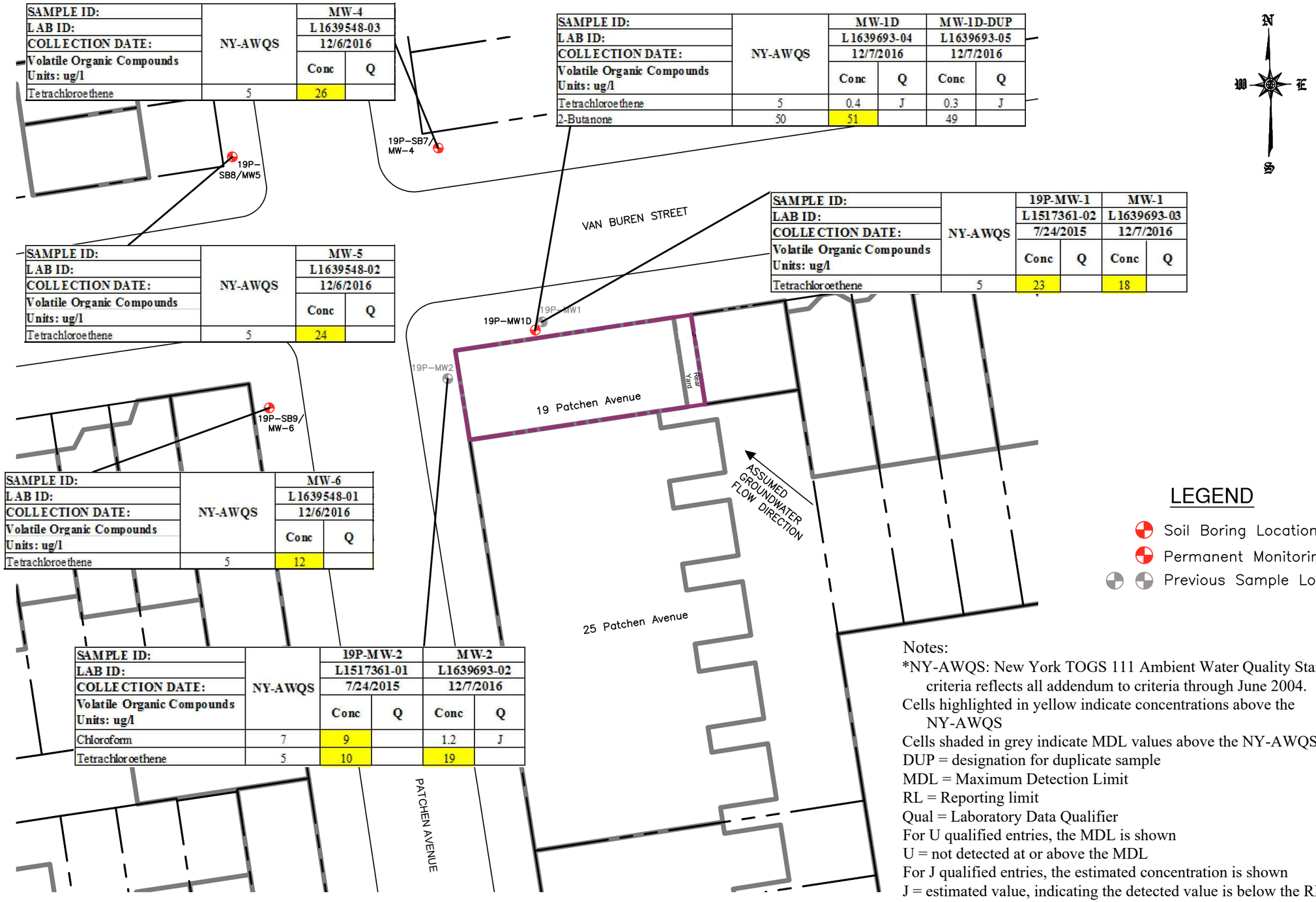
SAMPLE ID:	NY-AWQS	MW-1D		MW-1D-DUP	
LAB ID:		L1639693-04		L1639693-05	
COLLECTION DATE:		12/7/2016		12/7/2016	
Volatile Organic Compounds Units: ug/l		Conc	Q	Conc	Q
Tetrachloroethene	5	0.4	J	0.3	J
2-Butanone	50	51		49	

SAMPLE ID:	NY-AWQS	MW-5	
LAB ID:		L1639548-02	
COLLECTION DATE:		12/6/2016	
Volatile Organic Compounds Units: ug/l		Conc	Q
Tetrachloroethene	5	24	

SAMPLE ID:	NY-AWQS	19P-MW-1		MW-1	
LAB ID:		L1517361-02		L1639693-03	
COLLECTION DATE:		7/24/2015		12/7/2016	
Volatile Organic Compounds Units: ug/l		Conc	Q	Conc	Q
Tetrachloroethene	5	23		18	

SAMPLE ID:	NY-AWQS	MW-6	
LAB ID:		L1639548-01	
COLLECTION DATE:		12/6/2016	
Volatile Organic Compounds Units: ug/l		Conc	Q
Tetrachloroethene	5	12	

SAMPLE ID:	NY-AWQS	19P-MW-2		MW-2	
LAB ID:		L1517361-01		L1639693-02	
COLLECTION DATE:		7/24/2015		12/7/2016	
Volatile Organic Compounds Units: ug/l		Conc	Q	Conc	Q
Chloroform	7	9		1.2	J
Tetrachloroethene	5	10		19	



N
W E
S

LEGEND

- Soil Boring Location
- Permanent Monitoring Well
- Previous Sample Locations

Notes:

*NY-AWQS: New York TOGS 111 Ambient Water Quality Standards criteria reflects all addendum to criteria through June 2004.
Cells highlighted in yellow indicate concentrations above the NY-AWQS
Cells shaded in grey indicate MDL values above the NY-AWQS
DUP = designation for duplicate sample
MDL = Maximum Detection Limit
RL = Reporting limit
Qual = Laboratory Data Qualifier
For U qualified entries, the MDL is shown
U = not detected at or above the MDL
For J qualified entries, the estimated concentration is shown
J = estimated value, indicating the detected value is below the RL, but above the MDL
-- = No standard
- = Not Analyzed
Results and MDL values are in micrograms per liter (µg/L)

Basemap Features Source: New York City Dept. of Finance & NYC Open Data.

0 15' 30' 60'
Drawing Scale

CLIENT
19 PATCHEN AVENUE
BROOKLYN, NEW YORK

CONSULTANT
TENEN ENVIRONMENTAL
TENEN ENVIRONMENTAL, LLC
121 West 27th Street
Suite 702
New York, NY 10001
O: 646-606-2332
F: 646-606-2379

DRAWN BY: LM
CHECKED BY: CZ
DATE: JANUARY 2017
SCALE: AS NOTED

DRAWING TITLE: FIGURE 7
DRAWING NO.: GROUNDWATER SAMPLE RESULTS

Tables

Table 1
Project Organization and Emergency Contacts
19 Patchen Avenue - Brooklyn, New York
BCP Site #C224232

Title / Role	Name	Entity	Contact Information
Professional Engineer	Matthew Carroll	--	(646) 827-1061
QEP	Mohamed Ahmed	Tenen Environmental	(646) 606-2332
Volunteer	Chris Tepper	19 Patchen LLC	(212) 777-9500
Construction Manager	Gerald Pointing, Jr.	Broadway Builders	(212) 777-9500
NYSDEC	Cynthia Whitfield	NYSDEC	(518) 402-9568
NYSDOH	Angela Martin	NYSDOH	(518) 402-7860
Emergency	Ambulance	FDNY	911

Table 2
Interim Remedial Measures Schedule
19 Patchen Avenue - Brooklyn, New York
BCP Site #C224232

Task	Duration (days)	Start	End
NYSDEC Approval of IRM Work Plan	30	2/10/17	3/10/17
NYCDOB Permit for Exhaust Piping	30	2/10/17	3/10/17
Mobilization	10	3/10/17	3/20/17
Install and Start-up SSDS	30	3/20/17	4/20/17
Re-route Exhaust Piping *	30	3/20/17	4/20/17
Prepare Construction Completion Report	45	4/20/17	5/5/17

IRM - Interim Remedial Measure

Appendix A
Health and Safety Plan

HEALTH AND SAFETY PLAN

for
19 Patchen Avenue
Interim Remedial Measures Work Plan

19 Patchen Avenue,
Brooklyn, New York 11221
BCP Site # C224232

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B
625 Broadway, 12th Floor
Albany, NY 12233-7016

Prepared for:
19 Patchen LLC
826 Broadway, 11th Floor
New York, NY 10003

Prepared by:
TENEN ENVIRONMENTAL
121 West 27th Street, Suite 702
New York, NY 10001

February 2017

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Appendices

1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been prepared in conformance with the Occupational Safety and Health Administration (OSHA) standards and guidance that govern site investigation activities, other applicable regulations, and Tenen Environmental LLC (Tenen) health and safety policies and procedures. The purpose of this HASP is the protection of Tenen field personnel and others during the implementation of a Phase II investigation.

The Site, located at 19 Patchen Avenue, is a rectangular parcel of land located at the corner of Patchen Avenue and Van Buren Street in the Bedford Stuyvesant area of Brooklyn.

The Site area is 1,838 square feet (0.0422 acre) with 25 feet of frontage along Patchen Avenue. The Site is occupied by a four-story mixed-use commercial and residential building with a basement. An active dry cleaner occupies the ground floor commercial space. The current operator is Rodriguez Dry Cleaners (NYSDEC Dry Cleaning Facility #2-6104-01058). The Site is located in Brooklyn Community Board 3 and is generally identified on New York City tax maps as Kings County Block 1618, Lot 8.

1.1 Scope of HASP

This HASP includes safety procedures to be used by Tenen staff during the following activities:

- Installation of sub-grade components of a sub-slab depressurization system.

Subcontractors will ensure that performance of the work is in compliance with this HASP and applicable laws and regulations.

2.0 PROJECT SAFETY AUTHORITY

The following personnel are responsible for project health and safety under this HASP.

- Project Manager, Matthew Carroll
- Health and Safety Officer (HSO), Mohamed Ahmed

In addition, each individual working at the Site will be responsible for compliance with this HASP and general safe working practices. All Site workers will have the authority to stop work if a potentially hazardous situation or event is observed.

2.1 Designated Personnel

The Project Manager is responsible for the overall operation of the project, including compliance with the HASP and general safe work practices. The Project Manager may also act as the Health and Safety Officer (HSO) for this project.

Tenen will appoint one of its on-site personnel as the on-site HSO. This individual will be responsible for the implementation of the HASP. The HSO will have a 4-year college degree in occupational safety or a related science/engineering field, and at least two (2) years of experience in implementation of air monitoring and hazardous materials sampling programs. The HSO will have completed a 40-hour training course that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards.

The HSO will be present on-site during all field operations involving drilling or other subsurface disturbance, and will be responsible for all health and safety activities and the delegation of duties to the field crew. The HSO has stop-work authorization, which he/she will execute on his/her determination of an imminent safety hazard, emergency situation, or other potentially dangerous situation. If the HSO must be absent from the field, a replacement who is familiar with the Construction Health and Safety Plan, air monitoring and personnel protective equipment (PPE) will be designated.

3.0 HAZARD ASSESSMENT AND CONTROL MEASURES

Known previous and current uses of the site include operations that used chlorinated solvents. In particular, chlorinated solvents were detected in elevated levels in soil vapor, indoor air and groundwater. Soil samples collected from below the basement slab did not contain any compounds above the NY Part 375 Unrestricted Use soil cleanup objectives (SCOs).

3.1 Human Exposure Pathways

The media of concern at the Site include impacted soil vapor, indoor air and groundwater. In this scope of work, groundwater will not be encountered. Potential exposure pathways include dermal contact, incidental ingestion and inhalation of vapors. The risk of dermal contact and incidental ingestion will be minimized through general safe work practices, a personal hygiene program and the use of PPE. The risk of inhalation will be minimized through the use of an air monitoring program for VOCs and particulates.

3.2 Chemical Hazards

The following contaminants of concern may be present at the Site:

Chlorinated Solvents

- Tetrachloroethylene (PCE)
- Trichloroethene (TCE)
- Cis-1,2-Dichloroehtene (cis-1,2-DCE)

Material Safety Data Sheets (MSDSs) for each contaminant of concern are included in Appendix C. All personnel are required to review the MSDSs included in this HASP.

3.3 Physical Hazards

The physical hazards associated with the field activities likely present a greater risk of injury than the chemical constituents at the Site. Activities within the scope of this project shall comply with New York State and Federal OSHA construction safety standards.

Head Trauma

To minimize the potential for head injuries, field personnel will be required to wear National Institutes of Occupational Safety and Health (NIOSH)-approved hard hats during field activities. Hats must be worn properly and not altered in any way that would decrease the degree of protection provided.

Foot Trauma

To avoid foot injuries, field personnel will be required to wear steel-toed safety shoes while field activities are being performed. To afford maximum protection, all safety shoes must meet American National Standards Institute (ANSI) standards.

Eye Trauma
Field personnel will be required to wear eye protection (safety glasses with side shields) while field activities are being performed to prevent eye injuries caused by contact with chemical or physical agents.

Noise Exposure
Field personnel will be required to wear hearing protection (ear plugs or muffs) in high noise areas (noise from heavy equipment) while field activities are being performed.

Buried Utilities and Overhead Power Lines
Boring locations will be cleared by an underground utility locator service. In addition, prior to intrusive activities, the drilling subcontractor will contact the One Call Center to arrange for a utility mark-out, in accordance with New York State requirements. Protection from overhead power lines will be accomplished by maintaining safe distances of at least 15 feet at all times.

Thermal Stress
The effects of ambient temperature can cause physical discomfort, personal injury, and increase the probability of accidents. In addition, heat stress due to lack of body ventilation caused by protective clothing is an important consideration. Heat-related illnesses commonly consist of heat stroke and heat exhaustion.

The symptoms of heat stroke include: sudden onset; change in behavior; confusion; dry, hot and flushed skin; dilated pupils; fast pulse rate; body temperature reaching 105° or more; and/or, deep breathing later followed by shallow breathing.

The symptoms of heat exhaustion include: weak pulse; general weakness and fatigue; rapid shallow breathing; cold, pale and clammy skin; nausea or headache; profuse perspiration; unconsciousness; and/or, appearance of having fainted.

Heat-stress monitoring will be conducted if air temperatures exceed 70 degrees Fahrenheit. The initial work period will be set at 2 hours. Each worker will check his/her pulse at the wrist for 30 seconds early in each rest period. If the pulse rate exceeds 110 beats per minute, the next work period will be shortened by one-third.

One or more of the following precautions will reduce the risk of heat stress on the Site:

- Provide plenty of liquids to replace lost body fluids; water, electrolytic drinks, or both will be made available to minimize the risk of dehydration and heat stress
- Establish a work schedule that will provide appropriate rest periods
- Establish work regimens consistent with the American Conference of Governmental Industrial Hygienists (ACGIH) guidelines
- Provide adequate employee training on the causes of heat stress and preventive measures

In the highly unlikely event of extreme low temperatures, reasonable precautions will be made to avoid risks associated with low temperature exposure.

Traffic
Field activities will occur near public roadways. As a result, vehicular traffic will be a potential

hazard during these activities and control of these areas will be established using barricades or traffic cones. Additional staff will be assigned, as warranted, for the sole purpose of coordinating traffic. Personnel will also be required to wear high-visibility traffic vests while working in the vicinity of the public roadways and local requirements for lane closure will be observed as needed. All work in public rights-of-way will be coordinated with local authorities and will adhere to their requirements for working in traffic zones.

Hazardous Weather Conditions

All Site workers will be made aware of hazardous weather conditions, specifically including extreme heat, and will be requested to take the precautions described herein to avoid adverse health risks. All workers are encouraged to take reasonable, common sense precautions to avoid potential injury associated with possible rain or high wind, sleet, snow or freezing.

Slip, Trip and Fall

Areas at the Site may be slippery from mud or water. Care should be taken by all Site workers to avoid slip, trip, and fall hazards. Workers shall not enter areas that do not have adequate lighting. Additional portable lighting will be provided at the discretion of the HSO.

Biological Hazards

Drugs and alcohol are prohibited from the Site. Any on-site personnel violating this requirement will be immediately expelled from the site.

Any worker or oversight personnel with a medical condition that may require attention must inform the HSO of such condition. The HSO will describe appropriate measures to be taken if the individual should become symptomatic.

Due to the Site location in an urban area, it is highly unlikely that poisonous snakes, spiders, plants and insects will be encountered. However, other animals (dogs, cats, etc.) may be encountered and care should be taken to avoid contact.

4.0 AIR MONITORING

Air quality monitoring equipment will be used during all work activities to measure total organic vapors. A PID (to monitor total volatile organic concentrations) will be used during on-site activities. The equipment will be calibrated daily and the results noted in the project field book. A background level will be established, at a minimum, on a daily basis, and recorded in the field book. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shut down.
4. All 15-minute readings must be recorded. Instantaneous readings, if any, used for decision purposes should also be recorded.

During soil boring and sampling outside the mall buildings, particulate monitoring will be performed using a real-time particulate monitor that will monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

Object to be measured: Dust, Mists, Aerosols
Size range: <0.1 to 10 microns
Sensitivity: 0.001 mg/m3
Range: 0.001 to 10 mg/m3
Overall Accuracy: ±10% as compared to gravimetric analysis of stearic acid or reference dust.

Particulate levels will be monitored immediately downwind at the working site and integrated over a period not to exceed 15 minutes. The action level will be established at 150 ug/m^3 over the integrated period not to exceed 15 minutes.

5.0 PERSONAL PROTECTIVE EQUIPMENT

The personal protection equipment required for various kinds of site investigation tasks is based on 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, "General Description and Discussion of the Levels of Protection and Protective Gear."

Tenen field personnel and other site personnel will wear Level D personal protective equipment. During activities such as drilling, well installation, or sampling, where there is a chance of contact with contaminated materials, modified Level D equipment will be worn. The protection will be upgraded to Level C if warranted by the results of the air monitoring. A description of the personnel protective equipment for Levels D and C is provided below.

Level D
Respiratory Protection: None
Protective Clothing: Hard hat, steel-toed shoes, long pants, nitrile gloves

Modified Level D
Respiratory Protection: None
Protective Clothing: Hard hat, steel-toed shoes, coveralls/tyvek, nitrile gloves

Level C
Respiratory Protection: Air purifying respirator with organic vapor cartridges and filters.
Protective Clothing: Same as modified Level D

6.0 EXPOSURE MONITORING

Selective monitoring of workers in the exclusion area may be conducted, as determined by the HSO, if sources of hazardous materials are identified. Personal monitoring may be conducted in the breathing zone at the discretion of the Project Manager or HSO and, if workers are wearing respiratory protective equipment, outside the face-piece.

7.0 SITE ACCESS

Access to the Site during the investigation will be controlled by the Project Manager or HSO. Unauthorized personnel will not be allowed access to the sampling areas.

8.0 WORK AREAS

During any activities involving drilling or other subsurface disturbance, the work area must be divided into various zones to prevent the spread of contamination, clarify the type of protective equipment needed, and provide an area for decontamination.

The Exclusion Zone is defined as the area where potentially contaminated materials are generated as the result of drilling, sampling, or similar activities. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place and is located adjacent to the Exclusion Zone. The Support Zone is the area where support facilities such as vehicles, a field phone, fire extinguisher and/or first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all Site workers will assemble in the event of an emergency. These zones shall be designated daily, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

Control measures such as "Caution" tape and traffic cones will be placed around the perimeter of the work area when work is being done in the areas of concern (i.e., areas with exposed soil) to prevent unnecessary access.

9.0 DECONTAMINATION PROCEDURES

Personnel Decontamination
Personnel decontamination (decon), if deemed necessary by the HSO, will take place in the designated decontamination area delineated for each sampling location. Personnel decontamination will consist of the following steps:

- Soap and potable water wash and potable water rinse of gloves;
- Tyvek removal;
- Glove removal;
- Disposable clothing removal; and
- Field wash of hands and face.

Equipment Decontamination
Sampling equipment, such as split-spoons and bailers, will be decontaminated in accordance with U.S. Environmental Protection Agency methodologies, as described in the work plan.

Disposal of Materials
Purged well water, water used to decontaminate any equipment and well cuttings will be containerized and disposed off-site in accordance with federal, state and local regulations.

10.0 GENERAL SAFE WORK PRACTICES

To protect the health and safety of the field personnel, all field personnel will adhere to the guidelines listed below during activities involving subsurface disturbance.

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited, except in designated areas on the site. These areas will be designated by the HSO.
- Workers must wash their hands and face thoroughly on leaving the work area and before eating, drinking, or any other such activity. The workers should shower as soon as possible after leaving the site.
- Removal of potential contamination from PPE and equipment by blowing, shaking or any means that may disperse materials into the air is prohibited.
- Contact with contaminated or suspected surfaces should be avoided.
- The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat stress.
- Personnel will be cautioned to inform each other of symptoms of chemical exposure such as headache, dizziness, nausea, and irritation of the respiratory tract and heat stress.
- No excessive facial hair that interferes with a satisfactory fit of the face-piece of the respirator to the face will be allowed on personnel required to wear respiratory protective equipment.
- On-site personnel will be thoroughly briefed about the anticipated hazards, equipment requirements, safety practices, emergency procedures, and communications methods.

11.0 EMERGENCY PROCEDURES

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the HSO will determine the nature of the emergency and will have someone call for an ambulance, if needed. If the nature of the injury is not serious—i.e., the person can be moved without expert emergency medical personnel—onsite personnel should drive him to a hospital. **The nearest emergency room is located at NYC Health + Hospitals Woodhull located at 760 Broadway in Brooklyn, NY 11206. The emergency room entrance is on Flushing Avenue. The phone number is (718) 963-8000.** The route to the hospital is shown and detailed on the next page.

11.1 Route to Hospital

Driving directions to **NYC Health + Hospitals Woodhull** from **19 Patchen Avenue, Brooklyn, New York.**

Driving Directions

1. Head north on Patchen Avenue toward Van Buren Street
2. Turn left onto Broadway
3. Proceed for 0.9 miles
4. Turn left on Flushing Avenue. The emergency room entrance is on the left.

11.2 Emergency Contacts

There will be an on-site field phone. Emergency and contact telephone numbers are listed below:

Table 1 – Emergency Contacts

Ambulance	911
Emergency Room	(718) 963-8000
NYSDEC Spill Hotline	(800) 457-7362
NYSDEC Manager, Cynthia Whitfield	(518) 402-9568
Tenen QEP, Mohamed Ahmed	(917) 612-6018
On-site Field Phone, Matthew Carroll	(917) 510-6767
Client representative, Chris Tepper	(212) 777-9500

12.0 TRAINING

All personnel performing the field activities described in this HASP will have received the initial safety training required by 29 CFR, 1910.120. Current refresher training status also will be required for all personnel engaged in field activities.

For non-Tenen employees involved with hazardous waste, as determined by 40 CFR 262.11 and ECL 27-0903 or a "source area" as determined by DER-10 1.3(b)70 at the Site will be required, at a minimum, to have completed 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response (HAZWOPER), site safety training and medical monitoring for site workers.

All those who enter the work area while intrusive activities are being performed must recognize and understand the potential hazards to health and safety. All field personnel must attend a training program covering the following areas:

- potential hazards that may be encountered;
- the knowledge and skills necessary for them to perform the work with minimal risk to health and safety;
- the purpose and limitations of safety equipment; and
- protocols to enable field personnel to safely avoid or escape from emergencies.

Each member of the field crew will be instructed in the above objectives before he/she goes onto the site. The HSO will be responsible for conducting the training program.

13.0 MEDICAL SURVEILLANCE

All Tenen personnel performing field work involving drilling or other subsurface disturbance at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). The medical examination for Tenen employees will, at a minimum, be provided annually and upon termination of hazardous waste site work.

Appendix A

Acknowledgement of HASP

ACKNOWLEDGMENT OF HASP

Below is an affidavit that must be signed by all Tenen Environmental employees who enter the site. A copy of the HASP must be on-site at all times and will be kept by the HSO.

AFFIDAVIT

I have read the Construction Health and Safety Plan (HASP) for the 19 Patchen Avenue site Brooklyn, NY. I agree to conduct all on-site work in accordance with the requirements set forth in this HASP and understand that failure to comply with this HASP could lead to my removal from the site.

Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____

Appendix B

Injury Reporting Form (OSHA Form 300)

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name ______________________

City ______________________ State ______________

Identify the person			**Describe the case**			**Classify the case** CHECK ONLY ONE box for each case based on the most serious outcome for that case:				**Enter the number of days the injured or ill worker was:**		**Check the "Injury" column or choose one type of illness:** (M)					
(A) Case no.	(B) Employee's name	(C) Job title (e.g., Welder)	(D) Date of injury or onset of illness	(E) Where the event occurred (e.g., Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g., Second degree burns on right forearm from acetylene torch)	Death (G)	Days away from work (H)	Remained at Work: Job transfer or restriction (I)	Remained at Work: Other record-able cases (J)	Away from work (K)	On job transfer or restriction (L)	Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
			/ month/day			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
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			/ month/day			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
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			/ month/day			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
					Page totals ➤	___	___	___	___	___	___	___	___	___	___	___	___
												Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Appendix C

Material Safety Data Sheets (MSDS)

21 VOC

Material Safety Data Sheet
Tetrachloroethylene

ACC# 22900

Section 1 - Chemical Product and Company Identification

MSDS Name: Tetrachloroethylene
Catalog Numbers: C182 20, C182 4, C182-20, C182-4, C18220, C1824, O4586 4, O4586-4, O45864
Synonyms: Ethylene tetrachloride; Tetrachlorethylene; Perchloroethylene; Perchlorethylene
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
127-18-4	Tetrachloroethylene	99.0+	204-825-9

Hazard Symbols: XN N
Risk Phrases: 40 51/53

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Irritant. May cause severe eye and skin irritation with possible burns. May cause central nervous system depression. May cause liver and kidney damage. May cause reproductive and fetal effects. May cause cancer based on animal studies. **Caution!** May cause respiratory tract irritation.
Target Organs: Kidneys, central nervous system, liver.

Potential Health Effects
Eye: Contact with eyes may cause severe irritation, and possible eye burns.
Skin: May cause severe irritation and possible burns.
Ingestion: May cause central nervous system depression, kidney damage, and liver damage. Symptoms may include: headache, excitement, fatigue, nausea, vomiting, stupor, and coma. May cause gastrointestinal irritation with nausea, vomiting and diarrhea.
Inhalation: Inhalation of vapor may cause respiratory tract irritation. May cause central nervous system effects including vertigo, anxiety, depression, muscle incoordination, and emotional instability.
Chronic: Possible cancer hazard based on tests with laboratory animals. Prolonged or repeated skin contact may cause defatting and dermatitis. May cause respiratory tract cancer. May cause

adverse nervous system effects including muscle tremors and incoordination. May cause liver and kidney damage. May cause reproductive and fetal effects.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid if irritation develops or persists. Wash clothing before reuse. Flush skin with plenty of soap and water.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.
Extinguishing Media: Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. For small fires, use dry chemical, carbon dioxide, or water spray. For large fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray. Cool containers with flooding quantities of water until well after fire is out.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 2; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Flush down the spill with a large amount of water. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Do not reuse this container. Avoid breathing vapors from heated material. Avoid contact with skin and eyes. Keep container tightly closed. Keep away from flames

and other sources of high temperatures that may cause material to form vapors or mists.
Storage: Keep away from heat and flame. Store in a cool, dry place. Keep containers tightly closed.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Tetrachloroethylene	25 ppm TWA; 100 ppm STEL	150 ppm IDLH	100 ppm TWA; 200 ppm Ceiling

OSHA Vacated PELs: Tetrachloroethylene: 25 ppm TWA; 170 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: sweetish odor
pH: Not available.
Vapor Pressure: 15.8 mm Hg
Vapor Density: 5.2
Evaporation Rate:9 (ether=100)
Viscosity: 0.89 mPa s 20 deg C
Boiling Point: 121 deg C
Freezing/Melting Point:-22.3 deg C
Decomposition Temperature:150 deg C
Solubility: Nearly insoluble in water.
Specific Gravity/Density:1.623
Molecular Formula:C2Cl4
Molecular Weight:165.812

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, excess heat.
Incompatibilities with Other Materials: Strong bases, metals, liquid oxygen, dinitrogen tetroxide.

Hazardous Decomposition Products: Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 127-18-4: KX3850000
LD50/LC50:
CAS# 127-18-4:
Draize test, rabbit, eye: 162 mg Mild;
Draize test, rabbit, eye: 500 mg/24H Mild;
Draize test, rabbit, skin: 810 mg/24H Severe;
Draize test, rabbit, skin: 500 mg/24H Mild;
Inhalation, mouse: LC50 = 5200 ppm/4H;
Inhalation, rat: LC50 = 34200 mg/m3/8H;
Oral, mouse: LD50 = 8100 mg/kg;
Oral, rat: LD50 = 2629 mg/kg;
Carcinogenicity:
CAS# 127-18-4:
ACGIH: A3 - Animal Carcinogen
California: carcinogen; initial date 4/1/88
NIOSH: potential occupational carcinogen
NTP: Suspect carcinogen
OSHA: Possible Select carcinogen
IARC: Group 2A carcinogen
Epidemiology: Epidemiologic studies have given inconsistent results. Studi es have shown that tetrachloroethylene has not caused canc er in exposed workers. The studies have serious weakne sses such as mixed exposures. In tests with rats and mice, i t appeared that tissue destruction or peroxisome prolifera tion rather than genetic mechanisms were the cause of the observed increases in normally occurring cancers. The oral mouse TDLo that was tumorigenic was 195 gm/kg/50W-I.
Teratogenicity: Has caused musculoskeletal abnormalities. Has caused morphological transformation at a dose of 97mol/L in a study using rat embryos.
Reproductive Effects: Has caused behavioral, biochemical, and metabolic effects on newborn rats when the mother was exposed to the TCLo of 900 ppm/7H at 7-13 days after conception. A dose of 300 ppm/7H 6-15 days after conception caused post-implantation mortality.
Neurotoxicity: No information available.
Mutagenicity: Not mutagenic in Escherichia coli. No mutagenic effects were seen in rat liver after exposure at 200 ppm for 10 weeks. No chromosome changes were seen in the bone marrow cells of exposed mice.
Other Studies: A case of 'obstructive jaundice' in a 6-week old infant has been attributed to tetrachloroethylene in breast milk.

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: LC50 = 5.28 mg/L; 96 Hr.; Static Condition, 12 degrees C Fathead Minnow: LC50 = 18.4 mg/L; 96 Hr.; Flow-through condition Bluegill/Sunfish: LC50 = 12.9 mg/L; 96 Hr.; Static Condition ria: Phytobacterium phosphoreum: EC50 = 120.0 mg/L; 30 minutes; Microtox test No data available.

Environmental: In soil, substance will rapidly evaporate. In water, it will evaporate. In air, it can be expected to exist in the vapor phase.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 127-18-4: waste number U210.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	TETRACHLOROETHYLENE				TETRACHLOROETHYLENE
Hazard Class:	6.1				6.1
UN Number:	UN1897				UN1897
Packing Group:	III				III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 127-18-4 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 127-18-4: Effective Date: 6/1/87; Sunset Date: 6/1/97
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

CERCLA Hazardous Substances and corresponding RQs
CAS# 127-18-4: 100 lb final RQ; 45.4 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 127-18-4: acute.
Section 313
This material contains Tetrachloroethylene (CAS# 127-18-4, 99 0%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
CAS# 127-18-4 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA. CAS# 127-18-4 is listed as a Priority Pollutant under the Clean Water Act. CAS# 127-18-4 is listed as a Toxic Pollutant under the Clean Water Act.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 127-18-4 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act: WARNING: This product contains Tetrachloroethylene, a chemical known to the state of California to cause cancer. California No Significant Risk Level: CAS# 127-18-4: 14 ug/day NSRL

European/International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
XN N
Risk Phrases:
R 40 Limited evidence of a carcinogenic effect.
R 51/53 Toxic to aquatic organisms; may cause long-term adverse effects in the aquatic environment.

Safety Phrases:
S 23 Do not inhale gas/fumes/vapour/spray.
S 36/37 Wear suitable protective clothing and gloves.
S 61 Avoid release to the environment. Refer to special instructions/Safety data sheets.

WGK (Water Danger/Protection)
CAS# 127-18-4: 3
Canada - DSL/NDSL
CAS# 127-18-4 is listed on Canada's DSL List.
Canada - WHMIS
This product has a WHMIS classification of D1B, D2A.
Canadian Ingredient Disclosure List
CAS# 127-18-4 is listed on the Canadian Ingredient Disclosure List.
Exposure Limits
CAS# 127-18-4: OEL-ARAB Republic of Egypt:TWA 5 ppm (35 mg/m3);Skin OEL-AUSTRALIA:TWA 50 ppm (335 mg/m3);STEL 150 ppm;CAR OEL-BELGIUM:TWA 50 ppm (339 mg/m3);STEL 200 ppm (1368 mg/m3) OEL-CZECHOSLOVAKIA:TWA 250 mg/m3;STEL 1250 mg/m3 OEL-DENMARK:TWA 30 ppm (200 mg/m3);Skin OEL-FINLAND:TWA 50 ppm (335 mg/m3);STEL 75 ppm (520 mg/m3);Skin OEL-FRANCE:TWA 50 ppm (335 mg/m3) OEL-GERMANY:TWA 50 ppm (345 mg/m3);Carcinogen OEL-HUNGARY:STEL 50 mg/m3;Skin;Carcinogen OEL-JAPAN:TWA 50 ppm (340 mg/m3) OEL-THE NETHERLANDS:TWA 35 ppm (240 mg/m3);Skin OEL-THE PHILIPPINES:TWA 100 ppm (670 mg/m3) OEL-POLAND:TWA 60 mg/m3 OEL-RUSSIA:TWA 50 ppm;STEL 10 mg/m3 OEL-SWEDEN:TWA 10 ppm (70 mg/m3);STEL 25 ppm (170 mg/m3) OEL-SWITZERLAND:TWA 50 ppm (345 mg/m3);STEL 100 ppm;Skin OEL-THAILAND:TWA 100 ppm;STEL 200 ppm OEL-UNITED KINGDOM:TWA 50 ppm (335 mg/m3);STEL 15 ppm OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA

check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 6/17/1999
Revision #3 Date: 3/18/2003

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

2D

VOC

Material Safety Data Sheet
Trichloroethylene

ACC# 23850

Section 1 - Chemical Product and Company Identification

MSDS Name: Trichloroethylene
Catalog Numbers: S80232, S80327ACS-1, S80327ACS-2, NC932384B, NC9494003, NC9494591, NC9981849, S80237ACS-1, S80237ACS-2, T340-4, T341-20, T341-4, T341-500, T341J4, T403-4, XXT341SK4LIX48
Synonyms: Ethylene trichloride; triclene; trichloroethene; benzinol cecolene
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
79-01-6	Trichloroethylene	99.5	201-167-4

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid.
Warning! Causes eye and skin irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. May cause central nervous system depression. May cause cancer based on animal studies. Potential cancer hazard. May cause liver damage.
Target Organs: Central nervous system, liver, eyes, skin.

Potential Health Effects
Eye: Causes moderate eye irritation. May result in corneal injury. Contact produces irritation, tearing, and burning pain.
Skin: Causes mild skin irritation. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis. May cause peripheral nervous system function impairment including persistent neuritis, and temporary loss of touch. Damage to the liver and other organs has been observed in workers who have been overexposed.
Ingestion: Aspiration hazard. May cause irritation of the digestive tract. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.
Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. May cause respiratory tract irritation. May cause liver abnormalities. May cause peripheral nervous system effects.
Chronic: Possible cancer hazard based on tests with laboratory animals. Chronic inhalation may

cause effects similar to those of acute inhalation. Prolonged or repeated skin contact may cause defatting and dermatitis. May cause peripheral nervous system function impairment including persistent neuritis, and temporary loss of touch. Damage to the liver and other organs has been observed in workers who have been overexposed.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid imme diately.
Skin: Get medical aid if irritation develops or persists. Flush skin with plenty of soap and water.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Possible aspiration hazard. Get medical aid immediately.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors can travel to a source of ignition and flash back. Combustion generates toxic fumes. Containers may explode in the heat of a fire.
Extinguishing Media: Use water spray to cool fire-exposed containers. Use water spray, dry chemical, carbon dioxide, or chemical foam.
Flash Point: Not applicable.
Autoignition Temperature: 778 deg F (414.44 deg C)
Explosion Limits, Lower:12.5
Upper: 90.0
NFPA Rating: (estimated) Health: 2; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use only in a well-ventilated area. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Keep from

contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Trichloroethylene	50 ppm TWA; 100 ppm STEL	1000 ppm IDLH	100 ppm TWA; 200 ppm Ceiling

OSHA Vacated PELs: Trichloroethylene: 50 ppm TWA; 270 mg/m3 TWA

Personal Protective Equipment

Eyes: Wear chemical splash goggles.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Appearance: clear, colorless

Odor: sweetish odor - chloroform-like

pH: Not available.

Vapor Pressure: 58 mm Hg @20C

Vapor Density: 4.53

Evaporation Rate:0.69 (CCl4=1)

Viscosity: 0.0055 poise

Boiling Point: 189 deg F

Freezing/Melting Point:-121 deg F

Decomposition Temperature: Not available.

Solubility: Insoluble in water.

Specific Gravity/Density:1.47 (water=1)

Molecular Formula:C2HCl3

Molecular Weight:131.366

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Incompatible materials, ignition sources, oxidizers.

Incompatibilities with Other Materials: Alkalis (sodium hydroxide), chemically active metals (aluminum, beryllium, lithium, magnesium), epoxies and oxidants. Can react violently with aluminum, barium, lithium, magnesium, liquid oxygen, ozone, potassium hydroxide, potassium nitrate, sodium, sodium hydroxide, titanium, and nitrogen dioxide. Reacts with water under heat

and pressure to form hydrogen chloride gas.
Hazardous Decomposition Products: Hydrogen chloride, carbon dioxide, chloride fumes.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 79-01-6: KX4550000
LD50/LC50:
CAS# 79-01-6:
Draize test, rabbit, eye: 20 mg/24H Moderate;
Draize test, rabbit, skin: 2 mg/24H Severe;
Inhalation, mouse: LC50 = 8450 ppm/4H;
Inhalation, mouse: LC50 = 220000 mg/m3/20M;
Inhalation, mouse: LC50 = 262000 mg/m3/30M;
Inhalation, mouse: LC50 = 40000 mg/m3/4H;
Inhalation, rat: LC50 = 140700 mg/m3/1H;
Oral, mouse: LD50 = 2402 mg/kg;
Oral, mouse: LD50 = 2400 mg/kg;
Oral, rat: LD50 = 4920 mg/kg;
Skin, rabbit: LD50 = >20 gm/kg;
Skin, rabbit: LD50 = 20 mL/kg;
Carcinogenicity:
CAS# 79-01-6:

- **ACGIH:** Not listed.
- **California:** carcinogen, initial date 4/1/88
- **NTP:** Suspect carcinogen
- **IARC:** Group 2A carcinogen

Epidemiology: Suspected carcinogen with experimental carcinogenic, tumorigenic, and teratogenic data.
Teratogenicity: No information available.
Reproductive Effects: Experimental reproductive effects have been observed.
Mutagenicity: Human mutation data has been reported. IARC and the National Toxicology Program (NTP) stated that variability in the mutagencity test results with trichloroethylene may be due to the presence of various stabilizers used in TCEwhich are mutagens (e.g.epoxybutane, epichlorohydrin).See actual entry in RTECS for complete infomation.R68 Mutagen Category 3 (CHIP 2002, UK).
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. Bluegill sunfish, LD50= 44,700 ug/L/96Hr. Fathead minnow, LC50=40.7 mg/L/96Hr.
Environmental: In air, substance is photooxidized and is reported to form phosgene, dichloroacetyl chloride, and formyl chloride. In water, it evaporates rapidly.
Physical: No information available.

Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 79-01-6: waste number U228.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	TRICHLOROETHYLENE	TRICHLOROETHYLENE
Hazard Class:	6.1	6.1(9.2)
UN Number:	UN1710	UN1710
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 79-01-6 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 79-01-6: 100 lb final RQ; 45.4 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 79-01-6: acute, chronic, reactive.
Section 313
This material contains Trichloroethylene (CAS# 79-01-6, 99.5%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR
Clean Air Act:
CAS# 79-01-6 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 79-01-6 is listed as a Hazardous Substance under the CWA. CAS# 79-01-6 is listed as a Priority Pollutant under the Clean Water Act. CAS# 79-01-6 is listed as a Toxic Pollutant under

the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 79-01-6 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Trichloroethylene, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: CAS# 79-01-6: 50 æg/day NSRL (oral); 80 æg/day NSRL (inhalation)

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T

Risk Phrases:

R 36/38 Irritating to eyes and skin.
R 45 May cause cancer.
R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R 67 Vapours may cause drowsiness and dizziness.
R 68 Possible risk of irreversible effects.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.
S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 79-01-6: 3

Canada - DSL/NDSL

CAS# 79-01-6 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D1B, D2B.

Canadian Ingredient Disclosure List

CAS# 79-01-6 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 2/01/1999
Revision #5 Date: 5/31/2005

SAFETY DATA SHEET

Creation Date 22-Sep-2009 **Revision Date** 10-Feb-2015 **Revision Number** 1

1. Identification

Product Name **cis-1,2-Dichloroethylene**

Cat No. : **AC113380000; AC113380025; AC113380100; AC113380500**

Synonyms cis-Acetylene dichloride.

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 2
Acute oral toxicity	Category 4
Acute Inhalation Toxicity - Vapors	Category 4
Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word
Danger

Hazard Statements
Highly flammable liquid and vapor
Harmful if swallowed
Harmful if inhaled
Causes serious eye irritation
Causes skin irritation
May cause respiratory irritation

Precautionary Statements
Prevention
Wear protective gloves/protective clothing/eye protection/face protection
Use only outdoors or in a well-ventilated area
Avoid breathing dust/fume/gas/mist/vapors/spray
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Take precautionary measures against static discharge
Do not eat, drink or smoke when using this product
Response
Call a POISON CENTER or doctor/physician if you feel unwell
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell
Skin
IF ON SKIN: Wash with plenty of soap and water
Take off contaminated clothing and wash before reuse
If skin irritation occurs: Get medical advice/attention
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Ingestion
Rinse mouth
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Fire
Explosion risk in case of fire
Fight fire with normal precautions from a reasonable distance
Evacuate area
Storage
Store in a well-ventilated place. Keep cool
Store in a closed container
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
None identified

3. Composition / information on ingredients

Component	CAS-No	Weight %
cis-1,2-Dichloroethylene	156-59-2	97

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion Do not induce vomiting. Obtain medical attention.

Most important symptoms/effects Breathing difficulties. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. Use water spray to cool unopened containers. chemical foam.

Unsuitable Extinguishing Media No information available

Flash Point 6 °C / 42.8 °F
Method - No information available

Autoignition Temperature 440 °C / 824 °F

Explosion Limits
Upper 12.80%
Lower 9.70%
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Flammable. Vapors may travel to source of ignition and flash back.

Hazardous Combustion Products
Hydrogen chloride gas Carbon monoxide (CO) Carbon dioxide (CO_2)
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	3	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges. Avoid contact with skin, eyes and clothing.

Environmental Precautions See Section 12 for additional ecological information.

Methods for Containment and Clean Up Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling Ensure adequate ventilation. Wear personal protective equipment. Use explosion-proof equipment. Use only non-sparking tools. Avoid contact with skin, eyes and clothing. Avoid breathing dust/fume/gas/mist/vapours/spray. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharges.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat and sources of ignition. Flammables area.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
cis-1,2-Dichloroethylene	TWA: 200 ppm		

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
cis-1,2-Dichloroethylene			TWA: 200 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

Engineering Measures Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	aromatic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-80 °C / -112 °F
Boiling Point/Range	60 °C / 140 °F @ 760 mmHg
Flash Point	6 °C / 42.8 °F
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	12.80%
Lower	9.70%
Vapor Pressure	201 mmHg @ 25 °C
Vapor Density	3.34 (Air = 1.0)
Relative Density	1.280
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	440 °C / 824 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C2 H2 Cl2
Molecular Weight	96.94

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Keep away from open flames, hot surfaces and sources of ignition. Exposure to air. Exposure to light. Incompatible products. Exposure to moist air or water.

Incompatible Materials Bases

Hazardous Decomposition Products Hydrogen chloride gas, Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product

Component Information

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes, respiratory system and skin

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
cis-1,2-Dichloroethylene	156-59-2	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Do not empty into drains. Do not flush into surface water or sanitary sewer system.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
cis-1,2-Dichloroethylene	Not listed	Not listed	EC50 = 721 mg/L 5 min EC50 = 905 mg/L 30 min	Not listed

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility No information available.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No	UN1150
Proper Shipping Name	1,2-DICHLOROETHYLENE
Hazard Class	3
Packing Group	II

TDG

UN-No	UN1150
Proper Shipping Name	1,2-DICHLOROETHYLENE
Hazard Class	3
Packing Group	II

IATA

UN-No	1150
Proper Shipping Name	1,2-DICHLOROETHYLENE
Hazard Class	3
Packing Group	II

IMDG/IMO

UN-No	1150
Proper Shipping Name	1,2-DICHLOROETHYLENE
Hazard Class	3
Packing Group	II

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
cis-1,2-Dichloroethylene	X	-	X	205-859-7	-		-	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	Yes

Sudden Release of Pressure Hazard No
Reactive Hazard No

Clean Water Act Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA

Component	Hazardous Substances RQs	CERCLA EHS RQs
cis-1,2-Dichloroethylene	1000 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
cis-1,2-Dichloroethylene	X	-	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class B2 Flammable liquid
D1B Toxic materials
D2B Toxic materials

16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 22-Sep-2009
Revision Date 10-Feb-2015
Print Date 10-Feb-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally

Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

Appendix B
Soil / Materials Management Plan

SOIL/MATERIALS MANAGEMENT PLAN

for
19 Patchen Avenue
Interim Remedial Measures Work Plan

19 Patchen Avenue,
Brooklyn, New York 11221
BCP Site # C224232

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B
625 Broadway, 12th Floor
Albany, NY 12233-7016

Prepared for:
19 Patchen LLC
826 Broadway, 11th Floor
New York, NY 10003

Prepared by:
TENEN ENVIRONMENTAL
121 West 27th Street, Suite 702
New York, NY 10001

March 2017

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FIGURES

1.0 INTRODUCTION

This Soil/Materials Management Plan (SMMP) has been developed for the Interim Remedial Measures (IRM) Work Plan prepared for 19 Patchen Avenue (the Site).

The Site, located at 19 Patchen Avenue, is a rectangular parcel of land located at the corner of Patchen Avenue and Van Buren Street in the Bedford Stuyvesant area of Brooklyn.

The Site area is 1,838 square feet (0.0422 acre) with 25 feet of frontage along Patchen Avenue. The Site is occupied by a four-story mixed-use commercial and residential building with a basement. An active dry cleaner occupies the ground floor commercial space. The current operator is Rodriguez Dry Cleaners (NYSDEC Dry Cleaning Facility #2-6104-01058). The Site is located in Brooklyn Community Board 3 and is generally identified on New York City tax maps as Kings County Block 1618, Lot 8.

1.1 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed by a qualified environmental professional or experienced field geologist under the supervision of the Remedial Engineer (RE) and will be reported in the Interim Remedial Measures Construction Completion Report (IRMCCR). Soil Screening will be performed during all remedial and development excavations into known or potentially contaminated material regardless of when the invasive work is done and will include all excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of a COC.

1.2 Soil Staging Methods

Excavated soil from the sub-slab depressurization system (SSDS) pits will be placed in 55-gallon drums. While drums are on-site and work is occurring, they will be inspected daily. All drum management will be compliant with applicable laws and regulations.

1.3 Characterization of Excavated Materials

Soil/fill or other excavated media that is transported off the Site for disposal will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations. Soils are not proposed for reuse on-Site.

1.4 Materials Excavation, Load-Out and Departure

The RE overseeing the remedial activities, or a qualified environmental professional under his/her supervision, will:

- Oversee remedial work and the excavation and load-out of excavated material;
- Ensure that there is a party responsible for the safe execution of invasive and other work performed under this work plan;

- Ensure that Site development activities and development-related grading cuts will not interfere with, or otherwise impair or compromise the remedial activities proposed in this RAWP;
- Ensure that the presence of utilities and easements on the Site has been investigated and that any identified risks from work proposed under this RAWP are properly addressed by appropriate parties;
- Ensure that all loaded outbound trucks are inspected and cleaned if necessary before leaving the Site;
- Ensure that all egress points for truck and equipment transport from the Site will be kept clean of Site-derived materials during Site remediation.

Locations where vehicles exit the Site shall be inspected daily for evidence of soil tracking off premises. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials. Mechanical processing of historical fill and contaminated soil on the Site is prohibited.

1.5 Off-Site Materials Transport

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364.

Trucks removing drums from the Site will be loaded on Van Buren Street. Trucks will make a right on Patchen Avenue, followed by a right on Lafayette Avenue, followed by a left hand turn onto Broadway. Trucks will head northwest on Broadway to the Brooklyn Queens Expressway.

These are the most appropriate routes and take into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) limiting total distance to major highways; (d) promoting safety in access to highways; and, (e) overall safety in transport. All trucks loaded with Site materials will exit the vicinity of the Site using only the most-current New York City Department of Transportation (NYCDOT)-approved truck routes (currently the 2015 New York City Truck Route Map).

All trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

1.6 Materials Disposal Off-Site

To document that the disposal of regulated material exported from the Site complies with applicable laws and regulations, the following documentation will be established and reported by the RE for each disposal destination used in this project:

(1) a letter from the RE or Applicant to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that

material to be disposed is regulated material generated at an environmental remediation Site in New York under a governmental remediation program. The letter will provide the project identity and the name and phone number of the RE or Applicant, and will include as an attachment a summary of all chemical data for the material being transported; and

(2) a letter from each disposal facility stating it is in receipt of the correspondence, (1) above, and is approved to accept the material.

These documents will be included in the IRMCCR.
The IRMCCR will include an itemized account of the destination of all material removed from the Site during the interim remedial measures. Documentation associated with disposal of all material will include records and approvals for receipt of the material. This information will be presented in the IRMCCR.

All soil, fill and other waste excavated and removed from the Site will be managed as regulated material (municipal solid waste per 6NYCRR Part 360-1.2) and will be disposed in accordance with applicable laws and regulations. Historic fill and material that does not meet Track 1 Unrestricted Use soil cleanup objectives (SCOs) is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility). Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility).

Approximately one 55-gallon drum of soil is proposed for off-Site disposal. Final disposal facilities will be identified to NYSDEC prior to shipping material to any facility. Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the IRMCCR. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the IRMCCR. Hazardous wastes derived from on-Site will be stored, transported and disposed of in compliance with applicable laws and regulations.

If disposal of soil and fill from this Site is proposed for unregulated disposal (i.e., clean soil removed for development purposes), including transport to a Part 360-16 Registration Facility, a formal request will be made for approval by NYSDEC with an associated plan compliant with 6NYCRR Part 360-16. This request and plan will include the location, volume and a description of the material to be recycled, including verification that the material is not impacted by site uses and that the material complies with receipt requirements for recycling under 6 NYCRR Part 360. This material will be appropriately handled on-Site to prevent mixing with impacted material.

1.7 Materials Reuse

Soil reuse is not proposed on-Site.

1.8 Import of Backfill Soil from Off-Site Sources

Soil is not anticipated to be imported to the Site for use as clean cover.

1.9 Fluids Management

Groundwater will not be encountered during implementation of the IRM Work Plan.

1.10 Stormwater Pollution Prevention

All work will be completed in the cellar and stormwater pollution prevention practices are not required.

1.11 Erosion and Sediment Control Measures

All work will be completed in the cellar and erosion and sediment control measures are not required.

1.12 Contingency Plan

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to the NYSDEC Project Manager. Petroleum spills will be reported to the NYSDEC Spill Hotline. These findings will be included in applicable daily report(s). If previously unidentified contaminant sources are found during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to NYSDEC. Analysis will be performed for Full List volatiles and semi-volatiles, pesticides/PCBs, and TAL metals, as appropriate.

1.13 Odor, Dust and Nuisance Control

A Site-specific Community Air Monitoring Plan (CAMP) is included in the Health and Safety Plan (HASP) included as Appendix A of the IRM Work Plan.

Odor Control

All necessary means will be employed to prevent on- and off-Site odor nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) use of foams to cover exposed odorous soils. If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; and (e) use of chemical odorants in spray or misting systems.

Dust Control

Dust management during invasive on-Site work will include, as necessary:

- Use of a dedicated water spray method at suitable supply and pressure for SSDS pits; and,
- Identification of air intakes on adjoining residential properties.

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work will not resume until all nuisance dust emissions have been abated. Where nuisance dust emissions have developed during remedial work and cannot be corrected, use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices will be considered. NYSDEC will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the responsibility of the RE.

Other Nuisances

Noise control will be exercised during the remedial program. All remedial work will conform, at a minimum, to NYC noise control standards.

Appendix C
Citizen Participation Plan

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

Brownfield Cleanup Program

Citizen Participation Plan
for
19 Patchen Avenue, Brooklyn, NY

March 2017

BCP Site #C224232

19 Patchen Avenue

Brooklyn, New York 11221

Contents

* * * * *

Note: The information presented in this Citizen Participation Plan was current as of the date of its approval by the New York State Department of Environmental Conservation. Portions of this Citizen Participation Plan may be revised during the site's investigation and cleanup process.

Applicant: **19 Patchen LLC ("Applicant")**
Site Name: **19 Patchen Avenue ("Site")**
Site Address: **19 Patchen Avenue, Brooklyn, NY 11221**
Site County: **Kings County**
Site Number: **C224232**

1. What is New York's Brownfield Cleanup Program?

New York's Brownfield Cleanup Program (BCP) works with private developers to encourage the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and developed. These uses include recreation, housing, and business.

A *brownfield* is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal, and financial burdens on a community. If a brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

The BCP is administered by the New York State Department of Environmental Conservation (NYSDEC) which oversees Applicants who conduct brownfield site investigation and cleanup activities. An Applicant is a person who has requested to participate in the BCP and has been accepted by NYSDEC. The BCP contains investigation and cleanup requirements, ensuring that cleanups protect public health and the environment. When NYSDEC certifies that these requirements have been met, the property can be reused or redeveloped for the intended use.

For more information about the BCP, go online at:
http://www.dec.ny.gov/chemical/8450.html.

2. Citizen Participation Activities

Why NYSDEC Involves the Public and Why It Is Important

NYSDEC involves the public to improve the process of investigating and cleaning up contaminated sites, and to enable citizens to participate more fully in decisions that affect their health, environment, and social well-being. NYSDEC provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision-makers form or adopt final positions.

Involving citizens affected and interested in site investigation and cleanup programs is important for many reasons. These include:

- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment;

- Improving public access to, and understanding of, issues and information related to a particular site and that site's investigation and cleanup process;

- Providing citizens with early and continuing opportunities to participate in NYSDEC's site investigation and cleanup process;

- Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community; and

- Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision-making.

This Citizen Participation (CP) Plan provides information about how NYSDEC will inform and involve the public during the investigation and cleanup of the site identified above. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

Project Contacts

Appendix A identifies NYSDEC project contact(s) to whom the public should address questions or request information about the site's investigation and cleanup program. The public's suggestions about this CP Plan and the CP program for the site are always welcome. Interested people are encouraged to share their ideas and suggestions with the project contacts at any time.

Locations of Reports and Information

The locations of the reports and information related to the site's investigation and cleanup program also are identified in Appendix A. These locations provide convenient access to important project documents for public review and comment. Some documents may be placed on the NYSDEC web-site. If this occurs, NYSDEC will inform the public in fact sheets distributed about the site and by other means, as appropriate.

Site Contact List

Appendix B contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site's investigation and cleanup

process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project. These will include notifications of upcoming activities at the Site (such as fieldwork), as well as availability of project documents and announcements about public comment periods.
The site contact list includes, at a minimum:

- Chief executive officer and planning board chairperson of each county, city, town and village in which the Site is located;
- Residents, owners, and occupants of the Site and properties adjacent to the Site;
- The public water supplier which services the area in which the Site is located;
- Any person who has requested to be placed on the site contact list;
- The administrator of any school or day care facility located on or near the Site for purposes of posting and/or dissemination of information at the facility;
- Location(s) of reports and information.

The site contact list will be reviewed periodically and updated as appropriate. Individuals and organizations will be added to the site contact list upon request. Such requests should be submitted to the NYSDEC project contact(s) identified in Appendix A. Other additions to the site contact list may be made at the discretion of the NYSDEC project manager, in consultation with other NYSDEC staff as appropriate.

Note: The first site fact sheet (usually related to the draft Remedial Investigation Work Plan) is distributed both by paper mailing through the postal service and through DEC Delivers, its email listserv service. The fact sheet includes instructions for signing up with the appropriate county listserv to receive future notifications about the site. See http://www.dec.ny.gov/chemical/61092.html.

Subsequent fact sheets about the Site will be distributed exclusively through the listserv, except for households without internet access that have indicated the need to continue to receive site information in paper form. Please advise the NYSDEC site project manager identified in Appendix A if that is the case. Paper mailings may continue during the investigation and cleanup process for some sites, based on public interest and need.

CP Activities

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the site's investigation and cleanup program. The flowchart in Appendix D shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP activities through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a site, and the nature and progress of efforts to investigate and clean up a site.

- **Public forums, comment periods and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a site's investigation and cleanup.

The public is encouraged to contact project staff at any time during the site's investigation and cleanup process with questions, comments, or requests for information.

This CP Plan may be revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities. Modifications may include additions to the site contact list and changes in planned citizen participation activities.

Technical Assistance Grant

NYSDEC must determine if the site poses a significant threat to public health or the environment. This determination generally is made using information developed during the investigation of the Site, as described in Section 5.

If the Site is determined to be a significant threat, a qualifying community group may apply for a Technical Assistance Grant (TAG). The purpose of a TAG is to provide funds to the qualifying group to obtain independent technical assistance. This assistance helps the TAG recipient to interpret and understand existing environmental information about the nature and extent of contamination related to the Site and the development/implementation of a remedy.

An eligible community group must certify that its membership represents the interests of the community affected by the Site, and that its members' health, economic well-being or enjoyment of the environment may be affected by a release or threatened release of contamination at the Site.

As of the date the declaration (page 2) was signed by the NYSDEC project manager, the significant threat determination for the Site had not yet been made.

To verify the significant threat status of the Site, the interested public may contact the NYSDEC project manager identified in Appendix A.

For more information about TAGs, go online at
http://www.dec.ny.gov/regulations/2590.html

Note: The table identifying the citizen participation activities related to the site's investigation and cleanup program follows on the next page:

Citizen Participation Activities	Timing of CP Activity(ies)
Application Process:	
• Prepare site contact list • Establish document repository(ies)	At time of preparation of application to participate in the BCP.
• Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day public comment period • Publish above ENB content in local newspaper • Mail above ENB content to site contact list • Conduct 30-day public comment period	When NYSDEC determines that BCP application is complete. The 30-day public comment period begins on date of publication of notice in ENB. End date of public comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice, and notice to the site contact list should be provided to the public at the same time.
After Execution of Brownfield Site Cleanup Agreement (BCA):	
• Prepare Citizen Participation (CP) Plan	Before start of Remedial Investigation **Note:** Applicant must submit CP Plan to NYSDEC for review and approval within 20 days of the effective date of the BCA.
Before NYSDEC Approves Remedial Investigation (RI) Work Plan:	
• Distribute fact sheet to site contact list about proposed RI activities and announcing 30-day public comment period about draft RI Work Plan • Conduct 30-day public comment period	Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, public comment periods will be combined and public notice will include fact sheet. Thirty-day public comment period begins/ends as per dates identified in fact sheet.
After Applicant Completes Remedial Investigation:	
• Distribute fact sheet to site contact list that describes RI results	Before NYSDEC approves RI Report
Before NYSDEC Approves Remedial Work Plan (RWP):	
• Distribute fact sheet to site contact list about draft RWP and announcing 45-day public comment period • Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager) • Conduct 45-day public comment period	Before NYSDEC approves RWP. Forty-five day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day public comment period.
Before Applicant Starts Cleanup Action:	
• Distribute fact sheet to site contact list that describes upcoming cleanup action	Before the start of cleanup action.
After Applicant Completes Cleanup Action:	
• Distribute fact sheet to site contact list that announces that cleanup action has been completed and that NYSDEC is reviewing the Final Engineering Report • Distribute fact sheet to site contact list announcing NYSDEC approval of Final Engineering Report and issuance of Certificate of Completion (COC)	At the time the cleanup action has been completed. **Note:** The two fact sheets are combined when possible if there is not a delay in issuing the COC.

3. Major Issues of Public Concern

This section of the CP Plan identifies major issues of public concern that relate to the site. Additional major issues of public concern may be identified during the course of the site's investigation and cleanup process.

The Site is located within a Potential Environmental Justice Area. Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Based on neighborhood 2010 census data, there are sizable Hispanic-American and African American communities near the Site. Therefore, all future fact sheets will be translated into Spanish.

Environmental justice efforts focus on improving the environment in communities, specifically minority and low-income communities, and addressing disproportionate adverse environmental impacts that may exist in those communities.

No major issues of public concern have been identified during the review of the BCP Application. Furthermore, there may be impacts with regards to odor, noise or trucks. The area surrounding the site is served by a public water supply system that is regularly monitored thereby preventing exposure of the general public to non-potable groundwater. If issues are identified in the future, this CP Plan will be amended to address any additional CP activities that may need to be implemented.

4. Site Information

Appendix C contains a map identifying the location of the Site.

Site Description

The Site is located on the southeast corner of Patchen Avenue and Van Buren Street. The property is 1,838 square feet, approximately 0.0422 acres. The Site is located in Brooklyn Community Board 3 and is generally identified as Block 1618, Lot 8.

The Property is improved with one four-story building with commercial space on the ground floor and residential spaces on the remaining three floors. A dry cleaner is in operation on the ground floor.

The area surrounding the Site is predominantly residential and commercial. The adjacent properties include residential buildings to the south and east of the Site, a vacant lot to the north and a mixed-use residential building with a deli/grocery occupying the ground level to the west.

History of Site Use, Investigation, and Cleanup

The Site is currently occupied by an active dry cleaner in the commercial space on the ground floor and residential spaces in the remaining three floors. Based on historic information, the Site was developed for commercial and residential uses as early as 1908. The duration of the dry cleaning activities at the Site have been for approximately 57 years.

Environmental investigations completed at the Site have included analysis of soil, soil vapor and groundwater. The investigations were completed in 2015 as part of a Phase II Environmental Site Investigation and are summarized below.

Previous Environmental Studies

Phase I Environmental Site Assessment (2015)

Based upon a review of historic information sources, the following condition was identified as having the potential for negative environmental impacts: Historic and current use of the Site for dry cleaning operations.

Phase II Subsurface Investigation Report (2015)

Soil, soil vapor and groundwater sampling was completed to further investigate the Phase I Environmental Site Assessment findings. Twelve soil samples were collected from six soil borings; three sub-slab soil vapor samples and one indoor air sample were collected for full scan analysis; and two groundwater samples were collected.

The results of the sample analysis showed that Tetrachloroethene (or “PCE”) was detected in all of the soil vapor samples at concentrations were above the New York State Department of Health (NYSDOH) Air Guidance Value (AGV). Trichloroethene (TCE) was detected in two soil vapor samples above the NYSDOH AGVs. Some petroleum-related compounds were also detected at elevated levels in the soil vapor samples.

PCE was detected in groundwater above the NYSDEC TOGS 1.1.1 Class GA Standards (Class GA Standards). TCE was detected in groundwater samples below the Class GA Standards. No other degradation compounds of PCE were detected.

While PCE was detected in seven soil samples, the concentrations were all below the NYSDEC Unrestricted Use Soil Cleanup Objectives (SCOs). With the exception of chloroform, a common laboratory artifact, in one sample, no other Volatile Organic Compounds (VOCs) were detected above the NYSDEC Unrestricted Use SCOs.

5. Investigation and Cleanup Process

Application

The Applicant has applied for and been accepted into New York's Brownfield Cleanup Program as a Participant. This means that the Applicant was the owner of the Site at the time of the disposal or discharge of contaminants or was otherwise liable for the disposal or discharge of the contaminants. The Participant must fully characterize the nature and extent of contamination onsite, as well as the nature and extent of contamination that has migrated from the Site. The Participant also must conduct a "qualitative exposure assessment," a process that characterizes the actual or potential exposures of people, fish and wildlife to contaminants on the site and to contamination that has migrated from the Site.

The Applicant proposes that the Site will be used for restricted purposes.

To achieve this goal, the Applicant will conduct investigation and cleanup activities at the Site with oversight provided by NYSDEC. The Brownfield Cleanup Agreement executed by NYSDEC and the Applicant sets forth the responsibilities of each party in conducting these activities at the Site.

Investigation

The Applicant has completed a partial site investigation before it entered into the BCP. For the partial investigation, NYSDEC will determine if the data are useable.

The Applicant will conduct an investigation of the Site officially called a "remedial investigation" (RI). This investigation will be performed with NYSDEC oversight. The Applicant must develop a remedial investigation workplan, which is subject to public comment.

The site investigation has several goals:

1) Define the nature and extent of contamination in soil, surface water, groundwater and any other parts of the environment that may be affected;
2) Identify the source(s) of the contamination;
3) Assess the impact of the contamination on public health and the environment; and
4) Provide information to support the development of a proposed remedy to address the contamination or the determination that cleanup is not necessary.

The Applicant submits a draft "Remedial Investigation Work Plan" to NYSDEC for review and approval. NYSDEC makes the draft plan available to the public review during a 30-day public comment period.
When the investigation is complete, the Applicant will prepare and submit a report that

summarizes the results. This report also will recommend whether cleanup action is needed to address site-related contamination. The investigation report is subject to review and approval by NYSDEC.

NYSDEC will use the information in the investigation report to determine if the Site poses a significant threat to public health or the environment. If the Site is a "significant threat," it must be cleaned up using a remedy selected by NYSDEC from an analysis of alternatives prepared by the Applicant and approved by NYSDEC. If the Site does not pose a significant threat, the Applicant may select the remedy from the approved analysis of alternatives.

Interim Remedial Measures

An Interim Remedial Measure (IRM) is an action that can be undertaken at a Site when a source of contamination or exposure pathway can be effectively addressed before the site investigation and analysis of alternatives are completed. If an IRM is likely to represent all or a significant part of the final remedy, NYSDEC will require a 30-day public comment period.

Remedy Selection

When the investigation of the Site has been determined to be complete, the project likely would proceed in one of two directions:

1. The Applicant may recommend in its investigation report that no action is necessary at the Site. In this case, NYSDEC would make the investigation report available for public comment for 45 days. NYSDEC then would complete its review, make any necessary revisions, and, if appropriate, approve the investigation report. NYSDEC would then issue a "Certificate of Completion" (described below) to the Applicant.

or

2. The Applicant may recommend in its investigation report that action needs to be taken to address site contamination. After NYSDEC approves the investigation report, the Applicant may then develop a cleanup plan, officially called a "Remedial Work Plan". The Remedial Work Plan describes the Applicant's proposed remedy for addressing contamination related to the Site.

When the Applicant submits a draft Remedial Work Plan for approval, NYSDEC would announce the availability of the draft plan for public review during a 45-day public comment period.

Cleanup Action

NYSDEC will consider public comments, and revise the draft cleanup plan if necessary, before approving the proposed remedy. The NYSDOH must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy. The selected remedy is formalized in the site Decision Document.

The Applicant may then design and perform the cleanup action to address the site contamination. NYSDEC and NYSDOH oversee the activities. When the Applicant completes cleanup activities, it will prepare a Final Engineering Report (FER) that certifies that cleanup requirements have been achieved or will be achieved within a specific time frame. NYSDEC will review the report to be certain that the cleanup is protective of public health and the environment for the intended use of the Site.

Certificate of Completion

When NYSDEC is satisfied that cleanup requirements have been achieved or will be achieved for the Site, it will approve the FER. NYSDEC then will issue a Certificate of Completion (COC) to the Applicant. The COC states that cleanup goals have been achieved, and relieves the Applicant from future liability for site-related contamination, subject to certain conditions. The Applicant would be eligible to redevelop the Site after it receives a COC.

Site Management

The purpose of site management is to ensure the safe reuse of the property if contamination will remain in place. Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the Site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan.

An *institutional control* is a non-physical restriction on use of the Site, such as a deed restriction that would prevent or restrict certain uses of the property. An institutional control may be used when the cleanup action leaves some contamination that makes the Site suitable for some, but not all uses.

An *engineering control* is a physical barrier or method to manage contamination. Examples include: caps, covers, barriers, fences, and treatment of water supplies.

Site management also may include the operation and maintenance of a component of the remedy, such as a system that pumps and treats groundwater. Site management continues until NYSDEC determines that it is no longer needed.

Appendix A -
Project Contacts and Locations of Reports and Information

Project Contacts

For information about the site's investigation and cleanup program, the public may contact any of the following project staff:

New York State Department of Environmental Conservation (NYSDEC):

Cynthia Whitfield
Project Manager
NYSDEC
Division of Environmental Remediation
625 Broadway, 12th Floor
Albany, NY 12233-7015
Tel:(518) 402-9568
Email: cynthia.whitfield@dec.ny.gov

Thomas V. Panzone
Citizen Participation Specialist
NYSDEC Region 2
47-40 21st Street
Long Island City, NY 11101
Tel: (718) 482-4953
Email: Thomas.panzone@dec.ny.gov

New York State Department of Health (NYSDOH):

Angela Martin
Project Manager
NYSDOH
Bureau of Env. Exposure Investigation
Empire State Plaza Corning Tower,
Rm 1787
Albany, NY 12237
Tel: (518) 402-7880
BEEI@health.ny.gov

Locations of Reports and Information

The facilities identified below are being used to provide the public with convenient access to important project documents:

Brooklyn Public Library
Dekalb Branch
790 Bushwick Avenue
Brooklyn, NY 11221
Phone: (718) 455-3898
Hours: Mon, Thurs, Fri 10AM–6PM, Tues 10AM-8PM, Wed 1PM-8PM, Sat 10AM–5PM, Sun Closed

1360 Fulton Street
Brooklyn, NY 11216
Attn: Henry Butler
Phone: (718) 662-6601
Hours: (call for appointment)

Brooklyn Community Board #3

NYSDEC
Division of Environmental Remediation
625 Broadway, 12th Floor
Albany, NY 12233-7015
Attn: Cynthia Whitfield
Phone: (518) 402-9568
Hours: (call for appointment)

Appendix B - Site Contact List

Local Elected/Government Officials:

Mayor Bill de Blasio
City of New York
City Hall
New York, NY 10007

Hon. Scott Stringer
NYC Comptroller
1 Centre Street
New York, NY 10007

Hon. Letitia James
Public Advocate
1 Centre Street, 15th Floor
New York, NY 10007

Hon. Charles Schumer
U.S. Senator
780 Third Avenue, Suite 2301
New York, NY 10017

Hon. Kirsten Gillibrand
U.S. Senator
780 Third Avenue, Suite 2601
New York, NY 10017

Hon. Hakeem Jefferies
U.S. House of Representatives
55 Hanson Place, Suite 603
Brooklyn, NY 11217

Hon. Velmanette Montgomery
NYS Senate – District 25
30 Third Avenue, Room 207
Brooklyn, NY 11217

Hon. Eric M. Dilan
NYS Assembly – District 54
366 Cornelia Street
Brooklyn, NY 11237

Hon. Eric Adams
Brooklyn Borough President
209 Joralemon Street
Brooklyn, NY 11201

Hon. Darlene Mealy
NYC Council Member
1757 Union Street, 2nd Floor
Brooklyn, NY 11213

Carl Weisbrod, Commissioner
NYC Department of City Planning
22 Reade Street
New York, NY 10007

NYC Department of City Planning
Brooklyn Borough Office
16 Court Street
Brooklyn, NY 11241

Dan Walsh, Director
NYC Office of Environmental Remediation
100 Gold Street – 2nd Floor
New York, NY 10038

Nancy T. Sunshine, County Clerk
Kings County Clerk
360 Adams Street, Room 189
Brooklyn, NY 11201

Adjacent Properties:

Lisa Management, Inc.
826 Broadway, 11th Floor
New York, NY 10003

Skipp to My Lilly LLC
826 Broadway, 11th Floor
New York, NY 10003

Glenna McNair
25 Patchen Avenue
Brooklyn, NY 11231

Louis Ramos, Jr.
94 Summit Street
Brooklyn, NY 11231

G Loft LLC
45 North Station Plaza, Suite 315
Great Neck, NY 11021

Annie Frances
32 Patchen Avenue
Brooklyn, NY 11221

Joseph E. Holley
24 Patchen Avenue
Brooklyn, NY 11221

Santa J. Melo
26 Patchen Avenue
Brooklyn, NY 11221

Jenesis' Grocery Corp.
26 Patchen Avenue
Brooklyn, NY 11221

Local Media Outlets:

Brooklyn Eagle
30 Henry Street
Brooklyn, NY 11201

News 12 Brooklyn
164 20th Street
Brooklyn, NY 11232

NY 1 News
75 Ninth Avenue
New York, NY 10011

New York Daily News
4 New York Plaza
New York, NY 10004

New York Post
1211 Avenue of the Americas
New York, NY 10036

Courier-Life Publications
1 Metro-Tech Center North - 10th Floor
Brooklyn, NY 11201

The Brooklyn Papers
1 Metrotech Center, Suite 1001
Brooklyn, NY 11201

Hoy Nueva York
1 MetroTech Center, 18th Floor
Brooklyn, NY 11201

El Diario La Prensa
1 MetroTech Center, 18th Floor
Brooklyn, NY 11201

Public Water Supplier:

Emily Lloyd, Commissioner
NYC Department of Environmental Protection
59-17 Junction Boulevard
Flushing, NY 11373

Schools & Daycare Facilities:

Foosteps Childcare, Inc.
c/o Monica McDonald
1125 Broadway
Brooklyn, NY11221

Verny Daycare, Inc.
c/o Wiolet Williams-Rouse, MS
992 Greene Avenue, 1A
Brooklyn, NY 11221

Frederick Douglass Academy IV Secondary School
c/o Elvin Crespo, Principal
1014 Lafayette Avenue
Brooklyn, NY 11221

Brooklyn Excelsior Charter School
c/o Christopher Petty, Principal
856 Quincy Street
Brooklyn, NY 11221

PS 274
c/o Maritza Ollivierra Jone, Principal
800 Bushwick Avenue
Brooklyn, NY 11221

Balloons and You Day Care
c/o Michelle D. Williams
25 Patchen Avenue
Brooklyn, NY 11221

Charles Churn Christian Academy
c/o Linda Hunt
1052 Greene Avenue
Brooklyn NY 11221

EBC High School for Public Service
c/o Shawn Brown
1155 Dekalb Avenue
Brooklyn, NY 11221

Bushwick Leaders' High School for Academic Excellence
c/o Catherine Reilly
797 Bushwick Avenue
Brooklyn, NY 11221

P.S. 26 Jesse Owens School
Attn: Cynthia Celestine, Principal
1014 Lafayette Avenue
Bronx, NY 11221

Brooklyn Public Library
Dekalb Branch
790 Bushwick Avenue
Brooklyn, NY 11221

Brooklyn Community Board #3
1360 Fulton Street
Brooklyn, NY 11216
Attn: Tremaine Wright, Chairman
Attn: Henry Butler, District Manager

Community, Civic, Religious and Other Environmental Institutions:

Antonia Yuille, Director
Consolidated Edison Public Affairs
30 Flatbush Avenue
Brooklyn, NY 11217

Martha Works, President
81st NYPD Police Precinct Council
30 Ralph Avenue
Brooklyn, NY 11221

Engine 222 Battalion 37
FDNY
32 Ralph Avenue
Brooklyn, NY 11221

New Open Door Church of God in Christ
Attn: Pastor
999 Greene Avenue
Brooklyn, NY 11221

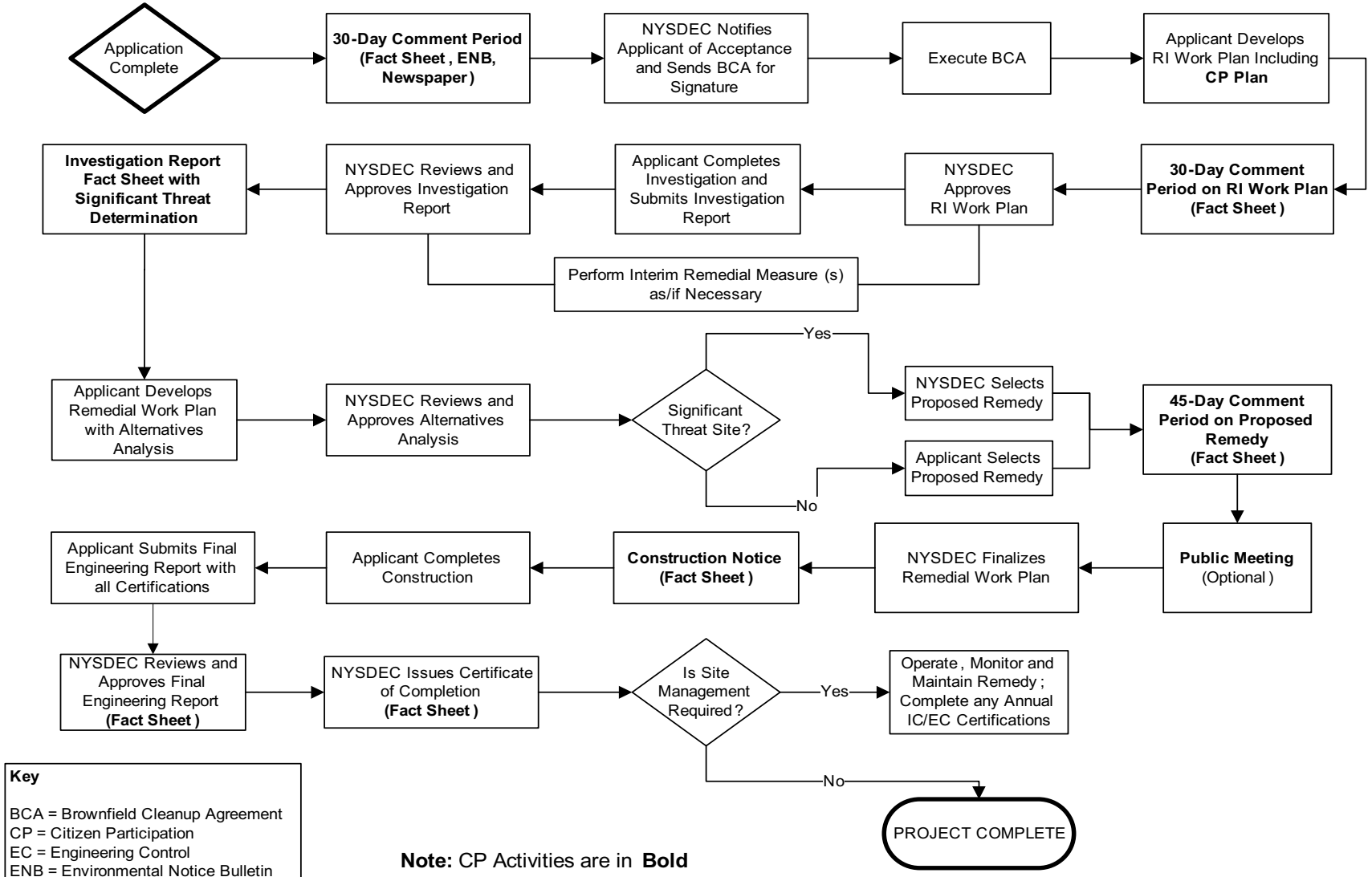
Calvary Seventh Day
Attn: Pastor
778 Lexington Avenue
Brooklyn, NY 11221

St. John's Bread & Life
795 Lexington Avenue
Brooklyn, NY 11221

Rugged Cross LP Church
12 Patchen Avenue
Brooklyn, NY 11221

Appendix C - Site Location Map

Appendix D– Brownfield Cleanup Program Process



Key

BCA = Brownfield Cleanup Agreement
CP = Citizen Participation
EC = Engineering Control
ENB = Environmental Notice Bulletin
IC = Institutional Control
RI = Remedial Investigation

Note: CP Activities are in **Bold**

Appendix D
Resumes

Matthew Carroll, P.E.
Environmental Engineer/Principal

Experience Summary

Matthew Carroll is an environmental engineer experienced in all aspects of site assessment and development and implementation of remedial strategies. He has managed projects from inception through investigation, remediation and closure. His expertise includes soil, soil gas, and groundwater remediation, preparation of cost estimates, remedial alternative selection and design, soil characterization for disposal, field safety oversight, and preparation of work plans and reports to satisfy New York and New Jersey state requirements, and New York City "e" designation and restrictive declarations. Mr. Carroll's project management experience includes past management of a New York City School Construction Authority hazardous materials contract. He is responsible for all engineering work performed by Tenen and is currently the project manager and remedial engineer for several New York State Brownfield Cleanup Program sites.

Selected Project Experience

470 Kent Avenue, Brooklyn
As project manager, supported the client in due diligence and transactional activities, including a Phase I ESA, preliminary site investigation, and remedial cost estimate; preparation of BCP application and remedial investigation work plan. The former manufactured gas plant, sugar refinery and lumberyard will be developed as a mixed-use project with market rate and affordable housing and public waterfront access. As remedial engineer, will be responsible for development of remedial alternatives and oversight and certification of all remedial activities.

500 Exterior Street, Bronx
Designed and implemented the investigation of this former lumberyard and auto repair shop that will be redeveloped as mixed use development with an affordable housing component; prepared BCP application and subsequent work plans and reports. Designed a remedial strategy incorporating both interim remedial measures (IRMs) and remediation during the development phase.

Gateway Elton I and II, Brooklyn
Conducted soil disposal characterization, prepared Remedial Action Work Plans and designed methane mitigation systems for two phases of a nine-building residential development and commercial space; prepared and oversaw implementation of a Stormwater Pollution Prevention Plan during construction and prepared and certified the remedial closure reports for the project.

Affordable Housing Development, Rye, NY
Consultant to the City of Rye on environmental issues pertaining to a county-owned development site slated for an afford senior housing; reviewed environmental documentation for the project and prepared summary memorandum for City Council review; recommended engineering controls to address potential exposure to petroleum constituents, presented report findings at public meetings and currently providing ongoing environmental support during project implementation.

Queens West Development BCP Site, Long Island City, New York
Assistant Project Manager for two developers involved in the site.

- Responsible for oversight of remediation under the New York State Brownfield Cleanup Program
- Technical review of work plans and reports and coordination of the Applicant's investigation and oversight efforts
- Provided input for mass calculations and well placement for an in-situ oxidation remedy implemented on a proposed development parcel and within a City street
- Conducted technical review of work pertaining to a former refinery. Documents reviewed included work plans for characterization and contaminant delineation; pilot test (chemical oxidation); remediation (excavation and groundwater treatment). Managed field personnel conducting full time oversight and prepared progress summaries for distribution to project team
- Following implementation of remedial action, implemented the Site Management Plan and installation/design of engineering controls (SSDS, vapor barrier/concrete slab, NAPL recovery). Also responsible for coordination with NYSDEC

Brownfield Cleanup Program Redevelopment Sites – West Side, New York City
Managed remediation of a development consisting of four parcels being addressed under one or more State and city regulatory programs (NYS Brownfield Cleanup Program, NYS Spills, and NYC "e" designation program). Remediation includes soil removal, screening and disposal; treatment of groundwater during construction dewatering and implementation of a worker health and safety plan and community air monitoring plan (HASP/CAMP)

Managed an additional BCP site, supported the Applicant in coordination with MTA to create station access for the planned No. 7 subway extension; also provided support the client in coordination with Amtrak to obtain access for remedial activities on the portion of the site that is within an Amtrak easement. The site will eventually be used for construction of a mixed-use high-rise building.

BCP Site, Downtown Brooklyn, New York
Performed investigation on off-site properties and designed an SSDS for an adjacent building, retrofitting the system within the constraints of the existing structure; coordinated the installation of the indoor HVAC controls and vapor barrier; provided input to the design of a SVE system to address soil vapor issues on the site.

West Chelsea Brownfield Cleanup Program Site
Designed an in-situ remediation program and sub-slab depressurization system to address contamination remaining under the High Line Viaduct; SSDS design included specification of sub-grade components, fan modeling and selection, identifying exhaust location within building constraints and performance modeling; prepared the Operations Maintenance and Monitoring Plan and Site Management Plan sections pertaining to the SSDS.

Historic Creosote Spill Remediation – Queens, New York – New York State Voluntary Cleanup Program
Modeled contamination volume and extent and prepared mass estimates of historic fill constituents and creosote-related contamination; designed a soil vapor extraction (SVE) and dewatering system to address historic creosote release both above and below static

water table; coordinated with the Metropolitan Transit Authority and prepared drawings to secure approval to drill in the area of MTA subway tunnels.

NYSDEC Spill Site– Far West Side, Manhattan
Provided support to client during negotiations with a major oil company regarding allocation of remedial costs. Worked with client's attorney to develop a regulatory strategy to address the client's obligations under the NYSDEC Spills Program and the New York City "e" designation requirements.

Affordable Housing Site, Brooklyn, New York
Modified prior work plans for soil, soil vapor and groundwater investigation to address requirements for site entry into the New York City Brownfield Cleanup Program. Prepared technical basis for use of prior data previously disallowed by OER. Currently conducting site investigation.

New York City School Construction Authority Hazardous Materials Contract
Provided work scopes and cost estimates, managed and implemented concurrent projects, including Phase I site assessments, Phase II soil, groundwater and soil gas investigations, review of contractor bid documents, preparation of SEQR documents, specifications and field oversight for above- and underground storage tank removal, and emergency response and spill control.

Former Manufacturing Facility, Hoboken, New Jersey
Evaluated site investigation data to support a revision of the current property use to unrestricted; modified the John & Ettinger vapor intrusion model to apply the model to a site-specific, mixed use commercial/residential development; implemented a Remedial Action Work Plan that included the characterization, removal and separation of 9,500 cubic yards of historic fill; designed and implemented a groundwater characterization/delineation program using a real-time Triad approach; designed and implemented an innovative chemical oxidation technology for the property.

F**ormer Varnish Manufacturer – Newark, New Jersey**
Prepared a Phase I environmental site assessment; implemented soil and groundwater sampling to assess presence of petroleum and chlorinated compounds; prepared alternate cost remediation scenarios for settlement purposes and implemented a groundwater investigation plan, including pump tests and piezometer installation to assess the effect of subsurface utilities and unique drainage pathways upon contaminant transport.

Education and Certifications

Professional Engineer, New York
Bachelor of Engineering, Environmental; Stevens Institute of Technology, 2002
Bachelor of Science, Chemistry, New York University, 2002
Technical and Regulatory Training in Underground Storage Tanks, Cook College, Rutgers University, 2006

Mary S. Manto
Project Director/Principal

Experience Summary

Ms. Manto has spent over 30 years in the environmental consulting industry, holding senior management roles in both large and small organizations. She has extensive experience in managing regulatory and hazardous waste investigation/remediation projects for public and private sector clients. These projects have involved due diligence for real estate transactions, state and federal Superfund sites, insurance cost recovery, industrial facilities (including aviation and manufacturing) and commercial facilities. Her background also includes permitting, environmental compliance audits, and environmental assessments and impact statements. Her prior experience includes 16 years with CH2M Hill, where she managed a hazardous material investigation/remediation group and served as project delivery leader for several offices, and, most recently, six years as project director for a New York City consulting firm. As Project Director for Tenen Environmental, Ms. Manto is responsible for the day-to-day operations of the company, providing project oversight and technical review of project scopes, budgets, and work products. She currently acts as Technical Director for investigation and remedial activities at several New York State Brownfield Cleanup Program projects. Ms. Manto also serves on the Board of the New York City Brownfield Partnership and co-chairs the Partnership's communication committee.

Selected Project Experience

West Chelsea Brownfield Cleanup Program (BCP) Site
Project manager for a $1.7 million investigation/remediation of a former industrial site in Manhattan; prepared and supervised the development of investigation and remediation work plans, citizen participation plans, and public outreach materials, and provided oversight of on- and offsite investigations and remedial activities.

West 42nd Street BCP/Spills/"e" Designation Development Project
Provided oversight of investigation and remediation of this property, portions of which were addressed under one or more New York State and New York City environmental regulatory programs; prepared the BCP applications, remedial cost estimates and, on behalf of the developer, participated in cost negotiations with the owner, a major oil company.

Quanta Resources, Long Island City, NY
For this 16-acre former waste oil facility, managed coordination of the PRP committee, regulatory interaction, and contractor oversight of investigation and remediation activities.

Remedial Investigation/Feasibility Study for PRP-lead Superfund Site, New Jersey
Managed all investigation and remediation tasks for this 80-acre site, which is being addressed under the USEPA Superfund and the U.S. Department of Energy's FUSRAP programs; remedial investigation involved simultaneous activities on multiple properties. The investigations included a geophysical survey, wetlands and floodplain assessment, overburden investigation and surface/groundwater investigations. Coordinated project activities with the USEPA, USDOE and the US Army Corps of Engineers.

JetBlue Airways, JFK International Airport, New York
Co-managed the Environmental Assessment for New Entrant Exemption to the High Density Rule and Operations Specifications. The document was approved by FAA and enabled JetBlue to operate with an exemption to the high density rule; prepared sections of an environmental baseline assessment of conditions at Terminal 6 at JFK, including assessment of data regarding subsurface conditions and operational and waste management practices of former building tenants.

Port Authority of New York and New Jersey
Managed the initial phases of an environmental assessment for the redevelopment of Terminals 5 and 6. The project team worked closely with outside architects, engineers, and cultural resources consultants in order track design changes through the evolution of the project.

Newark International Airport, Newark, New Jersey
For Concourse C3, prepared the documents to support a categorical exclusion to enable replacement of existing hard stands with a new concourse as well as modernization of the Terminal C bag system.

Working with the Port Authority and Continental Airlines, managed the environmental assessment for the Northside Facilities Modernization Project, including replacement of outdated facilities and relocation of a taxiway and adjacent road; prepared an environmental assessment for the Airside Access Improvement Program, a project which included a new taxiway, connector, removal of buildings and expansion of airside operations.

Naval Facilities Engineering Command – Initial Assessment Studies, East Coast
Conducted the initial assessment studies for nine U.S. Navy bases in the mid-Atlantic region. These studies evaluated the potential risks from historic hazardous material use and disposal practices and included record searches, interviews, aerial and ground surveys, and process reviews.

Consolidated Edison of New York – East River Development
As part of a multidisciplinary team representing a major NYC developer, prepared the hazardous materials portion of the Environmental Impact Statement, coordinated with and reviewed materials prepared by the consultants performing the remediation, and provided oversight of field activities.

Radiac Research Facility, Brooklyn, New York
Managed a New York State Part 373 permit modification for a hazardous and radiological waste storage facility, as required by a NYSDEC consent order. For the same client, prepared a Part 373 permit for the storage of mixed hazardous and radiological waste.

Consolidated Edison Company of New York
Prepared New York State Part 373 Hazardous Waste Contingency Plans for fourteen facilities including major generating stations, substations and customer service centers. The plans outlined measures to be taken in the event of a fire, explosion or unplanned release of hazardous materials to the environment. All plans subsequently met the rigorous requirements of the client's court-mandated internal audit program.

Managed and prepared sections of Facility Environmental Compliance Manuals for two central substations and a service center. The plans, which environmental regulations applicable to all media, applied corporate environmental policy to day-to-day facility operations, and included sections on air resources, water, oil and petroleum, hazardous and solid waste, PCBs, chemical management, land use, wetlands, and asbestos.

Insurance Cost Recovery

Managed several insurance cost recovery projects for major utility clients in New York, Arizona and New Mexico. Projects included an initial assessment of environmental conditions, development of a universe of potential claims, and calculation of a preliminary estimate of claim value.

Education and Training

Master of Public Health, Environmental Health; Columbia University, (1982)
Bachelor of Arts; Fordham University (1979)

Princeton Groundwater Pollution and Hydrology Course
Princeton Groundwater Remediation Course

Kristen Meisner, E.I.T
Project Engineer

Experience Summary

Kristen Meisner is an environmental engineer with experience in soil, groundwater and soil vapor sampling techniques and data analysis, remedial systems, environmental permitting, watershed planning and management, environmental restoration, spill prevention, control, and countermeasure as well as field safety oversight, and preparation of work plans and reports to satisfy various state regulatory requirements. Her experience includes field oversight and preparation of work plans to satisfy New York City and New York State program requirements.

Ms. Meisner's project management experience includes management of a New York City Transit Authority hazardous materials contract. While with a national consulting firm, Ms. Meisner designed and implemented environmental investigations, designed remedial systems and performed watershed analyses for the U.S. Army Corps of Engineers. Her prior experience has also involved projects related to the Spill Prevention, Control, and Countermeasure (SPCC) and Petroleum Bulk Storage (PBS) plan requirements. She has also prepared environmental permits for air, stormwater and wastewater under the NPDES, RCRA, SARA Title II, Title V, OSHA and Discharge Monitoring programs.

Selected Project Experience

Redevelopment Sites, Manhattan, NY
Project Engineer

- Managed remedial oversight including Community Air Monitoring Program in accordance with OER requirements including daily correspondence with OER project manager.
- Remediation includes soil removal, dewatering and end-point sampling.
- Tracked soil loading and advancement of hot-spot excavations

Orangeburg Commons, Orangeburg, NY
Project Engineer

- Performed sampling and reporting for a 15.8-acre property in the site-management phase of the NYS Brownfield Cleanup Program.
- Sampling included groundwater and soil gas field investigations. Reporting included mapping and graphing groundwater concentration trends at the Site
- Visual inspections of several engineering controls in place at the Site including: soil cover system, sub-slab depressurization system, vapor barrier.

Fountain Creek Watershed Study, U.S. Army Corps of Engineers
Project Manager

- Technical design to address flood control, erosion, sedimentation and environmental restoration
- Incorporated public input into watershed plans utilizing geographic information system technology for finalized reports

- Provided final project implementation report assembly including environmental impact assessment and investigation
- Responsibilities include the management, evaluation and improvement of the Storm Water Management Program for compliance with the MS4 Permit

Hydrogeologic Study, Garfield County, Colorado
Project Engineer

- Performed hydrogeological investigations with analysis of water quality data and delineation of petroleum impacts
- Evaluation of temporal groundwater trends concurrent with impacts of increased gas well drilling and gas production in domestic water wells and surface water bodies.
- Performed extensive Phase II Environmental Site Assessment including sampling of groundwater monitoring wells, ponds, gas wells, irrigation ditches, domestic wells and springs.
- Identified impacts to water resources from petroleum activity culminating in a public outreach forum

Willoughby Square Redevelopment Project, Brooklyn, NY
Completed remedial investigations, reporting and mapping of the Site. The remedial investigation completed included field sampling, soil characterization for waste disposal and regulatory coordination with the New York City Department of Environmental Protection (NYCDEP). Based on detections of hazardous levels of lead, the Site was entered into the Office of Environmental Remediation (OER) Voluntary Cleanup Program (VCP).

Automotive Repair Shop, Brooklyn, NY
Completed in-field soil and groundwater monitoring, remediation and design services for a redevelopment project. Provided input for mass calculations and well placement for in-situ oxidation remedy implemented on the proposed development parcel. Following implementation of remedial action, designed engineering controls (SSDS, vapor barrier/concrete slab, NAPL recovery) in coordination with NYSDEC.

New York City Transit Authority Hazardous Materials Contract
Managed and implemented projects including Phase I site assessments, Phase II soil and groundwater investigations as well as lead and asbestos abatement, inspection and removal projects. Provided support to client during all phases of hazardous waste management, chemical removal, enclosure and legal disposal of waste.

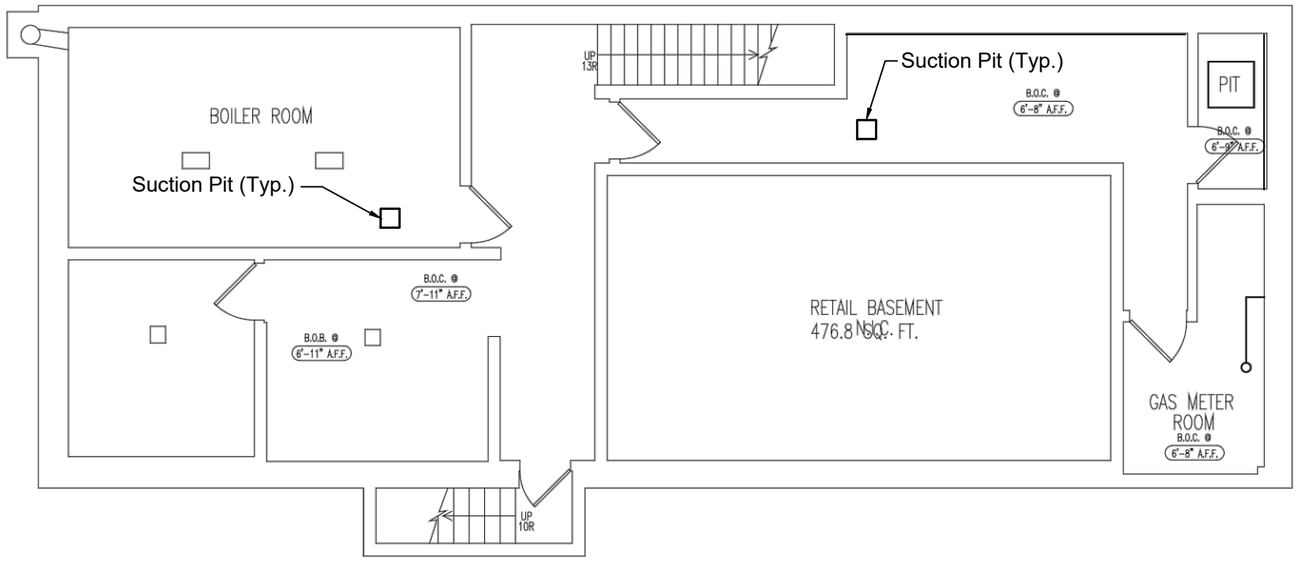
Education and Certifications

Engineer in Training, New York
Bachelor of Science, Environmental Engineering - Industrial Processes; University of New Hampshire, 2009

Professional Memberships

American Society of Civil Engineers
Environmental and Water Resources Institute

Appendix E
Sub-Slab Depressurization System (SSDS) Design



LEGEND

☐ Suction Pit Location

Basemap Source:
Aufgang Architects, LLC, Suffern, NY,
Proposed Repair and Rennovation for BEC New Communities HDFC, Inc.,
Proj #1518, Dwg. #A-100.00, 6/28/15

0 4' 8' 16'
Drawing Scale

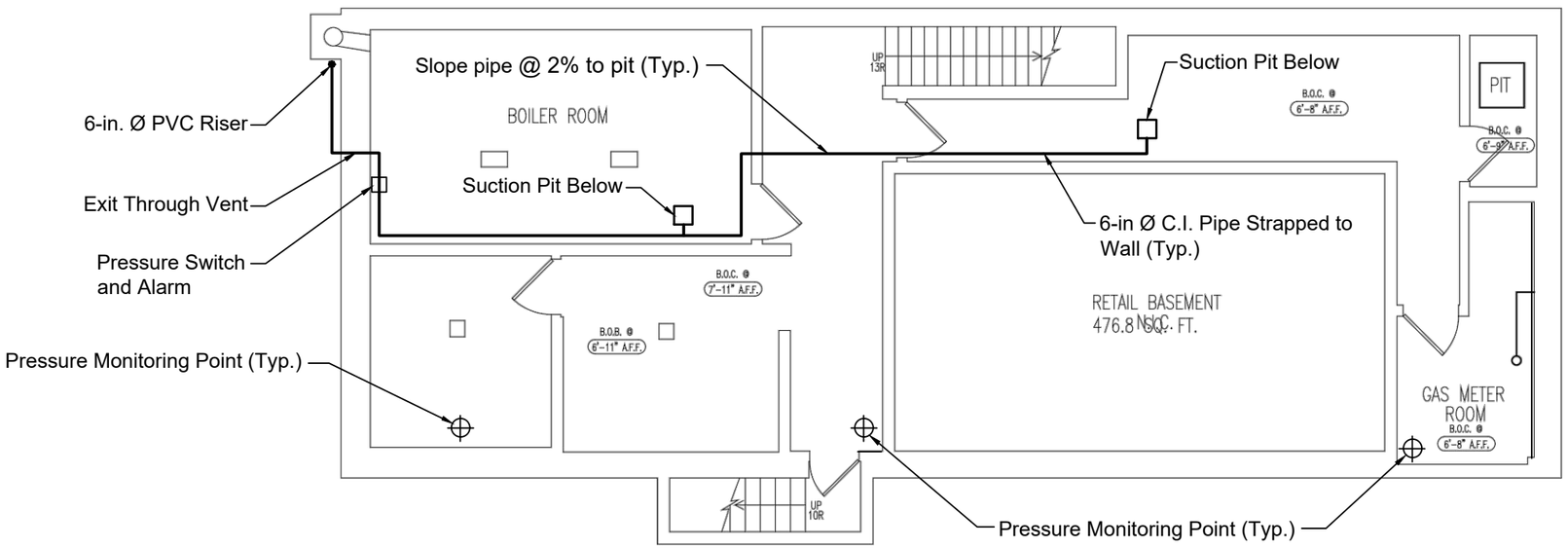
CLIENT
19 PATCHEN AVENUE
BROOKLYN, NEW YORK

CONSULTANT
TENEN ENVIRONMENTAL
TENEN ENVIRONMENTAL, LLC
121 West 27th Street
Suite 702
New York, NY 10001
O: 646-606-2332
F: 646-606-2379

DRAWN BY	CHECKED BY	DATE	SCALE:
LM	MC	FEBRUARY 2017	AS NOTED

DRAWING TITLE: X-100.00

DRAWING NO.: SSDS SUBGRADE LAYOUT



LEGEND

- Suction Pit Location
- Pressure Monitoring Point Location

0 4' 8' 16'

Drawing Scale

Basemap Source:
Aufgang Architects, LLC, Suffern, NY,
Proposed Repair and Rennovation for BEC New Communities HDFC, Inc.,
Proj #1518, Dwg. #A-100.00, 6/28/15

CLIENT

19 PATCHEN AVENUE
BROOKLYN, NEW YORK

CONSULTANT

TENEN ENVIRONMENTAL

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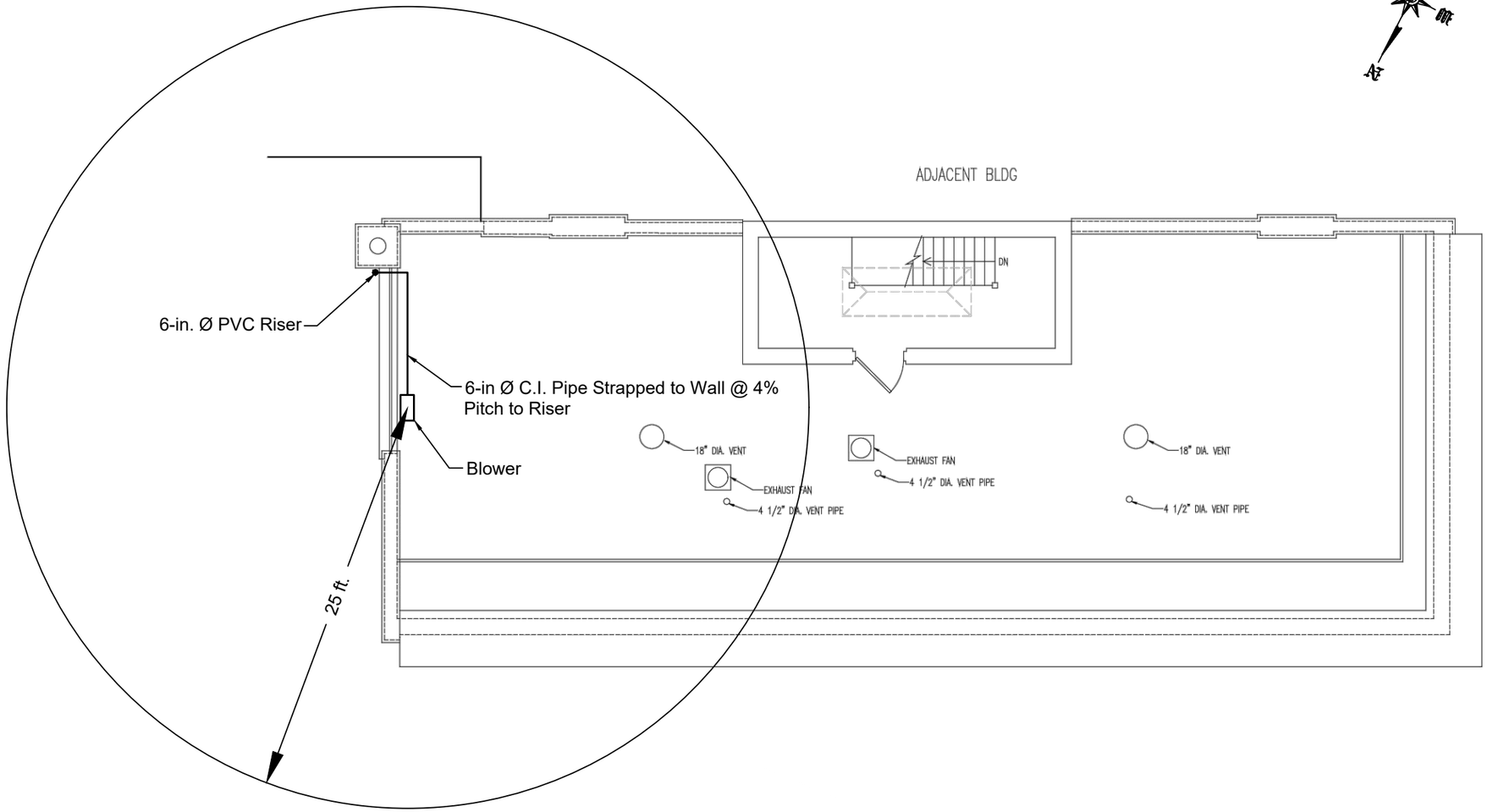
DRAWN BY	CHECKED BY	DATE	SCALE:
LM	MC	FEBRUARY 2017	AS NOTED

DRAWING TITLE: X-101.00

DRAWING NO.: SSDS CELLAR LAYOUT



Basemap Source:
Aufgang Architects, LLC, Suffern, NY,
Proposed Repair and Rennovation for BEC New Communities HDFC, Inc.,
Proj #1518, Dwg. #A-103.00, 6/28/15

0 4' 8' 16'
Drawing Scale

CLIENT
19 PATCHEN AVENUE
BROOKLYN, NEW YORK

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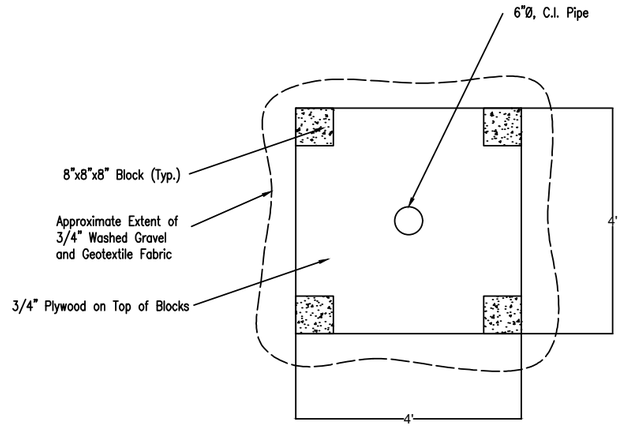
O: 646-606-2332
F: 646-606-2379

DRAWN BY: LM
CHECKED BY: MC
DATE: FEBRUARY 2017
SCALE: AS NOTED

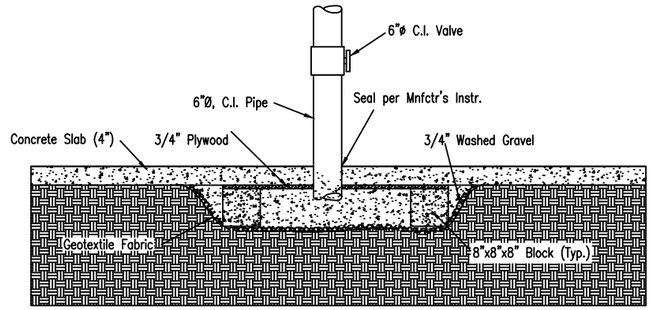
DRAWING TITLE: X-102.00
DRAWING NO.: SSDS ROOF LAYOUT

1



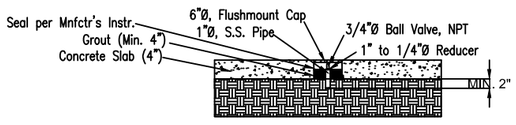
Suction Pit – Plan View

2



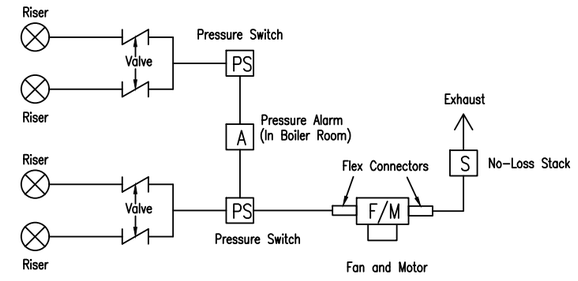
Suction Pit – Section View

3



Sub-Slab Depressurization Monitoring Point – Side View

4



Sub-Slab Depressurization System – Schematic from Riser to Exhaust Location

CLIENT

19 PATCHEN AVENUE
BROOKLYN, NEW YORK

CONSULTANT

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O: 646-606-2332
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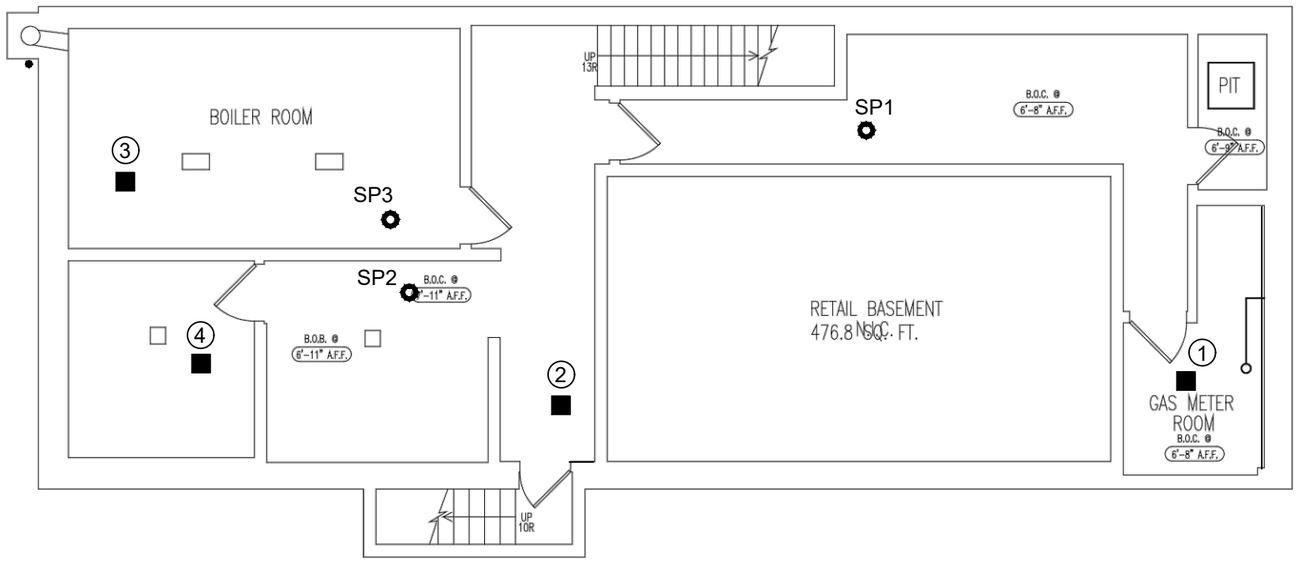
DRAWN BY	CHECKED BY	DATE	SCALE:
LM	MC	FEBRUARY 2017	AS NOTED

DRAWING TITLE: X-103.00

DRAWING NO.: SSDS DETAILS



Pressure Test Results	
Suction Location	Pressure Measured In:
SP1	#1, #2
SP2	#2, #4
SP3	#2, #3, #4

LEGEND

- ■ Pressure Response Monitoring Location
- ○ Suction Location

0 4' 8' 16'

Drawing Scale

Basemap Source:
Aufgang Architects, LLC, Suffern, NY,
Proposed Repair and Rennovation for BEC New Communities HDFC, Inc.,
Proj #1518, Dwg. #A-100.00, 6/28/15

CLIENT

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BROOKLYN, NEW YORK

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DRAWN BY	CHECKED BY	DATE	SCALE:
LM	MC	FEBRUARY 2017	AS NOTED

DRAWING TITLE: X-104.00

DRAWING NO.: PRESSURE TEST RESULTS

Appendix F
Draft Operations, Maintenance and Monitoring (OM&M) Plan

OPERATIONS, MAINTENANCE & MONITORING (OM&M) PLAN

SUB-SLAB DEPRESSURIZATION SYSTEM (SSDS)

for
19 Patchen Avenue
Interim Remedial Measures Work Plan

19 Patchen Avenue,
Brooklyn, New York 11221
BCP Site # C224232

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B
625 Broadway, 12th Floor
Albany, NY 12233-7016

Prepared for:
19 Patchen LLC
826 Broadway, 11th Floor
New York, NY 10003

Prepared by:
TENEN ENVIRONMENTAL
121 West 27th Street, Suite 702
New York, NY 10001

March 2017

OPERATIONS, MAINTENANCE AND MONITORING (OM&M) PLAN

TABLE OF CONTENTS

FIGURES

APPENDICES

OPERATIONS, MAINTENANCE AND MONITORING (OM&M) PLAN

1.0 INTRODUCTION

This Operations, Maintenance and Monitoring (OM&M) Plan has been developed to detail the engineering controls (ECs) implemented as part of the Interim Remedial Measures (IRM) Work Plan prepared for 19 Patchen Avenue (the Site).

The Site, located at 19 Patchen Avenue, is a rectangular parcel of land located at the corner of Patchen Avenue and Van Buren Street in the Bedford Stuyvesant area of Brooklyn.

The Site area is 1,838 square feet (0.0422 acre) with 25 feet of frontage along Patchen Avenue. The Site is occupied by a four-story mixed-use commercial and residential building with a basement. An active dry cleaner occupies the ground floor commercial space. The current operator is Rodriguez Dry Cleaners (NYSDEC Dry Cleaning Facility #2-6104-01058). The Site is located in Brooklyn Community Board 3 and is generally identified on New York City tax maps as Kings County Block 1618, Lot 8.

1.1 Background

Environmental investigations at the Site have documented elevated concentrations of chlorinated solvents in the sub-slab soil vapor. There is the potential for an indoor air intrusion condition.

In order to address the potential for indoor air quality impacts from the sub-slab soil vapor, an active sub-slab depressurization system (SSDS) has been designed and will be incorporated into the current building plan.

1.2 Summary of Engineering Controls (ECs)

Engineering Controls (ECs) to address residual contamination through physical protective measures at the Site have been incorporated to ensure that the Site remains protective of public health and the environment.

A sub-slab depressurization system (SSDS) was installed below the current slab in the basement of the building. The principal components of the SSDS are a layer of gravel beneath the basement slab, two suction pits within the gravel layer, solid-construction piping from each suction pit to an exterior suction fan on the roof and monitoring points through the basement slab. The goal of the system was to create a pressure differential of at least -0.002 inches of water column (in-wc) between the basement and sub-slab environments. A visual and audible alarm will be installed in the basement to notify the building management if the pressure at the suction fan has dropped below 50% of the start-up pressure. The system was designed in general accordance with NYSDOH's Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006 (NYSDOH Soil Vapor Guidance).

2.0 Engineering Control Operations

One permanent EC is being incorporated into the building as part of this IRM Work Plan to address potential soil vapor intrusion at the Site. The EC is:

- an active sub-slab depressurization system (SSDS).

General design drawings and specifications are included in the Appendices.

2.1 Sub-Slab Depressurization System (SSDS)

The SSDS will reduce the potential for soil vapor migration into the building in combination. The SSDS will be inspected at specific intervals as defined in this OM&M.

3.0 Routine Maintenance and Monitoring

EC inspections will be performed by a person knowledgeable with the mechanical systems present in the building and familiar with the property and may include a building or property superintendent.

3.1 EC Inspection Frequency

Site inspection and certification for performance of the active SSDS will be performed on a schedule detailed in the Final Engineering Report (FER) and reported in a Periodic Review Report (PRR).

3.2 EC Inspection Components

The EC inspections will evaluate the following:

- continued performance of ECs as designed;
- compliance with this SMP;
- continued achievement of remedial performance criteria;
- accuracy and completeness of Site records;
- necessity for any changes to the remedial systems; and
- general Site conditions at the time of inspection.

In the event of an emergency, such as a natural disaster or an unforeseen failure of any of the ECs, an inspection of the ECs will be conducted by a Qualified Environmental Professional (QEP), as defined by NYSDEC.

3.3 EC Inspections

3.3.1 Sub-Slab Depressurization System (SSDS)

EC inspections of the SSDS components shall include the following:

- Observe visible components (fan, vacuum alarm/monitor, vacuum gauge, tubing, riser pipe, etc.) for physical wear, damage and operational issues, and replace as necessary;
- Remove any blockages in vacuum monitor and gauge tubing and riser pipe taps;
- Verify operation of vacuum monitor by disconnecting tubing from riser pipe and noting if the building notification system goes into alarm mode;
- Verify operation of vacuum gauge by disconnecting tubing from riser pipe and noting if the indicator moves to zero (check high and low pressure ports to see if they are plugged correctly);
- Inspect riser pipe penetrations in concrete slab for proper seal;
- Inspect riser pipe connections at fan for leaks and tightness;
- Inspect condition of muffler (if installed) at end of outlet pipe; and
- Inspect power to fan by operating dedicated switch.

3.4 Inspection Reporting

EC inspections will be performed by a person with knowledge of the mechanical systems present in the building and familiar with the property. Inspection results will be reported to NYSDEC in a PRR.

3.5 Certifications

The results of the EC inspections will be certified at the time of the inspection and the signed certifications included in the PRR.

The Inspection Certification will certify whether:

- on-site ECs are unchanged from the previous certification;
- on-site ECs remain in-place and effective;
- on-site ECs are performing as designed; and
- anything has occurred that would impair the ability of the controls to protect public health and the environment.

4.0 EMERGENCY CONTACT NUMBERS

In the event of any emergency condition pertaining to any EC, the current Owner's representative(s) should contact the appropriate parties from the contact list below. Prompt contact should also be made to a Qualified Environmental Professional (QEP), as defined by NYSDEC. These emergency contact lists must be maintained in an easily accessible location at the Site.

Emergency Contact Numbers

Contact	Number
Medical, Fire and Police:	911
One Call Center:	(800) 272-4480 (3 day notice required for utility markout)
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
NYSDEC Spills Hotline	(800) 457-7362

Project Contact Numbers

Contact	Number
Matthew Carroll Tenen Environmental	(646) 606-2332

Appendix A

Sub-Slab Depressurization System

Appendix A-1

SSDS Design – As-Built

Appendix A-2

SSDS Operation – Routine Operating Procedures

Sub-Slab Depressurization System (SSDS)

Routine Operating Procedures

The long-term operation and maintenance program described below shall continue throughout the life cycle of the sub-slab depressurization system (SSDS) to ensure a proper working order. The long-term operation and maintenance program for the major SSDS components includes manufacturer's recommendations for the reinstallation of SSDS components if modifications to the existing system need to be made, inspection procedures, an operation schedule, typical routine maintenance activities and schedules, and troubleshooting. Refer to Section 3.3.3 for an overall inspection procedure of the SSDS.

The alarm system, described below, shall run continuously and only be disconnected for routine maintenance and inspection activities or replacement. The system includes the following:

- vacuum gauge/switch (Ashcroft pressure switch, watertight enclosure, product model B4-24-B-000-NEG50"H20
- building alarm system, activated through network interface device (NID) box

In case there is a need to relocate the vacuum gauge/switch, the new location shall ensure that the vacuum gauge/switch remains in close proximity to the riser pipe and is installed correctly. If the vacuum gauge is not indicating a vacuum while the SSDS is on, make sure that the tubing connected to the riser pipe is connected to the low pressure port. High pressure ports on the vacuum gauge/switch should be vented to atmosphere.

The vacuum gauge/switch does not require lubrication or periodic servicing. The vacuum gauge is not field serviceable and should be returned to the manufacturer or supplier if repair is needed. Repairs or alterations made to the vacuum gauge/switch by others will void the unit's warranty. The vacuum gauge/switch is factory calibrated and cannot be recalibrated in the field. The installation and operating instructions for the vacuum alarm/monitor have been included in Appendix A-3.

When testing the vacuum alarm/monitor, the tubing that connects the vacuum alarm/monitor to the riser pipe shall be disconnected and the low set point raised above the current reading. If the vacuum alarm/monitor is powered at the time of disconnecting the tubing from the riser pipe, the building system will go into alarm. The building system should go back on-line when the tubing is reconnected to the riser pipe. If the building system is in alarm when there is a vacuum present in the riser pipe, inspect the tubing and riser pipe tap to ensure that there are no blockages. If there is a blockage in either the tubing or the riser pipe tap, remove the blockage and retest the vacuum alarm/monitor.

Common troubleshooting tips that can be followed if the vacuum gauge/switch will not indicate a vacuum or is sluggish include the following:

- The pressure ports (high or low) are not hooked up correctly;
- The fittings or sensing lines are blocked, pinched or leaking;

- The cover is loose;
- The pressure sensor is improperly located;
- The ambient temperature is too low (below 20ºC).

The Industrial Plastic Fan direct-drive suction fan model 180 (CDD180) with a 1 horsepower Premium Efficiency BALDOR motor shall operate continuously and only be turned off for routine maintenance and inspection activities or replacement. The SSDS fan and motor shall not be left on the system piping without electrical power for more than 48 hours due to possible fan failure that could result from this non-operational storage. The SSDS fan unit does not require periodic servicing and should be returned to the manufacturer or supplier for service. Repairs or alterations made to the SSDS fan unit by others will void the unit's warranty. The installation and operating instructions for the SSDS fan unit have been included in Appendix A-4.

Appendix A-3

SSDS Vacuum Gauge and Switch – Installation and Operating Instructions

Appendix A-4

SSDS Fan and Motor – Installation and Operating Instructions

Appendix G
Exhaust Re-Routing Design

NEW YORK CITY BUILDING DEPARTMENT NOTES

SECTION A

1. ALL WORK SHALL COMPLY WITH THE APPLICABLE SECTIONS OF THE BUILDING CODE, NEW YORK CITY BUILDING CODE, AND ALL AMENDMENTS TO DATE, MATERIALS AND EQUIPMENT SUBJECT TO CONTROLLED INSPECTION.
2. MECHANICAL VENTILATION AIR CONDITIONING AND REFRIGERATION: INSPECTION AND TESTS OF THE REQUIRED VENTILATION SYSTEMS NEW YORK CITY BUILDING CODE 2008 VERSION
3. THE FOLLOWING WORK ITEMS, COMPONENTS, MATERIALS, CAPACITIES, ETC., SHALL COMPLY WITH THE FOLLOWING CODE REFERENCE.
   a. DUCT CONSTRUCTION AND SUPPLY INTAKES, EXHAUST AND RELIEFS FILTERS.
   b. NOISE CRITERIA LEVELS AND TEST PROCEDURE FOR SOUND POWER LEVELS.
   c. ELECTRIC WIRING EQUIPMENT, FIRE CONTROL AND CONTROLS MINIMUM TEMPERATURE TO BE MAINTAINED IN OCCUPIED SPACES DURING HEATING SEASON.
   d. 70 DEGREE F WHEN 5 DEGREE OUTSIDE (WITH 15 MPH WIND) OR AS INDICATED ON VENTILATION INDEX.
4. REFER TO ARCHITECTURAL DRAWING FOR FIRE RATED WALL LOCATIONS AND RATED CONSTRUCTION.
5. THE VENTILATION INDEX FOR ALL AREAS COMPLIES WITH THE MINIMUM CODE REQUIREMENTS. ALL CALCULATIONS OF THE VENTILATION INDEX ARE MADE WITHOUT TAKING ANY CREDIT FOR EXTERIOR WINDOWS AND/ OR OPENING IN AIR CONDITIONED AREAS.
6. UPON COMPLETION OF THIS VENTILATION SYSTEM, A TEST SHALL BE CONDUCTED IN THE PRESENCE OF AND DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR HAVING NOT LESS THAN FIVE (5) YEARS OF EXPERIENCE SUPERVISING INSTALLATION OF VENTILATING SYSTEMS. THE TEST SHALL SHOW COMPLIANCE WITH THE CODE REQUIREMENTS FOR VENTILATION AND THE PROPER FUNCTIONING OF ALL OPERATING DEVICES BEFORE THE SYSTEM IS APPROVED. THE LICENSED PROFESSIONAL ENGINEER OR REGISTERED ARCHITECT WHO CONDUCTS THE TESTS SHALL FILE A CERTIFICATE AS TO WHETHER THE SYSTEM COMPLIES WITH THE APPLICABLE LAWS. HE SHALL ALSO FILE WITH THE CERTIFICATION, A REPORT OF THE TEST. THE TEST AND REPORT SHALL BE MADE IN A MANNER SATISFACTORY TO THE SUPERINTENDENT. A STATEMENT SHALL BE FILED BY THE OWNER OR TENANT IN POSSESSION THAT THE SYSTEM WILL BE KEPT IN CONTINUOUS OPERATION AT ALL TIMES DURING NORMAL OCCUPANCY OF THE STRUCTURE AS PROVIDED IN THE APPLICABLE SECTIONS OF THE CODE. BASE BUILDING PLANS ARE FILED FOR SINGLE TENANT OCCUPANCY. ALL TENANT PLANS WILL BE FILED UNDER SEPARATE APPLICATIONS.
7. DETAIL OF DUCT SUPPORTS SHALL BE IN ACCORDANCE SMACNA 2002 EDITION UNLESS OTHERWISE NOTED, ALL DUCTS SHALL BE CONSTRUCTED OF GALVANIZED IRON. SEE DETAIL FOR METHOD USED FOR HANGING DUCT.
8. ALL VENTILATING AND HANGING DUCTWORK, BOTH HIGH AND LOW VELOCITY, TO BE CONSTRUCTED IN ACCORDANCE WITH THE DUCT MANUALS OF SMACNA, LATEST EDITION.
9. THE FOLLOWING WORK ITEMS, COMPONENTS, MATERIALS, CAPACITIES, ETC., TO COMPLY WITH THE FOLLOWING CODE REFERENCES:

SECTION B
CODES, REGULATIONS AND STANDARDS

a. ALL WORK SHALL COMPLY WITH THE REQUIREMENTS OF THE FOLLOWING CODES:
   1) FEDERAL, STATE AND LOCAL CODES HAVING JURISDICTION.
   2) NFPA-13, 90A.
   3) NATIONAL ELECTRIC CODE (N.E.C.) LATEST EDITION.
   4) NEW YORK CITY MECHANICAL CODE
   5) NEW YORK CITY FIRE CODE
   6) UNWRITERS LABORATORY (UL)
   7) NEW YORK STATE ENERGY CONSERVATION CODE (2010 ED.) (AS APPLICABLE)
   8) NEW YORK CITY MULTIPLE DWELLING LAW (AS APPLICABLE)
   9) NATIONAL FUEL GAS CODE (LATEST EDITION)
   10) NEW YORK CITY BUILDING CODE (2008 ED.)

HVAC DRAWING NOTES:

A. GENERAL

1. CONTRACTOR WILL BE HELD RESPONSIBLE TO HAVE VISITED AND EXAMINED THE PREMISES PRIOR TO SUBMITTING HIS PROPOSAL IN ORDER TO UNDERSTAND THE EXISTING CONDITIONS RELATED TO HIS WORK.
2. MATERIALS, DOCUMENTATION AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS, LOCAL CODES AND AS SPECIFIED.
3. DUCTWORK SHOWN IS DIAGRAMMATIC AND DOES NOT SHOW ALL OFFSETS, DROPS AND RISERS OF RUNS. CONTRACTOR SHALL ALLOW IN HIS PRICE THE ROUTING OF DUCTWORK AND PIPING TO AVOID OBSTRUCTIONS. EXACT RELOCATIONS ARE SUBJECT TO APPROVAL.
4. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK WILL BE NECESSARY FOR THE PERFORMANCE OF THE WORK. EXISTING CONDITIONS ARE NOT COMPLETELY DETAILED ON THE DRAWINGS. CONTRACTOR SHALL SURVEY THE SITE AND INCLUDE ALLOWANCE FOR SUCH REMOVALS AND RELOCATIONS.
5. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIALS, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW WORK.
6. FIREPROOFING AND INSULATION DISTURBED BY NEW CONSTRUCTION SHALL BE RESTORED TO ORIGINAL CONDITION.
7. SUPPORT ALL DUCTWORK FROM BUILDING STRUCTURE AND/OR FRAMING IN AN APPROVED MANNER. WHERE OVERHEAD CONSTRUCTION DOES NOT PERMIT FASTENING OF SUPPORTS FOR EQUIPMENT, FURNISH ADDITIONAL FRAMING.
8. SEAL OPENINGS AROUND DUCTS THROUGH PARTITIONS, WALLS AND FLOORS WITH MINERAL WOOL OR OTHER NON-COMBUSTIBLE MATERIAL.
9. EXACT LOCATIONS OF ALL WALL MOUNTED THERMOSTATS, SWITCHES, PANELS, ETC., SHALL BE SUBJECT TO ARCHITECT'S APPROVAL.
10. CONTRACTOR SHALL BALANCE ENTIRE SYSTEM TO CONFORM TO NEW AIR QUANTITIES SHOWN.
11. DUCTWORK SHALL CONFORM TO SMACNA STANDARDS EXCEPT A SNAP LOCK SEAM SHALL NOT BE PERMITTED AS A SUBSTITUTE FOR THE PITTSBURGH LOCK AT CORNERS OF DUCTS. DUCT LEAKAGE NOT TO EXCEED 5%.
12. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROLLED INSPECTION AS PART OF THIS CONTRACT. MECHANICAL CONTRACTOR SHALL PROVIDE THE NAME OF A LICENSED PROFESSIONAL ENGINEER TO ARCHITECT WHEN AWARDED CONTRACT.

B. EQUIPMENT

1. INVESTIGATE PATH THROUGH WHICH EQUIPMENT WILL BE MOVED. EQUIPMENT SHALL BE BROKEN DOWN IN SECTIONS AS NEEDED FOR MOVING THROUGH BUILDING SPACES.
2. ALL MECHANICAL EQUIPMENT SHALL BE INSTALLED IN FULL COMPLIANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
3. INSTALL EQUIPMENT AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS FROM DRAWINGS MAY BE REQUIRED TO ACCOMPLISH THIS.
4. CHANGES IN ARCHITECTURAL, STRUCTURAL, ELECTRICAL, MECHANICAL AND PLUMBING REQUIREMENTS FOR SUBSTITUTED EQUIPMENT SHALL BE THE RESPONSIBILITY OF THE BIDDER WISHING TO MAKE THE SUBSTITUTION. THIS SHALL INCLUDE THE COST OF ANY REDESIGN BY THE EFFECTED DESIGNERS.

VALVES AND GAUGES SYMBOL LIST

	GLOBE VALVE
	GATE VALVE
	CHECK VALVE
	AUTOMATIC THREE-WAY CONTROL VALVE
	AUTOMATIC TWO-WAY CONTROL VALVE
	RELIEF VALVE
	THERMOMETER
	PRESSURE GAUGE: GAUGE COCK
T	THERMOSTAT
	CONTROL VALVE STATION
MV	MIXING VALVE
BR	BAROMETRIC RELIEF
P	PRESSURE SENSOR
HWS	HOT WATER SUPPLY
HWR	HOT WATER RETURN
PD	PUMPED CONDENSATE RETURN
PD	PUMP DISCHARGE
- - - D - - -	DRAIN
CW	COLD WATER MAKE UP LINE
V	VENT LINE
	ARROW INDICATES DIRECTION OF FLOW
	UNION
	CAPPED PIPE WITH SHUT OFF VALVE
	STRAINER "Y" TYPE WITH BLOWDOWN VALVE
	STRAINER BASKET TYPE
	PIPE UP
	PIPE DOWN

APPLICABLE CODES AND STANDARDS

ALL WORK AS INDICATED ON PLANS MEET THE LATEST REQUIREMENTS OF THE NEW YORK STATE CODES AS ADOPTED LISTED BELOW.

NEW YORK STATE ENERGY CODE
NEW YORK CITY BUILDING CODE ADOPTED WITH THE LATEST AMENDMENDENT
NATIONAL ELECTRICAL CODE ADOPTED WITH TECHNICAL AMENDMENTS
NATIONAL STANDARD PLUMBING CODE ADOPTED WITH TECHNICAL AMENDMENTS
MODEL ENERGY CODE ASHRAE 90.1 ADOPTED WITH TECHNICAL AMENDMENTS
INTERNATIONAL FUEL GAS CODE ADOPTED WITH TECHNICAL AMENDMENTS

SPECIAL INSPECTIONS (NYC DOB TR-1 FORM)

THE FOLLOWING LISTED INSPECTIONS SHALL BE REQUIRED FOR FINAL SIGN OFF AND ACCEPTANCE:

MECHANICAL SYSTEMS	1704.15
FIRE STOP, DRAFT STOP, & FIRE BLOCK SYSTEMS	1704.25

ENERGY CODE PROGRESS INSPECTION (NYC DOB TR-8 FORM)

THE FOLLOWING LISTED INSPECTIONS SHALL BE REQUIRED FOR FINAL SIGN OFF AND ACCEPTANCE:

** HVAC AND SERVICE WATER HEATING EQUIPMENT
** DUCT PLENUM AND PIPING INSULATION AND SEALING
** MAINTENANCE INFORMATIONS

[** TABLE REFERENCE IN 1 RCNY §5000.01 (h) AND (2)]

NEW YORK STATE ENERGY COMPLIANCE NOTE

TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK STATE, AS ADOPTED BY NEW YORK CITY.

CONTROLLED INSPECTIONS

THE FOLLOWING CONTROLLED INSPECTIONS SHALL BE CONDUCTED, BUT NOT LIMITED TO THE FOLLOWING, AS DIRECTED BY THE NYC BUILDING DEPARTMENT:

1. MECHANICAL SYSTEMS
2. TR8 - ENERGY CODE:
   - AIR SEALING AND INSULATION - VISUAL
   - HVAC AND SERVICE WATER HEATING SYSTEM CONTROLS
   - DUCT PLENUM AND PIPING INSULATION AND SEALING

PROGRESS INSPECTION FOR ENERGY CODE COMPLIANCE

	INSPECTION/TEST	FREQUENCY	REFERENCE STANDARD	ECC OR OTHER CITATION
IIB3	HVAC AND SERVICE WATER HEATING EQUIPMENT: EQUIPMENT SIZING, EFFICIENCIES AND OTHER PERFORMANCE FACTOR OF ALL MAJOR EQUIPMENT UNITS, AS DETERMINED BY THE APPLICANT OF RECORD, AND NO LESS THAN 15% OF MINOR EQUIPMENT UNITS, SHALL BE VERIFIED BY VISUAL INSPECTION AND, WHERE NECESSARY, REVIEW OF MANUFACTURER'S DATA.	PRIOR TO FINAL PLUMBING AND CONSTRUCTION INSPECTION	APPROVED CONSTRUCTION DOCUMENTS; AMCA 500D	502.4.4; ASHRAE 90.1 - 6.4.3.4
IIB4	HVAC AND SERVICE WATER HEATING SYSTEM CONTROLS: NO LESS THAN 20% OF EACH TYPE OF REQUIRED CONTROLS AND ECONOMIZERS SHALL BE VERIFIED BY VISUAL INSPECTIONS AND TESTED FOR FUNCTIONALITY AND PROPER OPERATION. SUCH CONTROLS SHALL INCLUDE, BUT ARE NOT LIMITED TO: THERMOSTATIC, SET POINT OVERLAP RESTRICTION, OFF-HOUR, SHUTOFF DAMPER, SNOW MELT SYSTEM, DEMAND CONTROL SYSTEMS, OUTDOOR HEATING SYSTEMS, ZONES, ECONOMIZERS, AIR SYSTEMS, VARIABLE AIR VOLUME FAN, HYDRONIC SYSTEMS, HEAT REJECTIONS EQUIPMENT FAN SPEED, COMPLEX MECHANICAL SYSTEM SERVING MULTIPLE ZONES, VENTILATION, ENERGY RECOVERY SYSTEMS, HOT GAS BYPASS LIMITATION, TEMPERATURE, SERVICE WATER HEATING, HOT WATER SYSTEM, POOL HEATER AND TIME SWITCHES, EXHAUST HOODS, RADIANT HEATING SYSTEMS.	AFTER INSTALLATION	APPROVED CONSTRUCTION DOCUMENTS, INCLUDING CONTROL SYSTEM NARRATIVES, ASHRAE GUIDELINE 1: THE HVAC COMISSIONING PROCESS WHERE APPLICABLE	503.2.4, 503.2.5.1, 503.2.11, 503.3.503.4, 504.3, 504.6, 504.7, ASHRAE 90.1-6.3, 6.4, 6.5, 6.7.2.4, 7.4.4, 7.4.5.
IIB5	DUCT PLENUM AND PIPING INSULATION AND SEALING: INSTALLED DUCT AND PIPING INSULATION SHALL BE VISUALLY INSPECTED TO VERIFY PROPER INSULATIONS PLACEMENT AND VALUES.	AFTER INSTALLATION	APPROVED CONSTRUCTION DOCUMENTS, SMACNA DUCT CONSTRUCTION STANDARDS, METAL AND FLEXIBLE	503.2.7. 503.2.8, 504.5, ASHRAE 90.1 - 6.3, 6.4.4.2, 6.8.2, 6.8.3, 7.4.3.
IID1	MAINTENANCE INFORMATION: MAINTENANCE MANUALS FOR MECHANICAL, SERVICE HOT WATER AND ELECTRICAL EQUIPMENT AND SYSTEMS REQUIRING PREVENTIVE MAINTENANCE SHALL BE REVIEWED FOR APPLICABILITY TO INSTALLED EQUIPMENT AND SYSTEMS BEFORE SUCH MANUALS ARE PROVIDED TO THE OWNER. LABEL REQUIRED FOR SUCH EQUIPMENT OR SYSTEM SHALL BE INSPECTED FOR ACCURACY AND COMPLETENESS	PRIOT TO SIGN-OFF OR ISSUANCE OF FINAL CERTIFICATE OF OCCUPANCY	APPROVED CONSTRUCTION DOCUMENTS.	303.3, 503.2.9.3; ASHRAE 90.1 - 4.2.2.3, 6.7.2.2, 8.7.2.

SPECIAL INSPECTION (TR-1)

Y	N	PROGRESS INSPECTIONS	CODE SECTION
X		MECHANICAL SYSTEMS	BC 1704.16
	X	MECHANICAL DEMOLITION	BC 1704.19 BC 3306.6
	X	HEATING SYSTEMS	BC 1704.25
	X	CHIMNEYS	BC 1704.26
X		FIRESTOP, DRAFTSTOP, AND FIREBLOCK SYSTEMS	BC 1704.27
		PROGRESS INSPECTION (TR-1)	
Y	N	PROGRESS INSPECTIONS	TABLE REFERENCE IN 1RCNY5000-01(H)(1)AND(2)
X		ENERGY CODE COMPLIANCE INSPECTIONS	BC 110.3.5
	X	FIRE-RESISTANCE RATED CONSTRUCTION	BC 109.3.4
	X	FINAL	28-116.2.4.2, BC 109.5 DIR14 OF 1975,1RCNY101-10

REFER TO NYC DOB PAPERWORK FOR ALL RE□UIRED SIGN OFF RE□UIRED FILED.

ENERGY CODE PROGRESS INSPECTION (TR-8)

Y	N	PROGRESS INSPECTIONS	TABLE REFERENCE IN 1RCNY5000-01(H)(1)AND(2)	
	X	INSULATION PLACEMENT AND R VALUES	(IA2)	(IIA2)
	X	FENESTRATION THERMAL VALUES AND RATINGS	(IA3)	(IIA3)
	X	FENESTRATION RATINGS FOR AIR LEAKAGE	(IA4)	(IIA4)
X		AIR SEALING AND INSULATION - VISUAL	(IA6)	(IIA6)
	X	AIR SEALING AND INSULATION - TESTING	(IA7)	
	X	SHUT OFF DAMPERS	(IB2)	(IIB2)
X		HVAC AND SERVICE WATER HEATING EQUIPMENT	(IB3)	(IIB3)
	X	HVAC AND SERVICE WATER HEATING SYSTEM CONTROLS	(IB4)	(IIB4)
X		DUCT PLENUM AND PIPING INSULATION AND SEALING	(IB5)	(IIB5)
X		MAINTENANCE INFORMATION	(ID1)	(IID1)

LIGHTING COMCHECK REPORT HAS BEEN SUBMITTED FOR REVIEW AND APPROVAL UNDER ARCHITECTURAL DRAWING SET.

SCOPE OF WORK

PROVIDE ALL LABOR, MATERIALS, EQUIPMENT AND CONTRACTOR'S SERVICES NECESSARY FOR A COMPLETE SAFE INSTALLATION OF ALL WORK INDICATED IN CONTRACT DOCUMENTS.

CONTRACTOR SHALL EXTEND EXISTING ROUND 12"Ø (ESTIMATED) DRYER EXHAUST DUCT TO TERMINATE ON ROOF LEVEL AS INDICATED WITH INLINE EXHAUST FAN. FIELD VERIFY ROUND DUCT SIZE IN FIELD AND POINT OF CONNECTION OF NEW EXHAUST FAN WITH FIELD CONDITIONS PRESENT.

IN FULL CONFORMITY WITH REQUIREMENTS OF BUILDING CODES AND OF ALL AUTHORITIES HAVING JURISDICTION, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

1. SECURE CERTIFICATES, PAY ALL FEES AND CHARGES FOR ALL WORK INSTALLED CERTIFYING COMPLIANCE WITH THE LATEST BUILDING CODE OF NEW YORK CITY AND GOVERNING AUTHORITIES. DELIVER CERTIFICATES TO OWNER BEFORE FINAL BILLING.
2. NEW LOW PRESSURE DUCTWORK AND ACCESSORIES
3. LOW VOLTAGE CONTROLS
4. EXHAUST FANS AND CONTROLLERS
5. ANY RELATED DIFFUSERS, REGISTERS AND GRILLES.
6. INSULATION AND ACOUSTICAL LINING.
7. VIBRATION ISOLATION FOR ALL EQUIPMENT
8. MOTORS, STARTERS AND MISCELLANEOUS ELECTRICAL EQUIPMENT
9. SHOP DRAWINGS AND RECORD DRAWINGS.
10. FILING, FILING FEES, OBTAINING APPROVALS AND PERMITS INCLUDING SPECIAL INSPECTIONS AS REQUIRED.
11. COMPLETE AUTOMATIC CONTROL SYSTEMS FOR UNIT.
12. TESTING AND BALANCING OF SYSTEMS AND FURNISHING BALANCING REPORT.
13. STORING AND PROTECTION OF EQUIPMENT AND/OR APPURTENANCES SPECIFIED HEREIN.
14. CUTTING AND ROUGH PATCHING REQUIRED FOR THE WORK OF THIS TRADE.
15. PIPE HANGERS, VALVES, VIBRATION ISOLATION.
16. DRY CLEANING EXHAUST, BREECHING, FLUE AND ACCESSORIES

SUBMISSION OF A PROPOSAL SHALL BE CONSTRUED AS EVIDENCE, THAT A CAREFUL EXAMINATION OF THE PORTIONS OF THE EXISTING BUILDING, EQUIPMENT, ETC. WHICH AFFECT THIS WORK, AND THE ACCESS TO SUCH SPACE HAS BEEN MADE, AND THAT THE CONTRACTOR IS FAMILIAR WITH EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT THE EXECUTION OF THE WORK. CLAIMS WILL NOT BE ALLOWED FOR LABOR, EQUIPMENT OF MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN DURING SUCH AN EXAMINATION

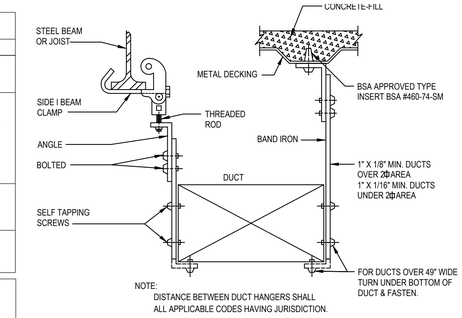
EXHAUST FAN SCHEDULE

UNIT NO.	ROOMS SERVED	CFM	S.P. (IN. WG.)	RPM	ELECTRICAL DATA			OPERATING WEIGHT	MFR.	MODEL	REMARKS
					WATTS	AMPS	V/PH/Hz				
DX-1	COMMERCIAL DRYER EXHAUST	800	.60	2900	301	3.01	115/1/60	75	AMERICAN ALDES	A-12HP	WIRED AND INTERLOCKED WITH COMMERCIAL DRY CLEANING MACHINE

NOTES:
1. FIELD VERIFY DUCT CONNECTION SIZE WITH FIELD CONDITIONS PRESENT PRIRO TO PURCHASE OF OF FAN.
2. TYPICAL FANS SHALL BE PROVIDED WITH SPEED CONTROLLER AND INDIVIDUAL SWITCHES. PROVIDE WITH VARI GREEN MOTORS
3. EXHAUST FANS SHALL BE PROVIDED WITH BACK DRAFT DAMPERS OR APPROVED EQUAL.

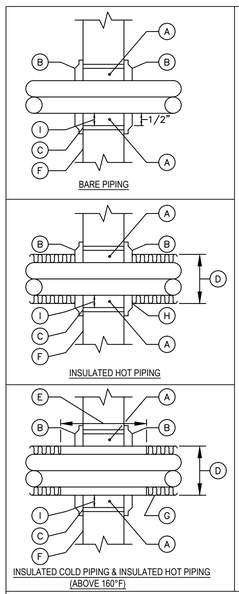
GENERAL MECHANICAL NOTES

1. ALL WORK SHALL BE PERFORMED IN A CLEAN AND WORKMANLIKE MANNER. CARE SHALL BE EXERCISED TO MINIMIZE ANY INCONVENIENCE OR DISTURBANCE TO OTHER AREAS OF THE BUILDING WHICH ARE TO REMAIN IN OPERATION. ISOLATE WORK AREAS BY MEANS OF TEMPORARY PARTITIONS AND/OR TARPS TO KEEP DUST AND DIRT WITHIN THE CONSTRUCTION AREA.
2. ALL ITEMS REMOVED SHALL BECOME PROPERTY OF THE OWNER AND SHALL BE DISPOSED OF AS PER THE OWNER'S INSTRUCTIONS, UNLESS INDICATED OTHERWISE. ALL ITEMS WHICH ARE NOT TO BE STORED ON SITE BY OWNERS SHALL BE REMOVED FROM THE BUILDING IMMEDIATELY.
3. THIS CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS PRIOR TO PROCEEDING WITH ANY WORK. WHERE DISCREPANCIES OCCUR BETWEEN THESE DOCUMENTS AND EXISTING CONDITIONS, THE DISCREPANCY SHALL BE REPORTED TO THE OWNER AND/OR ENGINEER FOR EXPEDITING AND RESOLVE. SUBMISSION OF PROPOSAL DIRECTLY OR INDIRECTLY IN CONNECTION WITH THIS WORK SHALL IMPLY THAT THE BIDDER HAS EXAMINED THE JOB SITE UNDER WHICH HE WILL BE OBLIGATED TO OPERATE SHOULD HE BE AWARDED THE WORK UNDER THIS CONTRACT. NO EXTRA CHARGE WILL BE ALLOWED FOR FAILURE OF ANY BIDDER TO EXAMINE THE SITE PRIOR TO BID.
4. CLEAN THE JOB SITE DAILY AND REMOVE FROM THE PREMISES ANY DIRT AND DEBRIS CAUSED BY THE PERFORMANCE OF THE WORK INCLUDED IN THIS CONTRACT.
5. USE OF THE BUILDING CORRIDORS FOR FOR HANDLING OF THE OWNER AND REMOVED EQUIPMENT AND MATERIALS SHALL BE AT THE DIRECTION OF THE OWNER AND SHALL BE COORDINATED WITH HIS OPERATIONS.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFEKEEPING OF HIS OWN PROPERTY ON THE JOB SITE. OWNER ASSUMES NO RESPONSIBILITY FOR PROTECTION OF PROPERTIES AGAINST FIRE, THEFT, AND ENVIRONMENTAL CONDITIONS.
7. PROVIDE ALL NECESSARY TEMPORARY OR PERMANENT CAPS OR PLUGS FOR PIPING. DO NOT LEAVE PIPING OPEN ENDED.
8. THIS CONTRACTOR SHALL COORDINATE HIS WORK WITH ALL OTHER TRADES TO FABRICATION, PURCHASE, AND/OR INSTALLATION OF ALL WORK.
9. ALL WORK SHALL CONFORM TO ALL STATE AND LOCAL CODES, RULES AND REGULATIONS AND ORDINANCES.
10. CONTRACTOR SHALL SECURE AND PAY ALL FEES AND PERMITS PERTAINING TO THE CONTRACT.
11. ALL EQUIPMENT SHALL BE INSTALLED IN STRICT COMPLIANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS. THE CONTRACTOR SHALL PROVIDE ALL HANGERS AND SUPPORTS REQUIRED FOR A COMPLETE INSTALLATION.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR WORKMEN'S IDENTIFICATION AND BADGING, SAFETY AND FIRE PROTECTION, CONTRACTOR'S LIABILITY INSURANCE, BARRICADES, WARNING SIGNS, TRASH REMOVAL, CUTTING AND PATCHING.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL RIGGING, HANDLING, AND PROTECTION OF ALL MATERIALS.
14. MECHANICAL CONTRACTOR SHALL SUPPLY ALL DISCONNECT SWITCHES AND MOTOR STARTERS. ALL DISCONNECT SWITCHES AND MOTOR STARTERS TO BE INSTALLED OUTSIDE SHALL COME WITH A NEMA 4X ENCLOSURE.



METHOD OF HANGING DUCTWORK

NOT TO SCALE



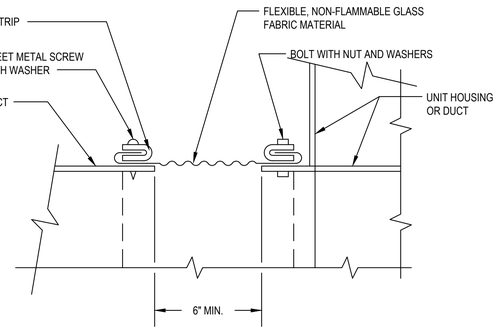
(A) PACK ALL SPACES FULL DEPTH W/MINERAL WOOL OR OTHER EQUALLY APPROVED FIRE RESISTIVE MATERIAL. (ASBESTOS OR FIBERGLASS SHALL NOT BE USED)

FIRE RESISTANT FOAM SEALANT CHASE FOAM CTC P2-655(N.Y.C. MEA 58-79 M1 & 11) MAY BE USED. INSTALLATION AS PER MANUFACTURER.

(B) ESCUTCHEON BOTH SIDES.
(C) SLEEVE
(D) INSULATION (OUTSIDE DIAMETER)
(E) ANHYDROUS CALCIUM SILICATE INSULATION THRU SLEEVE.
(F) FIRE RATED PARTITION, WALL OR FLOOR.
(G) FIBERGLASS INSULATION
(H) TERMINATE INSULATION AT ESCUTCHEON
(I) MAXIMUM 1/2" CLEARANCE BETWEEN INSIDE OF SLEEVE & PIPE.

DETAIL OF PIPING PIERCING FIRE RATED PARTITIONS, WALLS & FLOORS.

NOT TO SCALE



FLEXIBLE CONNECTION

NOT TO SCALE

NEW YORK CITY BUILDING DEPARTMENT APPROVAL NOTE:

THIS PLAN IS APPROVED ONLY FOR WORK INDICATED ON THE APPLICATION SPECIFICATION SHEET. ALL OTHER MATTERS SHOWN ARE NOT TO BE RELIED UPON, OR TO BE CONSIDERED AS EITHER BEING APPROVED OR IN ACCORDANCE WITH APPLICABLE CODES.

PROPOSED REPAIR AND RENOVATION FOR:

BEC NEW COMMUNITIES HDFC, INC

VERNON P. BUFFALO ASSOCIATES,L.P.
19 PATCHEN AVENUE
BROOKLYN, NEW YORK

BLOCK: 1386 LOT: 68

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT RD.
SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

DEVELOPER:
BEC NEW COMMUNITIES, HDFC, INC
67 HANSON PLACE
BROOKLYN, N.Y. 10017
Tel.

MEP ENGINEER:
WW ENGINEERING PLLC
922 72ND STREET Brooklyn, NY11228 (F)
917-446-0926
wing@wwengineeringpllc.com

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
1-30-17	ISSUED FOR DOB REVIEW & COMMENT

SHEET TITLE:
MECHANICAL GENERAL NOTES, SCHEDULES AND INSTALLATION DETAILS

SEAL & SIGNATURE

ISSUE DATE: 01/30/17	PROJECT NO: 2016_19_PATCHEN
DRAWN BY: W. WONG	CHECKED BY: W. WONG
SCALE: AS NOTED	SHEET NO: 1 OF 3

DRAWING NO: M-100.00

NYC DOB NUMBER:

GENERAL MECHANICAL INSTALLATION SPECIFICATIONS

1. GENERAL CONDITIONS

   A. THE APPLICABLE PROVISIONS OF THE GENERAL CONSTRUCTION SPECIFICATIONS SHALL APPLY TO THE FOLLOWING SPECIFICATION ARTICLES.

   B. CONTRACTOR TO ADHERE TO ALL BUILDING STANDARDS AND BUILDING CONSTRUCTION SPECIFICATIONS AND DETAILS.

2. NOTICE TO BIDDERS

   A. THE SPECIFICATIONS AND DRAWINGS ARE INTENDED TO SERVE JOINTLY AS A BASIS UPON WHICH THE CONTRACTOR SHALL SUBMIT A CONTRACT PRICE FOR THE MATERIAL AND LABOR PROVISIONS.

   B. WHEN CONFLICTS OCCUR IN THE SPECIFICATIONS OR IN THE DRAWINGS, OR BETWEEN EITHER, THE ITEMS OF GREATER QUANTITY OR HIGHER COST SHALL BE PROVIDED.

   C. THE CONTRACTOR SHALL PROVIDE ALL ITEMS OF LABOR OR MATERIALS NOT SPECIFICALLY INDICATED, BUT REQUIRED TO COMPLETE THE INTENDED INSTALLATIONS.

   D. THE CONTRACTOR SHALL COORDINATE HIS WORK OR ADJUST SAME TO THAT OF OTHER TRADES, IN ORDER THAT CONFLICTS IN SPACE LOCATIONS DO NOT OCCUR.

   E. THE WORK UNDER THIS CONTRACT SHALL BE PERFORMED SIMULTANEOUSLY WITH THE WORK OF OTHER TRADES, SO AS NOT TO DELAY THE OVERALL PROGRESS OF WORK.

   F. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR HIS WORK WITH IT'S COMPLETION AND FINAL ACCEPTANCE AND SHALL REPLACE ANY OF THE SAME WHICH MAY BE DAMAGED, LOST OR STOLEN, WITHOUT ADDITIONAL COST TO THE OWNER.

   G. ALL DUCTWORK AND PIPING IS SHOWN DIAGRAMMATICAL AND DOES NOT SHOW ALL OFFSETS, DROPS AND RISES OF RUNS. THE CONTRACTOR SHALL ALSO ALLOW IN HIS PRICE FOR REMOVAL AND REROUTING OF NEW AND EXISTING DUCTWORK AND PIPING TO AVOID OBSTRUCTIONS. EXACT LOCATIONS SUBJECT TO APPROVAL OF ARCHITECT. MAINTAIN MAXIMUM PIPE AND DUCT ELEVATIONS.

   H. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK WILL BE NECESSARY FOR THE PERFORMANCE OF THE GENERAL WORK. ALL EXISTING CONDITIONS CANNOT BE COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL SURVEY THE SITE AND INCLUDE ALL CHANGES IN MAKING UP THE WORK PROPOSAL.

   I. SUBMISSION OF A PROPOSAL SHALL BE CONSTRUED AS EVIDENCE THAT A CAREFUL EXAMINATION OF THE PORTIONS OF THE EXISTING BUILDING EQUIPMENT, ETC., WHICH AFFECT THIS WORK AND THE ACCESS TO SUCH SPACES HAS BEEN MADE AND THAT THE CONTRACTOR IS FAMILIAR WITH EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT THE EXECUTION OF THE WORK. LATER CLAIMS SHALL NOT BE MADE FOR LABOR, EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN DURING SUCH AN EXAMINATION.

3. OPERATING AND MAINTENANCE INSTRUCTIONS

   A. AFTER FINAL TEST AND ADJUSTMENTS FULLY INSTRUCT OWNER'S OPERATING PERSONNEL IN ALL DETAILS OF OPERATION FOR EQUIPMENT INSTALLED. A SIGNED RECEIPT WHICH SHALL BE OBTAINED FROM THE OPERATOR SHALL BE CONSTRUED AS EVIDENCE THAT INSTRUCTIONS WERE SATISFACTORY.

   B. FURNISH TWO (2) COPIES OF WRITTEN DESCRIPTIONS OF ALL SYSTEMS COVERING ALL MANUAL OPERATING PROCEDURES, AUTOMATIC CONTROL DESCRIPTIONS AND AUTOMATIC CONTROL TEMPERATURE AND PRESSURE SETTINGS. WRITTEN DESCRIPTIONS SHALL INCLUDE LUBRICATION SCHEDULES, PARTS LIST, PERFORMANCE SERVICE FOR EQUIPMENT, FILTER SIZE/QUANTITY SCHEDULE, ETC. WHEN MANUFACTURERS' STANDARD INSTRUCTIONS ARE UTILIZED, THEY SHALL BE CLEARLY MARKED IN INDICATE APPLICABILITY.

4. SHOP DRAWINGS AND EQUIPMENT SUBMISSIONS

   A. PRIOR TO SHIPMENT OF EQUIPMENT OR START OF INSTALLATION OF SYSTEM COMPONENTS, SUBMIT THE FOLLOWING FOR APPROVAL:

      1) A MINIMUM OF FOUR (4) SETS OF DETAILED CONSTRUCTION SHOP DRAWINGS FOR DUCTWORK LAYOUT, PIPING LAYOUT, EQUIPMENT AND SYSTEMS. DRAWINGS SHALL INDICATE ALL DIMENSIONS, MATERIALS OF CONSTRUCTION AND METHODS OF ASSEMBLY.

      2) EQUIPMENT SUBMITTALS FOR ALL EQUIPMENT, ASSOCIATED DEVICES AND MATERIALS INDICATING CAPACITIES AND PERFORMANCE DATA.

      3) SHEET METAL SHOP DRAWINGS SHALL BE AT A MINIMUM OF 3/8" = 1'-0" SCALE. THESE SHOP DRAWINGS SHALL BE USED AS THE COORDINATION DRAWINGS FOR ALL TRADES.

      4) IN LETTER FORM, MANUFACTURER'S NAMES FOR ACCESSORIES AND INCIDENTALS NOT COVERED BY SHOP DRAWINGS.

      5) ELECTRIC WIRING DIAGRAMS AND AUTOMATIC CONTROL DIAGRAMS AND SEQUENCE OF OPERATION. THE WIRING DIAGRAMS MUST BE COMPLETE AND COORDINATED WITH THE EQUIPMENT ACTUALLY INSTALLED.

5. RECORD DRAWING

   A. REPRODUCIBLE RECORD DRAWINGS SHALL BE SUPPLIED UPON WHICH CORRECTIONS SHALL BE MADE TO PROVIDE AN ACCURATE AND COMPLETE RECORD OF THE WORK AS INSTALLED.

6. APPROVALS AND SUBSTITUTIONS

   A. IT IS THE INTENT OF THESE SPECIFICATIONS THAT WHEREVER A MANUFACTURER IS SPECIFIED AND SUBSTITUTIONS ARE MADE, THEY SHALL CONFORM IN ALL RESPECTS TO THE SPECIFIED ITEM. CRITERIA AS DELINEATED FOR EQUIPMENT SHALL BE INTERPRETED AS MINIMUM PERFORMANCE REQUIREMENTS.

   B. BASE ALL BIDS ON THE EQUIPMENT AND MANUFACTURERS LISTED. IF SUBSTITUTION IS PROPOSED, MAKE APPLICATION TO THE OWNER IN WRITING STATING THE COST DIFFERENTIAL INVOLVED.

7. PERFORMANCE TESTS

   A. UPON COMPLETION OF THE INSTALLATION, TEST AND BALANCE ALL EQUIPMENT AND SYSTEMS UNDER FIELD OPERATING CONDITIONS TO DEMONSTRATE IT'S COMPLIANCE WITH SPECIFICATION REQUIREMENTS.

   B. SHOULD ANY PART OF THE SYSTEM FAIL TO MEET THE CONTRACT REQUIREMENTS, ADJUST, REPAIR OR REPLACE ALL DEFECTIVE OR INOPERATIVE PARTS AND AGAIN CONDUCT THE COMPLETE PERFORMANCE TEST.

   C. SUBMIT TEST RESULTS TO THE OWNER AND ENGINEER.

8. TESTING, ADJUSTMENTS AND BALANCING

   A. AIR SYSTEM BALANCING SHALL BE PERFORMED BY AN INDEPENDENT CERTIFIED TESTING AND BALANCING FIRM WITH A MINIMUM OF FIVE YEARS' EXPERIENCE. SUBMIT EVIDENCE OF QUALIFICATIONS.

   B. MAKE ALL REQUIRED ADJUSTMENTS OF AIR SYSTEM DEVICES UNTIL ALL SPECIFIED PERFORMANCES ARE MET. PROVIDE VOLUME DAMPERS AS REQUIRED FOR FINAL BALANCING OF AIR SYSTEMS.

   C. BALANCE ALL SUPPLY, RETURN FRESH AIR INTAKE AND EXHAUST DUCTWORK TO THE QUANTITIES INDICATED ON THE DRAWINGS WITH FOLLOWING TOLERANCES:

      1) FANS – DESIGN VOLUME PLUS 5%.

      2) LEAKAGE – 5% MAXIMUM.

      3) OUTLETS – DESIGN VOLUME PLUS 5%.

   D. WHEN BALANCING AIR CONDITIONING SYSTEMS AND FANS, CONTRACTOR WILL FURNISH AND INSTALL THE REQUIRED PULLEYS, SHEAVES AND BELTS TO OBTAIN THE DESIGN AIR QUANTITIES AND OPERATING STATIC PRESSURE.

9. VERIFYING EXISTING CONDITIONS, REMOVALS AND ALTERATION

   A. THE CONTRACTOR SHALL VISIT THE PREMISES TO DETERMINE EXISTING CONDITIONS AND COMPARE SAME WITH DRAWINGS AND SPECIFICATIONS AND SATISFY HIMSELF OF ALL CONDITIONS PRIOR TO THE SUBMISSION OF A BID PROPOSAL. NO ALLOWANCES WILL BE MADE FOR THE FAILURE TO COMPLY WITH THESE REQUIREMENTS AND A BID PROPOSAL SHALL BE CONSTRUED AS EVIDENCE HE HAS DONE SO.

10. CODES, PERMITS AND INSPECTIONS

   A. ALL WORK SHALL MEET OR EXCEED LATEST REQUIREMENT OF NATIONAL, STATE, COUNTY, MUNICIPAL AND OTHER AUTHORITIES EXERCISING JURISDICTION OF THE WORK OF THIS PROJECT.

   B. ANY PORTION OF THE WORK WHICH IS NOT SUBJECT TO APPROVAL OF AN AUTHORITY HAVING JURISDICTION SHALL BE PROVIDED IN ACCORDANCE WITH NATIONAL FIRE PROTECTION ASSOCIATION REQUIREMENTS.

   C. COMPLY WITH APPLICABLE UTILITY COMPANY RULES AND REGULATIONS.

   D. COMPLY WITH OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA) REQUIREMENTS.

   E. SECURE PERMITS AND INSPECTION CERTIFICATES AND TRANSMIT SAME TO THE OWNER AT THE COMPLETION OF THE WORK.

11. CODE APPROVAL

   A. UPON COMPLETION OF THIS VENTILATING SYSTEM, A TEST SHALL BE CONDUCTED IN THE PRESENCE AND UNDER THE DIRECTION OF A LICENSED AND PROFESSIONAL ENGINEER OR REGISTERED ARCHITECT BEFORE THE SYSTEM IS APPROVED.

   B. THE LICENSED PROFESSIONAL ENGINEER OR REGISTERED ARCHITECT WHO CONDUCTS THE TEST SHALL CERTIFY THAT THE SYSTEM COMPLIES WITH APPLICABLE LAWS. HE SHALL ALSO FILE WITH THIS CERTIFICATION A REPORT OF THE TEST. THE TEST AND REPORT SHALL BE MADE IN A MANNER SATISFACTORY TO THE SUPERINTENDENT.

   C. A STATEMENT SHALL BE FILED BY THE OWNER THAT THE SYSTEM OF VENTILATION WILL BE KEPT IN CONTINUOUS OPERATION AT ALL TIMES DURING NORMAL OCCUPANCY OF THE STRUCTURE THAT'S PROVIDED IN THE APPLICABLE SECTIONS OF THE CODE.

   D. ALL FIRE DAMPERS SHALL BE TYPE APPROVED BY THE BOARD OF STANDARDS AND APPEALS.

   E. VENTILATION SYSTEM INSTALLED WILL COMPLY WITH RULES OF THE DEPARTMENT OF THE BUILDING IN EFFECT.

12. GUARANTEE AND SERVICE

   A. THE CONTRACTOR SHALL GUARANTEE AND SERVICE THE ENTIRE INSTALLATION FOR A PERIOD OF ONE YEAR FROM THE DATE OF THE FINAL ACCEPTANCE OF THE INSTALLATION.

   B. THE CONTRACTOR SHALL, DURING THE PERIOD OF THE GUARANTEE, REPLACE OR REPAIR AT HIS OWN EXPENSE ANY PIECE OF EQUIPMENT AND/OR MATERIAL WHICH IS FOUND TO BE DEFECTIVE. THE REPLACEMENT OR REPAIR SHALL BE PERFORMED THE SAME DAY OF NOTIFICATION IN AN EMERGENCY FASHION WHEN NOTIFIED BY THE OWNER OR AUTHORIZED REPRESENTATIVE. THE CONTRACTOR SHALL ALSO REPAIR ALL DAMAGE TO SURROUNDING WORK CAUSED BY THE FAILURE, REPAIR OR REPLACEMENT OF DEFECTIVE EQUIPMENT.

   C. ALL REFRIGERATION COMPRESSORS SHALL HAVE A FACTORY GUARANTEE INCLUDING PARTS AND LABOR FOR FIVE YEARS TOTAL.

   D. THE FINAL ACCEPTANCE WILL BE MADE AFTER THE CONTRACTOR HAS ADJUSTED HIS EQUIPMENT, BALANCED THE VARIOUS SYSTEMS, DEMONSTRATED THAT IT FULFILLS THE REQUIREMENT OF THE DRAWINGS AND SPECIFICATIONS, AND HAS FURNISHED ALL THE REQUIRED CERTIFICATES OF INSPECTION AND APPROVALS.

13. WORK INCLUDED UNDER OTHER SECTIONS OF WORK

   A. ITEMS OF WORK WHICH SHALL BE INCLUDED UNDER OTHER SECTIONS OF WORK ARE AS FOLLOWS:

      1) REPAIR OF FIREPROOFING DAMAGED DURING THE INSTALLATION OF HANGERS FOR DUCTWORK AND PIPING.

      2) PROVISION OF ELECTRICAL DISCONNECT SWITCHES OR FUSES.

      3) ELECTRICAL WIRING FOR POWER, AUTOMATIC, SAFETY AND INTERLOCKING CONTROLS.

      4) PROVISION OF DUCT MOUNTED SMOKE DETECTORS (TO BE FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR).

      5) FINISH PAINTING OF EQUIPMENT (EXCEPT FACTORY SUPPLIED AND SPECIFIED).

      6) CONCRETE FOUNDATIONS, BASES OR CURBS.

14. SHEET METAL DUCTWORK

   A. ALL DUCTWORK, DAMPERS AND ALL AUXILIARY DEVICES AND WORK NECESSARY TO MAKE THE VARIOUS AIR CONDITIONING AND VENTILATING SYSTEMS COMPLETE AND READY FOR SATISFACTORY OPERATION SHALL BE FURNISHED AND INSTALLED.

   B. ALL LOW PRESSURE DUCTS SHALL BE GALVANIZED STEEL (24 GAUGE MINIMUM), EXCEPT WHERE OTHERWISE SPECIFIED, WITH GAUGES, BRACING AND CONSTRUCTION IN ACCORDANCE WITH THE LATEST SMACNA DUCT MANUAL STANDARDS. DRIVE SLIPS AND SNAP LOCK CONNECTIONS ARE NOT PERMITTED. TOTAL AIR VOLUME FOR LOW PRESSURE DUCT SYSTEMS SHALL BE AT LEAST 95% OF FAN SUPPLY WHEN MEASURED BY DUCT TRAVERSES TAKEN WITH A PITOT TUBE AND WATER MANOMETER.

   C. ALL LOW PRESSURE SUPPLY, RETURN AND EXHAUST DUCTWORK SHALL BE FABRICATED IN ACCORDANCE WITH SMACNA STANDARDS FOR 2" WG CONSTRUCTION.

   D. PROVIDE MANUAL DAMPERS IN EACH SPLIT OR TAP CONNECTION TO TRUNK DUCTS FOR BALANCING PURPOSES, EACH PROVIDED WITH OPERATOR AND LOCKING DEVICE. INSTALL DIVERTING VANES AT BRANCHES CONNECTED INTO THE MAIN WITHOUT A NECK.

   E. PROVIDE FUSIBLE LINK FIRE DAMPERS AT LOCATIONS SHOWN ON DRAWINGS AND WHERE NECESSARY TO COMPLY WITH LOCAL OR OTHER AGENCIES OR JURISDICTIONS REQUIRING THEIR INSTALLATIONS AND IN COMPLIANCE WITH THEIR CONSTRUCTION REQUIREMENTS. FUSIBLE LINK FIRE DAMPERS SHALL BE AS MANUFACTURED BY RUSKIN MFG. CO., MODEL NO. 1BD2, TYPE "B" (BSA 292-72-SA) OR APPROVED EQUAL. FUSIBLE LINK DAMPERS SHALL BE UL RATED STEEL CURTAIN TYPE WITH RECESSED FRAMES.

   F. PROVIDE HANGERS AND FASTENINGS ADEQUATE TO INSURE PERMANENT STABILITY AND IN COMPLIANCE WITH LOCAL CODE REQUIREMENTS. WHERE REQUIRED, PROVIDE SUPPLEMENTARY STEEL ANGLES OR CHANNELS. DO NOT HANG OR SUPPORT ONE DUCT FROM ANOTHER.

   G. ALL 90 DEGREE ELBOWS ARE TO BE FULL RADIUS THROAT AND HEEL. IF SQUARE ELBOW IS USED DUE TO LIMITED SPACE, TURNING VANES, DOUBLE AIRFOIL TYPE WILL BE USED. ALL TRANSITIONS, OFFSETS, DROPS OR RAISES ARE TO HAVE RADIUS TYPE LAYOUT. NO SHARP ANGLED FITTINGS (MORE THAN 15 DEGREES) SHALL BE USED.

   H. DUCTWORK LAYOUTS AND ROUTES AS SHOWN ON THE DRAWING ARE SCHEMATIC; THEREFORE, CHANGES IN DUCT SIZES AND/OR LOCATIONS SHALL BE MADE WHERE NECESSARY TO CONFORM TO SPACE CONDITIONS OR OBTAIN MAXIMUM HEADROOM CONDITIONS WITHOUT ADDITIONAL COST TO THE OWNER.

   I. AIR DIFFUSERS AND GRILLES SHALL BE LOCATED IN CONFORMANCE TO ARCHITECTURAL REFLECTED CEILING PLANS, WHERE SO INDICATED.

   J. WHERE DUCTS ARE REQUIRED TO BE REMOVED, ALL OPENINGS IN REMAINING DUCTS SHALL BE CAPPED AIRTIGHT.

   K. WHERE DUCTS ARE SHOWN TO BE ACOUSTICALLY LINED, THE SIZES SHOWN ON THE PLANS SHALL BE THE CLEAR INSIDE DIMENSIONS WHEN LINING IS TO BE PROVIDED.

   L. ALL LOW PRESSURE DUCTWORK WITH A STATIC PRESSURE OF 2 INCHES WATER GAUGE OR LESS SHALL BE SEALED WITH DUCT SEALANT TO MAINTAIN A LEAKAGE RATE OF NO GREATER THAN 5 PERCENT OF AIR VOLUME. APPLY DUCT SEALANT TO ALL TRANSVERSE SEAMS AND JOINTS.

   M. WHERE THE TRADE ELECTS TO USE "DUCT-MATE" FOR JOINTS OR SIMILAR PRODUCT, PVC CLIPS ARE NOT PERMITTED (USE METAL) AND ALL CORNERS SHALL BE BOLTED (BOLTLESS CONNECTORS ARE NOT PERMITTED) EXCEPT WHERE LOCAL CODES PERMIT DUCT-MATE JOINTS AS BREAKAWAY CONNECTION AT FIRE DAMPERS. ONLY GASKETS MANUFACTURED BY DUCT-MATE ARE ACCEPTABLE.

   N. WHERE SHOWN ON DRAWINGS AND UNLESS OTHERWISE SPECIFIED, OUTDOOR LOUVERS TO BE PROVIDED AS MANUFACTURED BY ARROW LOUVER AND DAMPER CO. OR CONSTRUCTION SPECIALTIES. LOUVERS SHALL BE AN EXTRUDED ALUMINUM STRUCTURE WITH AN ANODIZED ALUMINUM MILL FINISH OR FINISH AS SPECIFIED BY THE BUILDING MANAGEMENT. LOUVERS ARE ALSO TO BE PROVIDED WITH 1/2" WIRE MESH ALUMINUM BIRD SCREENS. ALL LOUVER SECTIONS NOT IN USE SHALL BE BLANKED-OFF WITH AN INSULATED SHEET METAL PANEL.

   O. AUTOMATIC DAMPERS REQUIRING MODULATING CONTROL SHALL BE RUSKIN DAMPER CO., MODEL CD60 OPPOSED BLADE DAMPER. DAMPER BLADES TO BE CONSTRUCTED OF 14 GAUGE GALVANIZED STEEL. BLADES TO BE ROLLED FORMED AIR FOIL TYPE ENGINEERED FOR MINIMUM AIR LEAKAGE WITH RUSKIPRENE SEALS FITTED INTO MECHANICALLY LOCKED GROOVE INSERTS IN BLADE EDGE. JAMB SEALS SHALL BE FLEXIBLE METAL, COMPRESSION TYPE TO PREVENT LEAKAGE BETWEEN BLADE DAMPER AND FRAME. DAMPER BLADE BEARINGS SHALL BE OF STAINLESS STEEL SLEEVE. DAMPERS SHALL BE CERTIFIED THAT LEAKAGE SHALL NOT EXCEED 1% WITH THE DAMPER CLOSED AND HOLDING 5" W.G. PRESSURE ACROSS THE FACE.

15. GRILLES, REGISTERS AND DIFFUSERS – GENERAL

   A. FURNISH AND INSTALL ALL METAL DIFFUSERS, GRILLES AND REGISTERS AS INDICATED ON DRAWINGS. ALL SIZES, AIR DISTRIBUTION PATTERNS AND AIR VOLUME CAPACITIES SHALL BE AS SPECIFIED ON THE DRAWINGS.

   B. AIR SUPPLY REGISTERS SHALL BE PROVIDED WITH ADJUSTABLE FACE LOUVERS PARALLEL TO THE LONG DIMENSION. PROVIDE KEY OPERATED OPPOSED BLADE DAMPERS FIXEDLY ATTACHED TO THE GRILLES.

   C. AIR RETURN GRILLES AND REGISTERS SHALL BE PROVIDED WITH FIXED FACE LOUVERS PARALLEL TO THE LONG DIMENSION AND SET AT 45 DEGREE ANGLE. FOR REGISTERS, PROVIDE KEY OPERATED OPPOSED BLADE DAMPERS FIXEDLY ATTACHED TO THE GRILLES.

   D. ALL AIR OUTLETS SHALL BE STEEL AND SHALL BE FACTORY PAINTED WITH ACRYLIC WHITE ENAMEL PAINT FINISH OR OTHER COLOR AS DIRECTED BY ARCHITECT.

   E. ALL CEILING TYPE AIR DIFFUSERS SHALL BE PROVIDED WITH EQUALIZING DEFLECTOR AND VOLUME DAMPERS.

   F. WHERE INDICATED ON DRAWINGS, REGISTERS INDICATED AS UNDERWRITERS' APPROVED SHALL BE FURNISHED WITH A FUSIBLE LINK SELF-CLOSING REGISTER HAVING FUSIBLE LINK APPROVED BY UNDERWRITERS' LABORATORIES.

   G. A SCHEDULE OF DIFFUSERS, GRILLES AND REGISTERS WITH MANUFACTURERS' MODELS, SIZES, ACCESSORIES, FINISHES, ETC., SHALL BE SUBMITTED FOR APPROVAL PRIOR TO RELEASE FOR FABRICATION AND DELIVERY.

16. INSULATION REQUIREMENTS

   A. INSULATION SHALL BE APPLIED TO DUCTWORK OF MATERIALS AS SPECIFIED HEREIN AND FOR APPLICABLE SYSTEMS OF THIS PROJECT.

   B. INSULATION SHALL BE CONTINUOUS THROUGH WALL AND SLAB OPENINGS.

   C. INSULATION OF COLD SURFACES WHERE VAPOR BARRIER JACKETS ARE SPECIFIED SHALL BE APPLIED WITH AN UNBROKEN VAPOR SEAL. HANGERS AND SUPPORTS THAT ARE SECURED TO COLD SURFACES SHALL BE ADEQUATELY INSULATED TO PREVENT CONDENSATION.

   D. WHERE INSULATION IS SPECIFIED FOR PIPING, INSULATE SIMILARLY ALL CONNECTIONS, VENTS, DRAINS, FLANGES, FITTINGS, VALVES, TANKS, PUMP CASINGS AND OTHER PARTS OF THE SYSTEM SUBJECT TO HEAT GAIN OR LOSS AND TO PREVENT CONDENSATION.

   E. NOTE THAT EQUIPMENT CASINGS, WHICH ARE INTERNALLY AND ACOUSTICALLY INSULATED, NEED NOT BE INSULATED IN THE EXTERIOR. ACOUSTIC LINED SUPPLY DUCTWORK SHALL BE INSULATED EXTERNALLY IN ADDITION TO ACOUSTIC LINING.

   F. DUCTWORK INSULATION

      1) ALL NEW AND EXISTING SHEET METAL SUPPLY DUCTWORK SHALL BE INSULATED WITH 1-1/2" THICK FLEXIBLE DUCT INSULATION, 0.75 LB/CU.FT. DENSITY WITH A MAX. K FACTOR OF .30 AT 75° MEAN TEMPERATURE, WITH REINFORCED FOIL FACED, FLAME RESISTANT, ALUMINUM FOIL VAPOR BARRIER. INSULATION AND FACING WILL HAVE A COMBINED FLAME SPREAD RATING NO GREATER THAN 25 AND SMOKE DEVELOPED RATING NOT EXCEEDING 50. ALL INSULATION SHALL BE SECURED WITH DUCT ADHESIVE AND SEEMS SEALED BY TWO-INCH SEALING LIP WITH ADHESIVE AND FASTENED WITH 16 GAUGE RUST RESISTANT WIRE OR FIBERGLASS CORD ON 12" CENTERS. ON DUCTS OVER 24" WIDE, WELDED PINS AND CLIPS SHALL BE USED ON THE UNDERSIDE FOR FASTENING INSULATION.

      2) FRESH AIR INTAKE, MIXED AIR DUCTWORK AND LOUVER BLANK-OFF PANELS SHALL BE INSULATED WITH RIGID DUCT INSULATION 4.2 LBS/CU.FT. DENSITY WITH A MAX. K FACTOR OF .24 AT 75 DEGREE MEAN TEMPERATURE WITH WHITE VINYL FOIL BARRIER FACING. INSULATION AND FACING WILL HAVE A COMBINED FLAME SPREAD RATING NO GREATER THAN 25 AND SMOKE DEVELOPED RATING NOT EXCEEDING 50. INSULATION SHALL BE IMPALED OVER WELDED PINS WITH CLIPS FIRMLY EMBEDDED INTO INSULATION. ALL JOINTS AND CLIPS SHALL BE SEALED WITH MATCHING STRIPS OF VINYL COATED VAPOR BARRIER LAMINATE SIMILAR TO OWENS CORNING 24 ASJ FOR DUCTS.

   G. PIPING INSULATION

      1) CONDENSATE DRAIN PIPING SHALL BE INSULATED WITH 1" THICK MOLDED GLASS FIBER WITH A MAXIMUM K FACTOR OF .24 AT 75 DEGREE F MEAN TEMPERATURE AND FACTORY APPLIED VAPOR BARRIER JACKET. INSULATION AND JACKET WILL HAVE A COMBINED FLAME SPREAD RATING NO GREATER THAN 25 AND SMOKE DEVELOPED RATING NOT EXCEEDING 50.

      2) ALL PIPING INSULATION TO BE INSTALLED WITH LONGITUDINAL LAP AND VAPOR BARRIER JOINT SEAL STRIPS WITH ADHESIVE OR SELF-SEALING LAPS. FITTINGS AND VALVES SHALL BE INSULATED WITH MOLDED FITTINGS MITERED SEGMENTS OR COMPRESSED BLANKET INSULATION. ALL EXPOSED PIPING SHALL HAVE FACTORY ATTACHED PRE-SIZED GLASS CLOTH COVERED VAPOR BARRIER JACKET. EXPOSED PIPE FITTINGS SHALL BE FINISH WITH OPEN WEAVE FABRIC AND TWO COATS OF VAPOR BARRIER COATING.

      3) FITTINGS AND VALVES SHALL BE INSULATED WITH SEGMENTS OF THE MOLDED INSULATION OR MOLDED FIBERGLASS FITTINGS WIRED SECURELY IN PLACE. FLANGES SHALL BE INSULATED WITH SECTIONAL PIPE INSULATION EXTENDING A MINIMUM OF 1" BEYOND THE END OF THE BOLTS. BOLT AREA TO BE FILLED WITH MINERAL WOOD CEMENT. THICKNESS OF FITTINGS, VALVE AND FLANGE INSULATION SHALL BE SAME AS ADJOINING PIPE INSULATION. CONCEALED FITTINGS, ETC., MAY BE INSULATED WITH 1 LB. FIBERGLASS BLANKET WRAPPED FIRMLY UNDER COMPRESSION, 2 TO 1 AND SECURED WITH COPPER-CLAD WIRE.

      4) INSULATION PIPE HANGER SHIELD SHALL BE INSTALLED AT HANGERS FOR INSULATED PIPING. SHIELD LENGTH AND MINIMUM SHEET METAL GAUGE SHALL CONFORM TO THE FOLLOWING SCHEDULE:

PIPE SIZE	SHIELD LENGTH	MINIMUM GAUGE
1/2" TO 1-1/2"	4"	16
2" TO 6"	6"	20

   H. ACOUSTICAL TREATMENT

      1) FURNISH AND INSTALL ACOUSTICAL LINING IN DUCTWORK PLENUMS AND CASINGS AS SHOWN ON THE DRAWINGS AND AS SPECIFIED HEREIN.

      2) ACOUSTICAL LINING WILL BE AS MANUFACTURED BY OWENS CORNING. FIBERGLASS DUCT LINER WILL BE A 1-1/2 LBS. PER CU.FT. DENSITY SEMI-RIGID GLASS FIBER BOARD WITH BINDER COAT ON AIR SIDE, MAXIMUM K FACTOR OF 0.24 AT 75 DEGREES F MINIMUM FOR USE AT AIR VELOCITIES UP TO 6000 FPM. ACOUSTICAL LINING WILL HAVE A FLAME SPREAD RATING NO GREATER THAN 25 AND SMOKE DEVELOPED RATING NOT EXCEEDING 50. BINDER COAT TO BE BLACK FOR DETECTION OF DAMAGE TO BINDER SURFACE.

      3) INSTALL LINER IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. COMPLETELY COVER ALL PORTIONS OF DUCTWORK PLENUMS AND CASINGS WITH APPROVED ADHESIVE. INSTALL LINER WITH ALL TRAVERSE JOINTS NEATLY BUTTED WITH NO INTERRUPTIONS OR GAPS. COVER ALL EXPOSED EDGES, JOINTS, MECHANICAL FASTENERS AND ANY DAMAGED AREAS WITH ADHESIVE. ADDITIONALLY, SECURE LINER WITH APPROVED MECHANICAL FASTENERS INSTALLED IN ACCORDANCE WITH SMACNA DUCT LINER APPLICATION STANDARD.

      4) ALL AIR CONDITIONING SUPPLY AIR DUCTWORK SHALL BE ACOUSTICALLY LINED FOR A MINIMUM DISTANCE OF 15 FEET DOWNSTREAM OF A FAN DISCHARGE WITH A MINIMUM OF ONE-INCH THICK ACOUSTICAL LINING.

      5) ALL RETURN/EXHAUST FANS SHALL BE ACOUSTICALLY LINED FOR A MINIMUM DISTANCE OF 15 FEET OF THE FAN'S INTAKE AND DISCHARGE OPENINGS WITH A MINIMUM OF ONE INCH THICK ACOUSTICAL LINING.

17. ELECTRICAL WIRING AND WIRING DIAGRAMS

   A. ELECTRICAL WIRING FOR POWER, AUTOMATIC TEMPERATURE, SAFETY AND INTERLOCKING CONTROLS FOR MOTORS, MOTOR STARTER AND OTHER ELECTRICAL APPARATUS AND DEVICES SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR UNDER ANOTHER DIVISION OF CONTRACT WORK.

   B. THE MECHANICAL CONTRACTOR SHALL PREPARE AND SUBMIT FOR APPROVAL TERMINAL POINT TO TERMINAL POINT, COMPLETELY COORDINATED AND INTEGRATED WIRING DIAGRAMS FOR ALL WIRING REQUIRING FIELD INSTALLATIONS BY THE ELECTRICAL CONTRACTOR, AS A SUBCONTRACT TO THE MECHANICAL CONTRACTOR.

   C. SPECIFIC WIRING DIAGRAMS OF FACTORY INSTALLED EQUIPMENT WIRING SHALL ALSO BE SUBMITTED FOR APPROVAL AND FURNISHED TO THE ELECTRICAL CONTRACTOR FOR HIS INSTALLATION REQUIREMENTS AND OTHER USES.

18. MOTOR STARTERS AND CONTROL DEVICES

   A. FURNISH TO THE ELECTRICAL CONTRACTOR WHO SHALL ERECT AND WIRE SUITABLE STARTING AND CONTROL EQUIPMENT FOR ALL MOTORS.

   B. MOTOR STARTERS SHALL BE CUTLER HAMMER, WESTINGHOUSE OR ALLEN BRADLEY MANUFACTURER, SUITABLE FOR WALL OR ANGLE IRON FRAME MOUNTING.

   C. GENERAL NOTES:

      1) ALL STARTERS FOR MOTORS LESS THAN 1/2 HP SHALL BE 120 VOLT, SINGLE PHASE, 60 CYCLE, A.C. SERVICE. MANUAL STARTERS WITH OVERLOAD PROTECTION AND LOCKOUT TYPE DISCONNECT SWITCH OR BREAKER MAY BE USED TO CONTROL SUCH MOTORS, EXCEPT WHERE INTERLOCKS OR AUTOMATIC CONTROLS ARE REQUIRED. IN SUCH CASES, MAGNETIC ACROSS-THE-LINE STARTERS SHALL BE FURNISHED.

      2) ALL COILS, CORES, RESISTANCE, INSULATION CONTACTS, TRIPPERS, ETC., OF STARTERS AND RELAYS SHALL BE OF THE APPROVED TYPE. ALL PARTS SUBJECT TO WEAR, ARCING, ETC., SHALL BE RENEWABLE.

      3) ALL WIRING, STARTERS, SWITCHES, ETC., SHALL BE IN FULL ACCORDANCE WITH ALL LOCAL AND INSURANCE UNDERWRITERS' CODE REQUIREMENTS.

      4) FURNISH DETAILED COMPOSITE WIRING DIAGRAMS FOR THOSE INSTALLING ELECTRICAL WORK, AND FURNISH SUCH OTHER INFORMATION NECESSARY TO INSURE THE PROPER CONNECTION, OPERATION AND CONTROL OF MOTORIZED EQUIPMENT, INCLUDING INTERLOCKS, AUTOMATIC OR SAFETY CONTROLS AND AUXILIARY CIRCUITS.

19. VIBRATION ISOLATION SYSTEMS

   A. ALL ROTATING, REVOLVING OR RECIPROCATING EQUIPMENT, INCLUDING PIPING CONNECTIONS TO THIS EQUIPMENT SHALL BE FURNISHED WITH SPRING-TYPE VIBRATION ISOLATORS, TO PREVENT THE TRANSMISSION OF OBJECTIONAL NOISES, SOUND OR VIBRATIONS TO THE OCCUPIED SPACES AND TO THE BUILDING STRUCTURES. STAINLESS STEEL BRAIDED FLEXIBLE HOSE CONNECTORS SHALL BE INSTALLED AT INLET AND DISCHARGE CONNECTIONS TO ALL PUMPS. SPRING-TYPE HANGERS SHALL BE PROVIDED FOR PIPING FOR A DISTANCE OF 20 FEET UP AND DOWNSTREAM OF ALL SUCH EQUIPMENT.

   B. VIBRATION ISOLATORS FOR FLOOR OR CEILING SUPPORTED EQUIPMENT SHALL HAVE A MAXIMUM LATERAL MOTION UNDER EQUIPMENT START-UP OR SHUT-DOWN CONDITIONS OF 1/4". MOTIONS IN EXCESS SHALL BE RESTRAINED BY SPRING TYPE MOUNTINGS.

   C. CEILING-HUNG FANS AND EQUIPMENT:

      1) PROVIDE SPRING HANGER ROD ISOLATORS. STEEL COMPRESSION SPRING AND NEOPRENE SOUND PAD WITHIN A STEEL RETAINER BOX. SIMILAR TO MASON INDUSTRIES, INC., TYPE SLF, SLR, OR PCHS.

      2) ONE (1) IN. MINIMUM STATIC DEFLECTION, 1/2 IN. MINIMUM RESERVE DEFLECTION, FACTORY-PRELOADED TO 75% OF A RATED LOAD.

      3) PROVIDE SUPPLEMENTAL STEEL AS REQUIRED WHERE EQUIPMENT OR STRUCTURE CANNOT SUPPORT POINT LOADS.

   D. FLOOR MOUNTED EQUIPMENT HAVING INTERNAL ISOLATION:

      1) PROVIDE 3/4 IN. THICK NEOPRENE ACOUSTICAL BASE PADS OF WAFFLE CONSTRUCTION. SIMILAR TO MASON INDUSTRIES INC. TYPE SUPER W PADS.

      2) 50 PSI MAXIMUM LOADING. PROVIDE STEEL BEARING PLATE TO DISTRIBUTE LOAD WHERE REQUIRED.

      3) ALL FLOOR MOUNTED EQUIPMENT SHALL BE ERECTED ON 4" STEEL REINFORCED CONCRETE PADS OVER THE COMPLETE FLOOR AREA OF THE EQUIPMENT, UNLESS INDICATED TO THE CONTRARY ON THE DRAWINGS.

      4) VIBRATION ISOLATOR SHALL BE PROVIDED BY EITHER OF THE FOLLOWING MANUFACTURERS:

         A) MASON INDUSTRIES
         B) VIBRATION ELIMINATOR CO.
         C) CONSOLIDATED KINETICS CO.

20. PIPING INSTALLATIONS AND REQUIREMENTS

   A. FURNISH AND INSTALL PIPING WHICH IS SCHEMATICALLY INDICATED AND SIZED ON DRAWINGS. PIPING TO BE INSTALLED TO MEET SPECIFIED HEADROOM OR FIELD CONDITIONS. PIPING SHALL CONFORM TO LATEST ASME CODES FOR PRESSURE PIPING.

   B. PROVIDE PROPER PROVISION FOR EXPANSION AND CONTRACTION IN PIPE WORK TO PREVENT UNDUE STRAINS ON PIPING OR APPARATUS CONNECTED.

   C. FURNISH AND INSTALL PIPING HANGERS, SUPPORTS, ANCHORS AND GUIDES HAVING A BUILT-IN SAFETY FACTOR OF FIVE (5); IN CONFORMANCE TO THE LATEST ANSI B31.9 CODE FOR PRESSURE PIPING AND MSS STANDARD PRACTICE SP-58 AND SP-69. ALL HANGER SPECIFICATIONS SHALL BE FURNISHED WITH ZINC CHROMATE PRIME PAINT FINISH.

   D. SUPPORT HANGERS FROM BUILDING STEEL FRAMING WITH APPROVED TYPE CLAMP INSERT. PROVIDE ADDITIONAL STEEL SUPPORTS BETWEEN EXISTING FRAMING MEMBERS AS REQUIRED. ALL PIPE HANGING RODS, INSERTS AND CLAMPS SHALL BE U.L. APPROVED FOR THEIR RESPECTIVE USES. DO NOT HANG PIPING FROM OTHER PIPING.

   E. PROVIDE PIPE HANGERS WITH SHIELDS ON ALL INSULATED PIPING.

   F. UNLESS OTHERWISE SPECIFICALLY APPROVED, HANGER SIZE AND SPACING SHALL BE AS FOLLOWS:

      COPPER TUBING

PIPE SIZES	MAXIMUM HANGER SPACING	MINIMUM ROD SIZES
1/2" TO 1-1/4"	6 FT. O.C.	3/8"

      THE ABOVE HANGER SPACINGS APPLY TO STRAIGHT RUNS OF PIPE ONLY. AT POINTS WHERE VALVES, SPECIALTIES OR BRANCH CONNECTIONS ARE LOCATED, ADDITIONAL HANGERS OR SUPPORTS SHALL BE USED TO PROPERLY SUPPORT THE LOAD.

21. SLEEVES AND ESCUTCHEONS FOR PIPING

   A. PIPE PENETRATIONS THROUGH MASONRY/CONCRETE WALLS, FLOORS, ROOF CONSTRUCTION AND FRAMED PARTITIONS SHALL HAVE A TRIM OPENING CUT NOT GREATER THAN NECESSARY FOR THE INSTALLATION OF A SLEEVE SECURED THEREIN. THE SPACE BETWEEN THE PIPE AND ITS SLEEVE SHALL NOT EXCEED ONE-HALF INCH.

   B. SLEEVES SHALL BE FLUSH WITH THE FINISHED WALL OR PARTITION SURFACE.

   C. ANNULAR SPACES BETWEEN PIPING AND SLEEVES OR CORE DRILLED FLOOR OPENINGS SHALL BE PACKED WITH MINERAL WOOL AND SEALED TO RETAIN THE FIRE INTEGRITY OF THE WALLS, PARTITIONS AND FLOORS WITH A NON-HARDENING COMPOUND SIMILAR TO DUXSEAL AS MANUFACTURED BY THE J.M. CLIPPER CORPORATION.

   D. SLEEVES FOR PIPING THROUGH MASONRY WALL SHALL BE SCHEDULE 40, STANDARD GALVANIZED STEEL PIPE; IN FRAMED PARTITIONS SHALL BE 18 GAUGE SHEET METAL. THE SPACE BETWEEN THE PIPE AND ITS SLEEVE SHALL NOT EXCEED ONE-HALF (1/2) INCH.THE SLEEVE SHALL BE FLUSH WITH THE FINISHED WALL SURFACES.

   E. PIPING IN EXPOSED AREAS, PASSING THROUGH WALLS, FLOORS OR CEILINGS SHALL BE FITTED WITH CHROMIUM-PLATED CAST BRASS ESCUTCHEONS WITH FASTENING SET SCREWS.

22. PIPING MATERIALS AND FITTINGS

   A. PIPING MATERIALS AND FITTINGS SHALL BE PROVIDED IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

SERVICE	PIPING MATERIAL	FITTINGS
CONDENSATE DRAIN COPPER LINES B16.18	HARD TEMPER COPPER TYPE "L" ASTM B-88	WROUGHT SOLDER ANSI

END OF SPECIFICATION

NEW YORK CITY BUILDING DEPARTMENT APPROVAL NOTE:
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PROPOSED REPAIR AND RENOVATION FOR:
BEC NEW COMMUNITIES HDFC, INC
VERNON P. BUFFALO ASSOCIATES,L.P.
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BROOKLYN, NEW YORK
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DEVELOPER:
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DATE	SUBMISSIONS / REVISIONS
1-30-17	ISSUED FOR DOB REVIEW & COMMENT

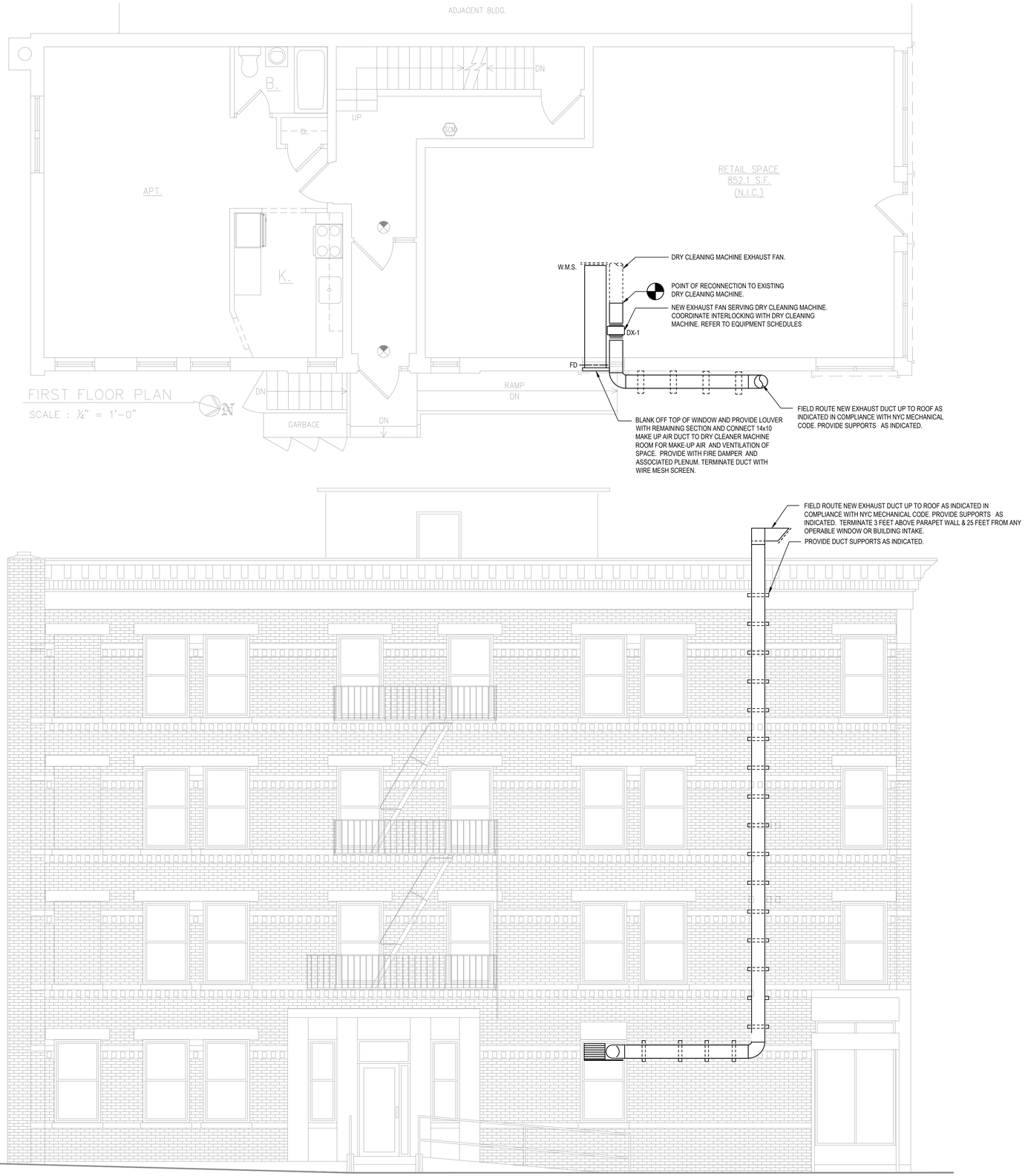
SHEET TITLE:
GENERAL MECHANICAL SPECIFICATIONS

SEAL & SIGNATURE

ISSUE DATE:	PROJECT NO:
01/30/17	2016_19_PATCHEN
DRAWN BY:	CHECKED BY:
W. WONG	W. WONG
SCALE:	SHEET NO:
AS NOTED	2 OF 3

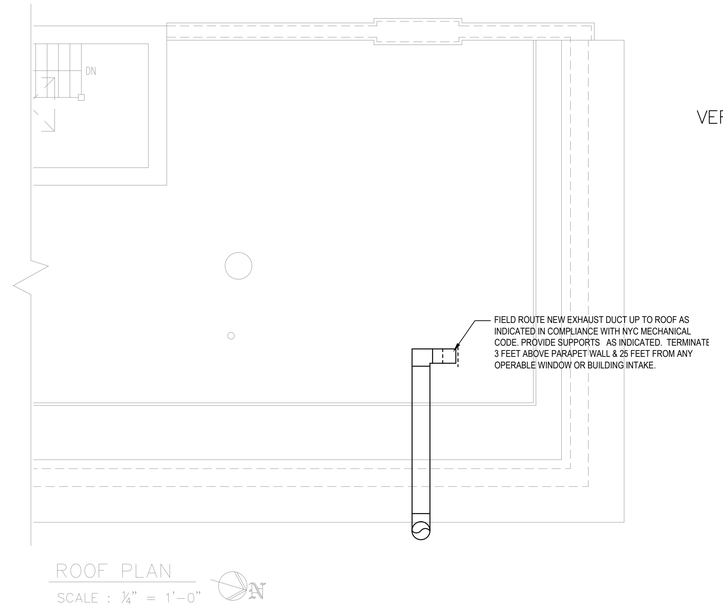
DRAWING NO: M-101.00

NYC DOB NUMBER:



FIRST FLOOR PLAN
SCALE : ¼" = 1'-0"

A
A-200
VAN BUREN ST. ELEVATION
SCALE : ⅛" = 1'-0"



ROOF PLAN
SCALE : ¼" = 1'-0"

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AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
1-30-17	ISSUED FOR DOB REVIEW & COMMEN

SHEET TITLE:
1ST FLOOR, ROOF, AND ELEVATION PART PLANS

SEAL & SIGNATURE

ISSUE DATE:	PROJECT NO:
01/30/17	2016_19_PATCHE
DRAWN BY: W. WONG	CHECKED BY: W. WONG
SCALE: AS NOTED	SHEET NO: 3 OF 3

DRAWING NO: M-102.00

NYC DOB NUMBER: